APPENDIX A
METES AND BOUNDS

SCHEDULE "A"
ENVIRONMENTAL EASEMENT
PROPERTY DESCRIPTION

Joseph Nicoletti Associates
Professional Land Surveyors, P.C.
499 JERICHO TURNPIKE, SUITE 201
MINEOLA, NY 11501

LEGAL AND ENVIRONMENTAL EASEMENT DESCRIPTION FOR SITE #C203056

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF THE BRONX, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTHERLY SIDE OF EAST 138th STREET DISTANT 100 FEET WESTERLY FROM THE CORNER FORMED BY THE INTERSECTION OF THE NORTHERLY SIDE OF EAST 138th STREET WITH THE WESTERLY SIDE OF ALEXANDER AVENUE;

RUNNING THENCE WESTERLY ALONG THE NORTHERLY SIDE OF EAST 138th STREET, 393.22 FEET TO AN ANGLE POINT THEREON:

THENCE STILL WESTERLY ALONG THE NORTHERLY SIDE OF EAST 138th STREET ON A LINE WHICH FORMS AN INTERIOR ANGLE OF 164 DEGREES 26 MINUTES 20 SECONDS WITH THE PRECEDING COURSE, 58.94 FEET TO THE CORNER FORMED BY THE INTERSECTION OF THE NORTHERLY SIDE OF EAST 138th STREET WITH EASTERLY SIDE OF 3rd AVENUE;

THENCE NORTHERLY ALONG THE EASTERLY SIDE OF 3rd AVENUE, ON A LINE WHICH FORMS AN INTERIOR ANGLE OF 105 DEGREES 33 MINUTES 40 SECONDS WITH THE PRECEDING COURSE, 27.96 FEET TO AN ANGLE THEREIN;

THENCE NORTHEASTERLY ALONG THE SOUTHEASTERLY SIDE OF 3rd AVENUE ON A LINE WHICH FORMS AN INTERIOR ANGLE OF 156 DEGREES 32 MINUTES 10 SECONDS WITH THE PRECEDING COURSE, 170.31 FEET TO THE CORNER FORMED BY THE INTERSECTION OF THE SOUTHEASTERLY SIDE OF 3rd AVENUE WITH THE SOUTHERLY SIDE OF EAST 139th STREET;

THENCE EASTERLY ALONG THE SOUTHERLY SIDE OF EAST 139th STREET ON A LINE WHICH FORMS AN INTERIOR ANGLE OF 113 DEGREES 27 MINUTES 50 SECONDS, 332.19 FEET;

THENCE SOUTHERLY AT RIGHT ANGLES TO THE SOUTHERLY SIDE OF EAST 139th STREET, 100 FEET;

THENCE EASTERLY AT RIGHT ANGLES TO THE PRECEDING COURSE, 50 FEET;

THENCE SOUTHERLY AT RIGHT ANGLES TO THE PRECEDING COURSE, 100 FEET TO THE NORTHERLY SIDE OF EAST 138th STREET AT THE POINT OR PLACE OF BEGINNING.

BEING THE SAME PIECE OR PARCEL OF LAND CONVEYED TO BORINQUEN COURT ASSOCIATES, L.P., FROM WEST SIDE FEDERATION FOR SENIOR AND SUPPORTIVE HOUSING, INC., BY DEED DATED JUNE 13, 2012 RECORDED JUNE 22, 2012 IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK AS CRFN: 2012000247165

APPENDIX B
ENVIRONMENTAL EASEMENT

New York State Department of Environmental Conservation
Office of General Counsel, 14th Floor
625 Broadway, Albany, New York 12233-1500
Fax: (518) 402-9018 or (518) 402-9019
Website: www.dec.ny.gov

Joe Martens
Commissioner

November 26, 2013

Benjamin Crespi
WSFSSH
Senior Project Manager
2345 Broadway
New York, NY 10024

Re: Site No. C203056
Borinquen Court Environmental Easement

Dear Mr Crespi,

Enclosed please find an originally-executed Environmental Easement covering the above – referenced property, which was accepted by the Department. Please have the easement, original survey and the enclosed TP 584 form recorded in the City of New York Register's Office, in the manner prescribed by New York State Property Law Article 9 and Environmental Conservation Law Article 71, Title 36. Once the Environmental Easement is recorded, the local municipality will need to be notified as well as the Notice to any parties identified as having an interest in the property, as set forth in Schedule "B" of the Title Commitment.

Please return a copy of the recorded easement marked by the New York City Register's Office with the date and location of recording, executed title affidavits (if applicable), a certified copy of the municipal notice, copy of easement notice for any interested parties along with proof of service and recording on the same noted in the final title insurance policy to my attention. The information from the recorded easement, full size survey and recorded notices are necessary to process the Certificate of Completion. However, be advised that failure to receive the additional documents requested above within thirty days of the filing of the easement may result in revocation of Certificate of Completion.

If you have any questions, or if you need further assistance with this matter, do not hesitate to contact me.

Very truly yours,

Yvonne Ward
Senior Attorney

Enclosure: Environmental Easement
TP 584/RPT

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 26th day of November, 2013, between Owner(s) BORINQUEN COURT ASSOCIATES, L.P., a New York limited partnership, having an office at 2345 Broadway, New York, NY 10024, (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233.

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 271-285 East 138th Street in the City and State of New York, County of Bronx known and designated on the tax map of the City Register of the City of New York as tax map parcel numbers: Section 9 Block 2314 Lot 1, being the same as that property conveyed Grantor by deed dated June 13, 2012 and recorded in the City Register of the City of New York in CRFN No.: 2012000247165. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.8194 +/- acres, and is hereinafter more fully described in the Land Title Survey dated August 23, 2010, recently updated on July 13, 2013 prepared by Joseph Nicoletti Associates Professional Land Surveyors P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C203056-05-11, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the County of Bronx Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

[10/12]

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved b the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5 the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no

privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C203056
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Borinquen Court Associates, L.P.
By Borinquen Court Housing Company, Inc., its general partner.

By: Laura M. Tavormina

Print Name: LAURA M. TAVORMINA

Title: TREASURER Date: 9/25/2013

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF New York)

On the 25th day of September, in the year 20 13, before me, the undersigned, personally appeared Laura M. Tavormina personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Robin P. Pace
Notary Public - State of New York

ROBIN P. PACE
Notary Public, State of New York
No. 01PA6122112
Qualified in New York County
Commission Expires March 23, 2017

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 26th day of November, in the year 2013, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

SCHEDULE "A"
ENVIRONMENTAL EASEMENT
PROPERTY DESCRIPTION

Joseph Nicoletti Associates
Professional Land Surveyors, P.C.
499 JERICHO TURNPIKE, SUITE 201
MINEOLA, NY 11501

LEGAL AND ENVIRONMENTAL EASEMENT DESCRIPTION FOR SITE #C203056

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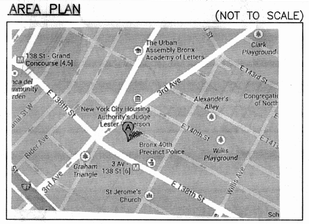
SURVEY

AREA PLAN

(NOT TO SCALE)



LEGEND:

P.O.B. ..... POINT OF BEGINNING
C.L.F. ..... CHAIN LINK FENCE
BLDG ..... BUILDING
CONC.BLK. ..... CONCRETE BLOCK
CONC.RET. ..... CONCRETE RETAINING WALL
G ..... GAS VALVE
W ..... WATER VALVE
LIGHT POLE
FIRE HYDRANT
TS ..... TRAFFIC SIGNS
MANHOLE
8" ..... TREE AND DIAMETER
DR ..... DRAIN
HANDICAPPED PARKING SPACE

LOT AREA:

79,254.5 SQ.FT. = 1.8194 ACRES

BUILDING AREA:

±21,510.9 SQ.FT.

ENGINEERING / INSTITUTIONAL CONTROLS:

- ALL ENGINEERING CONTROLS MUST BE OPERATED AND MAINTAINED AS SPECIFIED IN THE SITE MANAGEMENT PLAN (SMP).
- ALL ENGINEERING CONTROLS ON THE CONTROLLED PROPERTY MUST BE INSPECTED AT A FREQUENCY AND IN A MANNER DEFINED IN THE SMP.
- GROUNDWATER MONITORING AND OTHER ENVIRONMENTAL OR PUBLIC HEALTH MONITORING MUST BE PERFORMED AS DEFINED IN THE SMP.
- GROUNDWATER USE RESTRICTION – THE USE OF GROUNDWATER UNDERLYING THE PROPERTY IS PROHIBITED WITHOUT TREATMENT RENDERING IT SAFE FOR INTENDED USE.
- VAPOR INTRUSION – THE POTENTIAL FOR VAPOR INTRUSION MUST BE EVALUATED FOR ANY BUILDINGS DEVELOPED ON THE SITE; AND ANY POTENTIAL IMPACTS THAT ARE IDENTIFIED MUST BE MONITORED OR MITIGATED.
- VEGETABLE GARDENS – AND FARMING ON THE PROPERTY ARE PROHIBITED.
- SOIL COVER – ANY BREACH OF THE NATURAL SITE COVER, INCLUDING FOR THE PURPOSES OF CONSTRUCTION OR UTILITIES WORK, MUST BE REPLACED OR REPAIRED ACCORDING TO THE SITE MANAGEMENT PLAN (SMP). SITE SOIL EXCAVATED AND REMOVED FROM THE PROPERTY MUST BE MANAGED, CHARACTERIZED, AND PROPERLY DISPOSED OF IN ACCORDANCE WITH THE NYSDEC REGULATIONS AND DIRECTIVES. GUIDELINES FOR MANAGEMENT OF SUBSURFACE SOILS/FILL AND LONG–TERM MAINTENANCE OF THE NATURAL SITE COVER IS PROVIDED IN THE SMP.
- LAND USE – THE USE AND DEVELOPMENT OF THE SITE IS LIMITED TO RESTRICTED RESIDENTIAL, COMMERCIAL AND INDUSTRIAL USES ONLY AS DEFINED IN 6 NYCRR PART375–1.8(G)(2) (II), (III) & (IV).

LEGAL & ENVIRONMENTAL EASEMENT DESCRIPTION FOR SITE #C203056:

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HUD CERTIFICATE:

"I HEREBY CERTIFY TO THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD); LEX TERRAE, LTD. (TITLE COMMITMENT NO.BRX–243129–L, EFFECTIVE FEBRUARY 20, 2012 and AMENDED MARCH 1, 2012) STEWART TITLE INSURANCE COMPANY; JPMORGAN CHASE BANK, N.A., ITS SUCCESSORS AND/OR ASSIGNS; NEF ASSIGNMENT CORPORATION, AS NOMINEE, ITS BENEFICIARIES, SUCCESSOR AND/OR ASSIGNS; NATIONAL EQUITY FUND, INC.; BORINQUEN COURT ASSOCIATES, L.P.; BORINQUEN COURT HOUSING COMPANY INC.; THE CITY OF NEW YORK, ACTING BY AND THROUGH ITS DEPARTMENT OF HOUSING PRESERVATION AND DEVELOPMENT, ITS SUCCESSORS AND/OR ASSIGNS; STATE OF NEW YORK MORTGAGE AGENCY (SONYMA), ITS SUCCESSORS AND/OR ASSIGNS; NEW YORK CITY HOUSING DEVELOPMENT CORPORATION, ITS SUCCESSORS AND/OR ASSIGNS AND TO THE PEOPLE OF THE STATE OF NEW YORK ACTING THROUGH THEIR COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION:

I MADE AN ON THE GROUND SURVEY PER RECORD DESCRIPTION OF THE LAND SHOWN HEREON LOCATED IN CITY AND STATE OF NEW YORK, ON AUGUST 23, 2010 AND LAST UPDATED ON MARCH 19, 2012; AND THAT IT AND THIS MAP WAS MADE IN ACCORDANCE WITH THE HUD SURVEY INSTRUCTIONS AND REPORT, FORM HUD–92457M, AND THE REQUIREMENTS FOR AN ALTA/ACSM LAND TITLE SURVEY, AS DEFINED IN THE 2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS.

TO THE BEST OF MY KNOWLEDGE, BELIEF AND INFORMATION, EXCEPT AS SHOWN HEREON: THERE ARE NO ENCROACHMENTS EITHER WAY ACROSS PROPERTY LINES; TITLE LINES AND LINES OF ACTUAL POSSESSION ARE THE SAME; AND THE PREMISES ARE FREE OF ANY 100/500 YEAR RETURN FREQUENCY FLOOD HAZARD, AND SUCH FLOOD FREE CONDITION IS SHOWN ON THE FEDERAL FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 360497–0091F DATED SEPTEMBER 5, 2007."

JOSEPH NICOLETTI
NEW YORK STATE LICENSE NO.049147

REF.NO.: B2314–010 TITLE NO.: BRX–243129–L

CERTIFICATION:

TO LEX TERRAE, LTD. (TITLE COMMITMENT NO.BRX–243129–L, EFFECTIVE FEBRUARY 20, 2012 and AMENDED MARCH 1, 2012) STEWART TITLE INSURANCE COMPANY; JPMORGAN CHASE BANK, N.A., ITS SUCCESSORS AND/OR ASSIGNS; NEF ASSIGNMENT CORPORATION, AS NOMINEE, ITS BENEFICIARIES, SUCCESSOR AND/OR ASSIGNS; NATIONAL EQUITY FUND, INC.; BORINQUEN COURT ASSOCIATES, L.P.; BORINQUEN COURT HOUSING COMPANY INC.; THE CITY OF NEW YORK, ACTING BY AND THROUGH ITS DEPARTMENT OF HOUSING PRESERVATION AND DEVELOPMENT, ITS SUCCESSORS AND/OR ASSIGNS; STATE OF NEW YORK MORTGAGE AGENCY (SONYMA), ITS SUCCESSORS AND/OR ASSIGNS; NEW YORK CITY HOUSING DEVELOPMENT CORPORATION, ITS SUCCESSORS AND/OR ASSIGNS AND TO THE PEOPLE OF THE STATE OF NEW YORK ACTING THROUGH THEIR COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 6A, 6B, 7A, 7B1, 7C, 8, 9, 10, 11A, 13, 14, 16, 17, 18, 19, 20 AND 21 OF TABLE A THEREOF.

THE FIELD WORK WAS COMPLETED ON AUGUST 23, 2010 AND LAST UPDATED JULY 13, 2013 (EASEMENT NOTE).
THIS SURVEY HAS BEEN REVISED WITH THE BENEFIT OF TITLE REPORT PREPARED BY STEWART TITLE INSURANCE COMPANY, TITLE NO. BRX–245686–L, DATED JULY 11, 2013.

DATE: AUGUST 23, 2010
UPDATED: JULY 13, 2013

JOSEPH NICOLETTI
NEW YORK STATE LICENSE NO.049147

TABLE A ITEMS:

OPTIONAL SURVEY RESPONSIBILITIES AND SPECIFICATIONS

1. MONUMENTS PLACED (OR A REFERENCE MONUMENT OR WITNESS TO THE CORNER). DISTANCE IS NOTED IN THE WRITTEN LEGAL DESCRIPTION AND SHOWN ON SURVEY.

2. ADDRESSES: SEE SURVEY.

3. FLOOD ZONE CLASSIFICATION: NO PORTION OF THE PROPERTY SHOWN ON THE SURVEY LIES WITHIN A SPECIAL HAZARD AREA, AS DESCRIBED ON THE FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH THE SUBJECT PROPERTY IS LOCATED. THE PROPERTY IS LOCATED IN ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) OF THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL NO.360497–0091F BEARING AN EFFECTIVE DATE OF SEPTEMBER 5, 2007. DUE TO THE COMPLEXITY OF THE REGULATIONS, GRAPHIC REPRESENTATION CANNOT BE SHOWN.

4. GROSS LAND AREA: SEE SURVEY.

6(A). CURRENT ZONING CLASSIFICATION, AS PROVIDED BY WWW.NYC.GOV.
THE SUBJECT PROPERTY LIES IN ZONE R6 OF THE ZONING RESOLUTION MAP NO.6A, MAP UPDATE EFFECTIVE APRIL 6, 2011 AS PER THE NEW YORK CITY PLANNING COMMISSION, ZONING RESOLUTION AND MAPS, AT WWW.NYC.GOV.

6(B). ZONING REQUIREMENTS AND RESTRICTIONS: AS PROVIDED BY INSURER.
THE SURVEY PLAT IS NOT INTENDED TO BE AND SHOULD NOT BE USED FOR THE PURPOSE OF DETERMINING COMPLIANCE WITH LOCAL BUILDING AND ZONING LAWS AND REGULATIONS. THE PLAT SHOULD ONLY BE RELIED UPON FOR THE PURPOSE OF DISCLOSING EXCEPTIONS TO TITLE. DUE TO THE COMPLEXITY OF THE BULK RESTRICTIONS, GRAPHIC REPRESENTATION CANNOT BE SHOWN.

7(A). EXTERIOR DIMENSIONS OF ALL BUILDINGS AT GROUND LEVEL: SEE SURVEY.

7(B)(1). SQUARE FOOTAGE OF EXTERIOR FOOTPRINT OF ALL BUILDINGS AT GROUND LEVEL: SEE SURVEY.

7(C). MEASURED HEIGHT OF ALL BUILDINGS ABOVE GRADE: SEE SURVEY.

8. SUBSTANTIAL FEATURES OBSERVED IN THE PROCESS OF CONDUCTING THE SURVEY: SEE SURVEY.

9. STRIPING, NUMBER AND TYPE OF PARKING SPACES:
THERE ARE 31 STRIPED PARKING SPACES (INCLUDED TWO HANDICAPPED PARKING SPACES) LOCATED ON THE SUBJECT PROPERTY.

10(A). DETERMINATION OF THE RELATIONSHIP AND LOCATION OF CERTAIN DIVISION OR PARTY WALLS: SEE SURVEY.

11(A). LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY AS DETERMINED BY OBSERVED EVIDENCE: SEE SURVEY.

13. NAMES OF ADJOINING OWNERS: SEE SURVEY.

14. DISTANCE TO THE INTERSECTING STREET PER TITLE COMMITMENT: SEE SURVEY.

16. OBSERVED EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS: NONE.
AT TIME OF SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS WITHIN RECENT MONTHS.

17. PROPOSED CHANGES IN STREET RIGHT OF WAY LINES, IF INFORMATION IS AVAILABLE FROM THE CONTROLLING JURISDICTION: NONE.
AT TIME OF SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF ANY CHANGES IN STREET RIGHT OF WAY LINES EITHER COMPLETED OR PROPOSED, AND AVAILABLE FROM THE CONTROLLING JURISDICTION.

OBSERVED EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS: NONE.
AT TIME OF SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS.

18. OBSERVED EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL: NONE.
AT TIME OF SURVEY, THERE WAS NO OBSERVABLE EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.

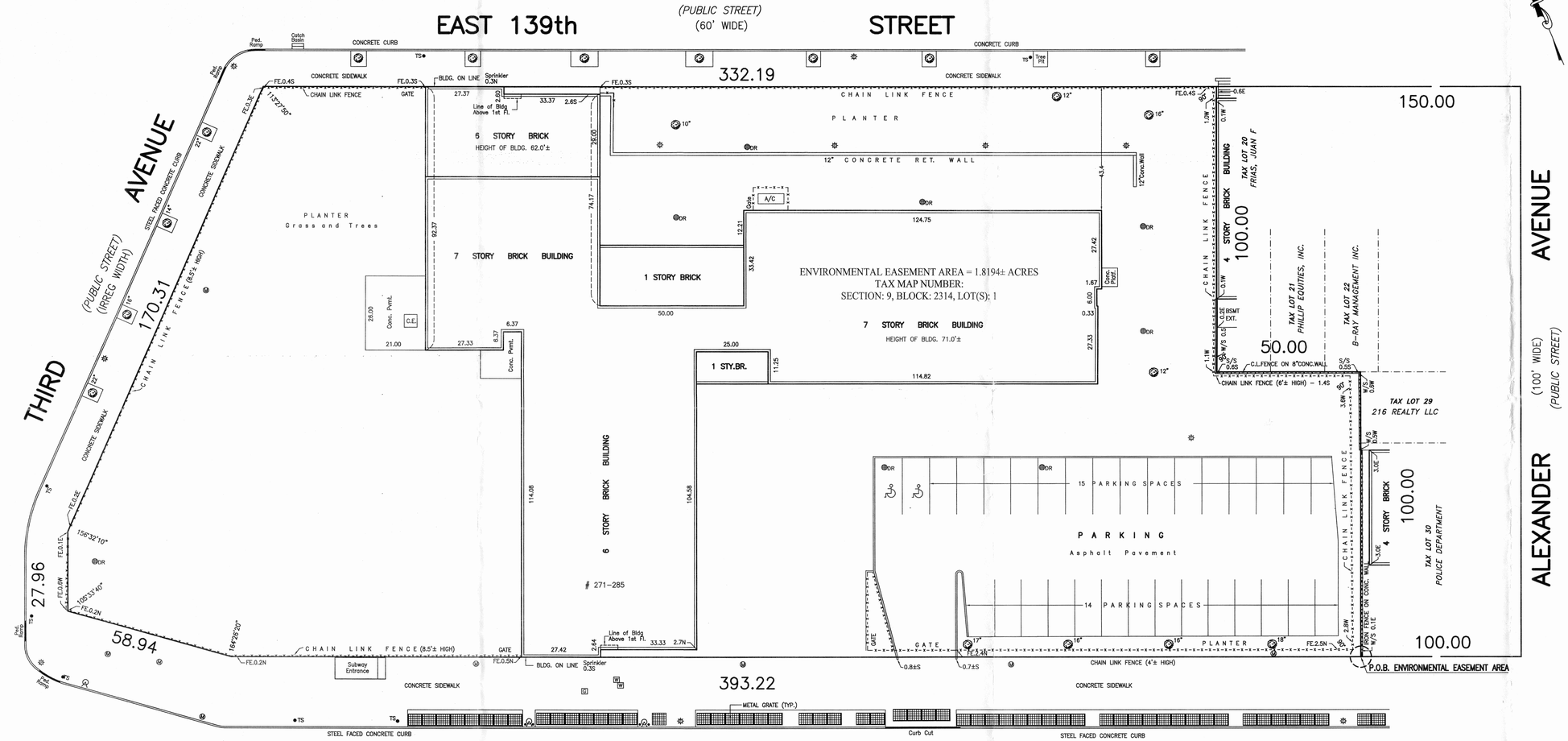
19. WETLANDS INFORMATION: THE SUBJECT PROPERTY IS NOT LOCATED WITHIN A WETLANDS AREA AS DESIGNATED BY U. S. FISH AND WILDLIFE SERVICE, NATIONAL WETLANDS INVENTORY WEBSITE. U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, WASHINGTON, D.C. HTTP://WWW.FWS.GOV/WETLANDS/.

20(A). THE LOCATION OF IMPROVEMENTS WITHIN ANY OFFSITE EASEMENTS OR SERVITUDES BENEFITING THE SURVEYED PROPERTY THAT ARE DISCLOSED IN THE RECORD DOCUMENTS PROVIDED TO THE SURVEYOR AND THAT ARE OBSERVED IN THE PROCESS OF CONDUCTING THE SURVEY, TOGETHER WITH APPROPRIATE RECORDING REFERENCES, TO THE EXTENT THAT SUCH MATTERS CAN BE LOCATED, HAS BEEN SHOWN ON THE SURVEY.

EXCEPT AS SHOWN ON THE SURVEY AND/OR AS INDICATED BELOW, THERE ARE NO OBSERVABLE EASEMENTS, SERVITUDES OR RIGHTS OF WAY OF WHICH THE UNDERSIGNED HAS BEEN ADVISED.

a) COVENANTS AND RESTRICTIONS CONTAINED IN DEED FROM THE CITY OF NEW YORK RECORDED IN REEL 395 PAGE 1708 AND RE–RECORDED IN CRFN 2008000357481– BLANKET DESCRIPTION OF LOT
b) TERMS, COVENANTS, AND CONDITIONS CONTAINED IN LAND DISPOSITION AGREEMENT BETWEEN THE CITY OF NEW YORK AND BORINQUEN COURT HOUSING DEVELOPMENT FUND CORPORATION DATED AS OF AUGUST 17, 1978 RECORDED JULY 27, 1979 IN REEL 395 PAGE 1738– NOT SURVEY RELATED
c) AGREEMENT AS TO SUBWAY ENTRANCE CONSTRUCTION RECORDED IN LIBER 1959 CP 68– EFFECTS SUBWAY ENTRANCE ON EAST 138TH STREET– SEE SURVEY
d) DECLARATION RECORDED IN REEL 372 PAGE 866 AS PURPORTED TO BE MODIFIED BY AMENDED DECLARATION IN REEL 382 PAGE 1545– BLANKET DESCRIPTION OF LOT
e) TERMS, COVENANTS AND CONDITIONS CONTAINED IN REGULATORY AGREEMENT DATED JULY 16, 1979 BETWEEN BORINQUEN COURT HOUSING DEVELOPMENT FUND CORPORATION AND THE SECRETARY OF HOUSING AND URBAN DEVELOPMENT RECORDED JULY 27, 1979 IN REEL 395 PAGE 1727.
f) COVENANTS AND RESTRICTIONS AS CONTAINED IN DEED FROM HYCHDC REAL ESTATE CORP., TO EAST ONE THIRTY EIGHTH HOUSING DEVELOPMENT FUND COMPANY INC., RECORDED MARCH 21, 2011 IN CRFN 2011000100670.

21. PROFESSIONAL LIABILITY INSURANCE TO BE IN EFFECT THROUGHOUT THE CONTRACT TERM. CERTIFICATE OF INSURANCE TO BE FURNISHED UPON REQUEST.



THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THE EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN ("SMP"). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP MAY BE OBTAINED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR AT DERWEB@GW.DEC.STATE.NY.US.

THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO TITLE 36 OF ARTICLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE EXISTENCE OF RIGHT–OF–WAYS AND/OR EASEMENTS OF RECORD, IF ANY, NOT SHOWN HEREON, ARE NOT CERTIFIED.
ENCROACHMENTS OR VAULTS, IF ANY, BELOW SURFACE ARE NOT SHOWN.

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYORS INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID TRUE COPY. GUARANTEES OR CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED AND ON HISBEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES OR CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

NO PROPERTY MONUMENTS, STAKES, PINS OR OTHER MARKERS WERE PLACED AS PART OF THE PREPARATION OF THIS SURVEY.

0 20' 40' 60'

DRAWN BY B.I.M.

DATE	REVISIONS
7/13/2013	UPDATED (EASEMENT NOTES)

SEAL

ALTA/ACSM LAND TITLE SURVEY & HUD SURVEY

TAX SECT.: 9	TAX BLOCK: 2314	TAX LOT: 1

MAP OF PROPERTY AT
NO.271–285 EAST 138th STREET
BCP SITE # C203056
SITE NAME: BORINQUEN COURT
BRONX
THE BRONX COUNTY, NEW YORK

JOSEPH NICOLETTI ASSOCIATES
PROFESSIONAL LAND SURVEYORS P.C.
499 JERICHO TURNPIKE, SUITE 201
MINEOLA, NEW YORK 11501
516–873–7278

DATE: AUGUST 23, 2010	SCALE: 1"=20'	REF.NO.: B2314–010

APPENDIX C
EXCAVATION WORK PLAN

APPENDIX C – EXCAVATION WORK PLAN

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

Jane O'Connell
Regional Hazardous Waste Remediation Engineer
Hunter's Point Plaza
47-40 21st Street
Long Island City, NY 11101-5407

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix D of this document;
- Identification of disposal facilities for potential waste streams;
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

C-2 SOIL SCREENING METHODS

All areas of residual contaminated soils remaining after the completion of the remediation activities have been surveyed by a surveyor licensed to practice in the State of New York. The survey information is shown in Figure 1-3.

Visual, olfactory and instrument-based soil screening (i.e., for VOCs using a photoionization detector [PID]) will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

C-3 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

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.

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.

C-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

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

The presence of utilities and easements on the site will be investigated by the Remedial Engineer prior to any invasive work. Requests will be filed with Dig Safely New York to facilitate the identification, location, and marking of subsurface utilities. In addition, private utility clearance using ground penetrating radar (GPR) and/or other appropriate technologies will also be conducted. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. As appropriate, certain utilities may need to be protected and remain active while others should be shutdown/de-energized, terminated, and/or removed to facilitate excavation activities.

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).

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

C-5 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.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. Truck transport routes are as follows:

For Trucks Heading North: Head west 0.3 miles on 138th Street and turn right on entrance road to Major Deegan Expressway (Route 87) North.

For Trucks Heading East/South: Head east 0.3 miles on 138th Street to Route 278 (Bruckner Expressway) and make left under the expressway. The entrance to the Bruckner Expressway east will be approximately 0.1 miles on the left.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure C-1. This is the most appropriate route and takes 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.

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

C-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and 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 off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this Site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

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. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). It is not expected that hazardous materials will be found at the Site but should they be encountered, they will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

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

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. 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.

C-7 MATERIALS REUSE ON-SITE

Chemical criteria for on-site reuse of material have been approved by NYSDEC and are listed in Table 1-3 of the SMP and in Table C-1 of this Appendix. Historic fill material is present across much of the Site. This material contained chemicals in

concentrations that are in excess of these criteria. Therefore, soil below the demarcation layer and below the existing buildings and parking lot is anticipated to exceed the criteria for on-Site reuse. Following is a summary of allowable soil reuse at the Site.

Any excavated material above the demarcation layer depicted in Figure 1-12a can be reused at the Site. Material excavated from below the demarcation layer can be reused below the composite cover system (i.e., the soil must be placed below the demarcation layer, below the building slab, or below pavement). Material excavated from below the demarcation layer or other elements of the composite cover system which is demonstrated to meet the SCOs listed in Table 1-3 of the SMP and in Table C-1 of this Appendix may be reused at the site. Otherwise, the soil must be disposed off-Site (with the exception noted for the 10.5-foot excavation specified as Area C in Figure 1-12). In this area, the demarcation barrier was placed at a depth of two feet to be consistent with surrounding areas, and to provide notice that if excavation does occur in this area, work should be halted and the excavation approach re-evaluated. A summary of the soil handling requirements is presented in Figure 1-12a.

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. As detailed above, contaminated on-site material, including historic fill and contaminated soil that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported

and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a State Pollution Discharge Elimination System (SPDES) permit.

C-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP. The demarcation layer, consisting of orange snow fencing material or equivalent material will be replaced to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination'. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

C-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

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

All imported soils will meet the backfill and cover soil quality objectives as listed in 6 NYCRR Part 375 Table 375-6.8(b): Restricted Residential Use Soil Cleanup Objectives. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality

standards are listed in DER-10 Appendix 5 Allowable Constituent Levels for Imported Fill or Soil Subdivision 5.4(e) Restricted Residential Use (NYSDEC, 2010) and are provided at the end of this section as Table C-1.

Unless otherwise approved in advance by the NYSDEC, sampling must be conducted in accordance with Table C-2 below.

Table C-2
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site
(Source DER-10 Table 5.4(e)10)

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1 3	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
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		

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.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-11 STORMWATER POLLUTION PREVENTION

The Stormwater Pollution Control Plan used during the remedial action and site development activities described in Section 1.4 is included in Appendix K for reference.

This plan will be followed until completion of development activities. All further earth moving activities will be performed in accordance with applicable federal, state, and local regulation, and all necessary permits will be obtained in advance of such activities.

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 SMP 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 construction area.

C-12 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling

results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

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. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

C-13 COMMUNITY AIR MONITORING PLAN

During any excavation activity initiated under the SMP, air monitoring will be conducted in accordance with the Community Air Monitoring Plan (CAMP) included as Appendix E of this SMP. In summary, the CAMP calls for real-time monitoring for VOCs and particulates (i.e., dust) at the downwind perimeter of each designated work area when intrusive activities are in progress at the Site. Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas. Continuous monitoring is required for all ground intrusive activities to the extent practicable (e.g., air monitoring may not be conducted during precipitation events).

Air monitoring locations will be adjusted on a daily or more frequent basis based on actual wind directions, and will consist (at a minimum) of an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors on-site and off-site. Specific odor control methods to be used on a routine basis will include limiting the area of open excavations and shrouding open excavations with tarps or other covers when necessary. If nuisance odors are identified at the site boundary, or if odor complaints are received, 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 any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (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.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-15 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 the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

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

C-16 OTHER NUISANCES

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

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX D

HEALTH AND SAFETY PLAN

East One Thirty Eighth Street Housing Development Fund Company, Inc.

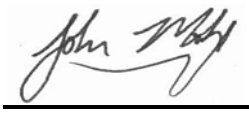
Site-Specific Health and Safety Plan: Borinquen Court

9 October 2012

Project No. 0168812
Bronx, NY

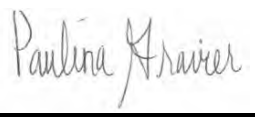
Ernie Rossano

Partner-in-Charge



John Mohlin

Project Manager



Paulina Gravier

Project H&S Consultant

ERM
40 Marcus Drive
Suite 200
Melville, NY 11747
631 756 8900/ 631 756 8901 (fax)

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ERM developed the following Health and Safety Plan (HASP) for use by ERM personnel and by ERM contractors (individually, an "ERM Contractor" and collectively, "ERM Contractors"). ERM personnel must adhere to the practices and procedures specified in the HASP. Each ERM Contractor must review the HASP and agree to accept and abide by the HASP, subject to any modifications to the HASP (to address the ERM Contractor's more stringent practices and procedures) agreed upon in writing by ERM and the ERM Contractor. The ERM Contractor shall indicate such acceptance by signing this document prior to commencing work at the Site. However, if any ERM Contractor commences work at the Site, the ERM Contractor shall be deemed to have accepted the HASP and the terms hereof and the failure to execute and return to ERM a copy of this notice shall not be relevant to such interpretation.

If a contractor or a person other than the Client, ERM employees and ERM Contractors (individually, a "Third Party" and collectively, "Third Parties") receives a copy of the HASP, such Third Party should not assume that the HASP is appropriate for the activities being conducted by the Third Party.

NO THIRD PARTY HAS THE RIGHT TO RELY ON THE HASP. EACH THIRD PARTY SHOULD ABIDE BY ITS OWN SITE-SPECIFIC HEALTH AND SAFETY PLAN IN ACCORDANCE WITH ITS OWN PROFESSIONAL JUDGMENT AND ESTABLISHED PRACTICES.

ERM shall not be responsible for the implementation of any Third Party safety program(s), except to the extent otherwise expressly agreed upon by ERM and a Third Party in writing. The services performed by ERM for the Client and any right of the client and/or an ERM Contractor to rely on the HASP shall in no way insure to the benefit of any Third Party, including, but not limited to, employees, agents, or consultants and subcontractors of ERM Contractors, so as to give rise to any cause of action by such Third Party against ERM.

The HASP generated by ERM in connection with the Project is for use on a specific site and in connection with a specific project. ERM makes no representation or warranty as to the suitability of the HASP for reuse on another site or as to the suitability of the HASP for reuse on another project or for modifications made by the Client or a Third Party to the HASP.

All entrants to portions of the jobsite controlled by ERM must sign the HASP. Signing below certifies understanding and willingness to comply with the contents of this HASP. ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Subcontractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to their organization's health and safety program for their protection.

Printed Name	Signature	Company	Date

1.0 PROJECT AND SITE INFORMATION

1.1 GENERAL PROJECT INFORMATION

East One Thirty Eighth Housing Development Fund Company, Inc. (the Volunteer) entered into a Brownfield Cleanup Agreement (BCA) with NYSDEC (NYSDEC BCA Index No.C203056-05-11 Site No. C203056) to investigate and address environmental impacts at the Borinquen Court Site located at 285 East 138th Street in Bronx, New York (Site). As a result, ERM has developed this HASP for use on the Borinquen Court project.

To meet this objective, ERM will perform the following key tasks:

- Observe and document the excavation of the upper 2-feet of uncapped soil within the boundaries of the Site by a third-party, with the exception of soil beneath the building and existing parking lot that exceeds 6NYCRR Part 375-65 Track 2 Restricted Residential Soil Cleanup Objectives (RRSCOs). Otherwise, cover the uncapped soil with two feet of clean fill material or cap with pavement. Soil exceeding PGWSCOs in areas of impacted groundwater will also be excavated.
- Observe and document the removal of soil by a third-party that exceeds RRSCOs in areas where footings and other construction activities are planned.
- Treat residual groundwater contamination to enhance monitored natural attenuation in-situ via the addition of a calcium peroxide compound to portions of the aquifer impacted by petroleum hydrocarbons.
- Treat residual groundwater contamination in-situ via the injection of sodium permanganate (NaMnO4) in portions of the aquifer impacted by chlorinated hydrocarbons.
- Monitor soil vapor during the in-situ chemical oxidation injection activities to further evaluate the potential for soil vapor intrusion.
- Soil vapor and indoor air will be monitored during remedial activities to ensure this pathway remains incomplete.
- Collect post-excavation soil samples.
- Groundwater monitoring in support of the groundwater remediation activities

1.2 SITE NAME AND ADDRESS

Borinquen Court
285 East 138th Street
Bronx, New York

1.3 SITE DESCRIPTION

Borinquen Court is a seven-story, 145-unit, 137,800 sq. ft. low-income senior housing complex in the Mott Haven section of the South Bronx in New York City. The building is constructed of block and plank, with a slab on grade foundation and a brick façade. The building sits on a 79,400 sq. ft. piece of land on Third Avenue between East 138th street to East 139th Street in the Bronx. The building entrance fronts on East 138th Street and the building includes three residential wings that surround a centralized core. An open, paved parking lot that accommodates 33 cars is located on the southeast portion of the site and to the west is an open, landscaped area. The site occupies approximately 1.8 acres and approximately ¾ of the block. The site is legally defined as Tax Block 2314, Lot 1. A Site location map is presented as Appendix C.

The properties surrounding the site are used primarily for residential purposes, with some commercial and industrial uses as well. Immediately to the west of the site is the intersection of Morris and Third Avenues and immediately to the east is the New York City Police Department's 40th Precinct. North of the site, across East 139th street, are 3 and 4 story residential buildings and one manufacturing building and south of the site is a high rise New York City Housing Authority complex, the Mayor John Purroy Mitchell Houses, surrounded by parking lots. The MTA #6 train runs adjacent to the property along East 138th Street. A subway station exists on the corner of 138th and Third Avenue and abuts the property.

1.4 CLIENT HEALTH & SAFETY REQUIREMENTS

The client does not have any special requirements for the work governed by this HASP, other than those described in subsequent sections below.

2.0 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

Table 2-1 includes the roles, names, contact information, and responsibilities of ERM personnel, ERM Contractors, and other individuals associated with the health and safety leadership of this project. This page must be posted on-site.

TABLE 2-1: Key Project Health & Safety Personnel

Role	*Person*	*Contact Information*	*Responsibilities*
Partner-In-Charge (PIC)	Ernie Rossano	Office: (631) 756-8917 Mobile: (516) 250-1429 E-mail: ernie.rossano@erm.com	Final authority in approving the HASP and ensuring that the project team is supplied with the training, equipment and materials necessary for a safe work environment.
Project Manager (PM) and/or Construction Manager (CM)	John Mohlin	Office: (631) 756-8931 Mobile: (516) 315-6872 E-mail: john.mohlin@erm.com	Implementing the requirements of the ERM Health & Safety Program on this project and maintaining management awareness of the project's health and safety status. Provide H&S leadership during project performance.
Field Safety Officer (FSO)	James Causarano	Office: (631) 756-8900 E-mail: james.causarano@erm.com	Assist the PM/CM by implementing HASP on a day-to-day basis. Recognize significant H&S hazards and utilize STOP WORK authority when appropriate.
Subject Matter Expert	Paulina Gravier	Office: (212) 447-1942 Mobile: (484) 802-5243 E-mail: Paulina.gravier@erm.com	Assist in the recognition, evaluation, and control of hazards associated with the site.
ERM Employees	Listed on Signature Page	N/A	ERM employees will fully participate in the implementation of the HASP by obtaining necessary training, attending site safety meetings, wearing designated PPE, complying with site H&S rules, and advising the FSO of H&S concerns at the site.
Client Contact	Stephanie Green	Office: (212) 721-6032 x1014	
Local First Responders	FDNY: Engine 83 Ladder 29	Office: (718) 402-2270	
Local Hospital (attach map)	Lincoln Medical and Mental Health Center	Office: (718) 579-5000	

3.0 EMPLOYEE TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

All ERM and ERM Contractor personnel working on-site (including their on-site supervisors) who may be exposed to hazardous substances, health hazards, or safety hazards will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility, and medically qualified to perform the work. Prior to mobilization, all site workers are required to have the following training and medical surveillance:

- Training meeting the requirements of 29 CFR 1910.120 or 29 CFR 1926.65 (as applicable), *Hazardous Waste Operations and Emergency Response* (HAZWOPER).

The PM/CM and FSO must possess additional training, as described below:

- ERM FSO training; and
- 10-hour OSHA Construction training.

The PM/CM will verify that site personnel have received all appropriate training as required by this HASP prior to their arriving on-site by reviewing written training documentation. Copies of the written training documentation will be retained in the project file. ERM Contractor personnel will not be allowed to work at the site unless said training documentation is available.

4.0 FIELD ACTIVITIES

4.1 MAJOR PROJECT TASKS

Major tasks to be performed by ERM personnel include, but are not limited to, the following:

- Oversight of excavation activities;
- Sub-slab soil gas sampling; and
- Sodium permanganate and calcium peroxide compound injections.

Major tasks to be performed by third-party contractor personnel include the following:

- Excavation Activities.

Each of the tasks above has a Safe Work Practice (SWP) associated with it, or Job Hazard Analysis (JHA) prepared for it. SWPs and JHAs are further described below. It is important to note that the planned activities to be performed at the project Site have also undergone ERM's Global Project Liability Analysis (PLAN) process to assess the project risks, determine acceptability, and to customize the requirements needed to ensure that the risks are managed accordingly. The PLAN document, dated 7 May 2012 and reviewed by Truong Mai, is available for review, as needed, but shall be reviewed and understood by key ERM personnel team members managing the ERM major project tasks outlined above.

4.2 SITE PERSONNEL JOB TASKS & CERTIFICATION REQUIREMENTS

Workers with the following job descriptions will be engaged in activities conducted in at the site.

Trackhoe Operator - The trackhoe operator operates the trackhoe from within an environmentally controlled cab within the boundaries of each impoundment. A Kobelco SK300 or equivalent excavator will be used to remove trees and to excavate soils/sludges from within the impoundments. The work is performed approximately eight hours per working day

Truck Driver - The truck driver operates the vehicle from the cab. Trucks are utilized for hauling excavated materials. Trucks coming onsite will first be inspected for caked on soils and debris. If the truck is not clean as determined by the Contractor or Engineer, it will be rejected and not allowed to enter. In addition, the Contractor will set up a decontamination pad to wash the trucks prior to exiting the site. The work is performed approximately eight hours per working day.

Laborers – Field laborers will be utilized during completion of all work activities. In addition to providing assistance where needed for those activities listed in Section 4.1, other work duties will include, but are not limited to, construction of site structures (decon pad, trailer set up/renovation), welding, saw cutting, operation of stormwater pumps, equipment decontamination, and general site and equipment upkeep and maintenance.

Other visitors to the site not directly involved in proposed work activities (i.e., various contractors) will be considered in the HASP as technical personnel listed above.

5.0 HAZARD IDENTIFICATION AND CONTROL

5.1 JOB HAZARD ANALYSES

Prior to initiating any new project activity not covered by a Safe Work Practice, or when there is a change in site conditions, the FSO will assist project team members in completing a Job Hazard Analysis (JHA). The JHA will list the hazards associated with the project activity as well as associated control strategies. JHAs for the tasks listed in Section 4.1, as well as a blank copy of the JHA form, are located in Appendix B.

5.2 SAFE WORK PRACTICES

ERM has Safe Work Practices (SWP) that define minimum requirements for controlling hazards related to the work and surroundings. These have been completed for tasks performed commonly by ERM employees. As such, jobsite tasks whose hazards are identified and controlled by use of a SWP do not require JHAs to be developed for them. Copies of the SWPs that have been identified as pertinent to the hazards inherent in the work for this project are identified in the table of contents and have been included in Appendix C.

5.3 SITE INSPECTIONS

The FSO or designee will inspect the job site at least once per day using the Site Walk Checklist in Appendix E as a guide. Completed checklists will be retained in the site safety file.

5.4 BEHAVIOR-BASED SAFETY

Everyone on site as part of this project will make a commitment to work safely and to look out for others on the job site. A tool will be used to help ERM personnel and ERM Contractors to think about the safety related aspects of the work at hand, as described in applicable JHAs.

5.5 STOP WORK AUTHORITY

It is ERM policy that all site personnel have the authority, without fear of reprimand or retaliation to:

- **Immediately** stop any work activity that presents a danger to the site team or the public; and

- Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health & safety policies.

All site personnel are empowered to identify and correct Unsafe Acts, Unsafe Conditions and Near Misses before they can cause an Incident (see Section 13). After all:

You see it, you own it!

If someone utilizes their Stop Work Authority, then work can only be restarted by the FSO, in concert with the CM/PM, PIC and ERM Coordinator.

5.6 CHEMICAL HAZARDS

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and ground water sampling, the following constituents of concern listed in Table 5-1 may be encountered at the site. Universal Chemical Safety Data Cards for the constituents of concern are located in Appendix H.

TABLE 5-1: Constituents of Concern

COMPOUNDS OF CONCERN			Air Monitoring Action Limits
	GW	**SOIL**	
VOCS	Ethylbenzene Isopropylbenzene m-p xylene Cis 1,2 Dischloroethene Napthalene Tetrachloroethene Trichloroethene	xylene toluene Ethylbenzene Isopropylbenzene	30 ppm Total VOCs

SVOCS	None	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene	80 ug/m3 Total Particulates
METALS	Iron Sodium Magnesium Manganese	Barium Lead Mercury Zinc Copper Cadmium	80 ug/m3 Total Particulates
PEST/PCBs	None	4,4'-DDE 4,4'-DDT Dieldrin Endrin	80 ug/m3 Total Particulates

Table 5-2 shows chemicals that are routinely used by ERM at the site as part of the project. The MSDS for these chemicals are located in Appendix I.

TABLE 5-2: Chemicals Used for Project Execution

- Calcium peroxide
- Sodium permanganate monohydrate
- Liquinox
- Silica Sand
- Isobutylene Balance Air (calibration gas)
- Diesel
- Gasoline

5.7 AMBIENT AIR MONITORING

Ambient air monitoring should be conducted by the FSO when there is a question of employee exposure to hazardous concentrations of substances to assure the proper selection of engineering controls, work practices, and PPE. Additional monitoring should be conducted under any of the following circumstances.

- Work begins on a different portion of the site;
- Change in job tasks;
- Change in weather;

- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or ground water;
- When new hazardous substances are encountered; and
- During high-risk operations (e.g. drum opening, or handling of leaking drums, or when working in areas with obvious liquid/soil contamination).

Ambient air monitoring will be conducted using direct-reading real-time instruments as indicated in Table 5-3. If more that one instrument is listed, either instrument may be chosen. Not all work at the site will require ambient air monitoring for all contaminants. During the mobilization phase of a particular project task or activity, either the PM or the FSO will determine what contaminants may be encountered in order to have the appropriate instrumentation on-site. The Project Health and Safety Consultant is available to assist the PM or the FSO in determining the appropriate instrumentation.

TABLE 5-3: Ambient Air Monitoring Instruments

Constituent	*Instrument*
Organics	MiniRae 2000 with 10.6 eV lamp or equivalent
Dust	MIE PDR 1000 Personal DataRAM Aerosol Monitor

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas will be required for fieldwork lasting longer than one day.

Under stable site conditions, ambient air monitoring will be conducted at least once every two hours in the workers' breathing zone and at other locations based on the professional judgment of the FSO or the Subject Matter Expert. Ambient air monitoring results will be recorded on the Ambient Air Monitoring Form found in Appendix J. If site conditions become unstable or change dramatically, then ambient air monitoring will be conducted more frequently based on the professional judgment of the FSO or the Subject Matter Expert.

Table 5-4 outlines the steps to be taken by the FSO when the action levels of the various contaminants are exceeded. Respiratory protection is selected based on occupational exposure limits of the constituents at the site and the potential for exposure to vapors and dust from site activities.

TABLE 5-4: Action Levels and Response Actions Requirements

Chemical	*Action Level*	*Response Actions*
Organics	PID reads 5 ppm sustained in the breathing zone for 1 minute, above background	Stop work and workers leave immediate area • FSO to evaluate work practices and assess engineering controls to reduce airborne concentrations • Monitor again after allowing vapors to dissipate.

		• If readings are less than 5 ppm, resume work. • If readings remain 5 ppm or greater, stop work and workers leave immediate area • Contact PM and Subject Matter Expert • FSO waits 15 minutes, evaluates need for Tyvek covers, dons half-face respirator with organic vapor cartridges
Dust	Greater than 0.08 mg/m^3 sustained in the breathing zone for 15 minute, above background	• Stop work and implement dust control measures (e.g., watering the area). • Monitor again after allowing dust to dissipate. • If readings are less than 0.08 mg/m^3, resume work. • If readings are 0.08 mg/m^3 or greater, resume work wearing half-face respirators with HEPA cartridge and Tyvek coveralls if required • If readings are 0.08 mg/m^3 or greater, resume work wearing half-face respirators with HEPA cartridge and Tyvek coveralls if required

6.0 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity;
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done; and
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table 6-1 also serves as the written certification that the PPE Hazard Assessment has been conducted. The signature page containing the client's name, project name and number, date and signatures of the parties responsible for the development of the HASP also serve as part of the written certification.

6.1 RESPIRATORY PROTECTION

The type of respiratory protection required will be based on the results of ambient air monitoring, the results of any models used to predict ambient air concentrations, and the professional judgment of either the FSO or the Project Health and Safety Consultant. Respiratory protection requirements are outlined on Table 5-4, above.

TABLE 6-1: Personal Protection Equipment Requirements

PPE Level	*Ensemble Components*	*Tasks Requiring Use*
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	• Long pants and shirt with sleeves. • Safety-toed footwear. • Safety glasses with molded side shields. • Hard hat. • General purpose work gloves if task does not involve water or wet materials. • Hearing protection. • High visibility traffic vest.	Subcontractor oversight, excavation of contaminated soils, post-excavation sampling, in-situ injections, sub-slab soil gas sampling.

Level C Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D or Modified Level D and the following: • Full-face or half-face air purifying respirator with combination organic vapor/high efficiency particulate air (HEPA) cartridges.	Follow Table 5-4 (air monitoring action levels) for determining when Level C PPE is necessary.
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	• Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved). • Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls). • Coveralls. • Gloves, inner and outer, chemical-resistant. • Boots, outer, chemical-resistant steel toe and shank. • Boot-covers, outer, chemical-resistant (disposable).	Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the FSO and/or the Project Health and Safety Consultant, the HASP will be revised.
Level A Should be worn when the highest level of respiratory, skin, and eye protection is needed.	Level B and the following: • Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH). • Totally-encapsulating chemical-protective suit.	Tasks requiring Level A PPE are not authorized during this project. If Level A PPE is needed, as determined by the FSO and/or the Project Health and Safety Consultant, contact the North America H&S Leader for assistance.

7.0 MEDICAL SUPPORT REQUIREMENTS

First aid supplies are available for all building personnel. A first aid kit is located in the main office to the right of the reception station.

For the duration of the project, at least one individual currently certified to render emergency first aid and/or CPR will be present during all work activities. It is important to note that because this is a low income senior housing complex, the facility is staffed 24-hr per day thus no one will be alone on site. Additional medical surveillance will be provided for employees who are injured, become ill or develop signs or symptoms due to possible exposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

8.0 SITE INFRASTRUCTURE, CONTROL, AND GENERAL RULES

8.1 INFRASTRUCTURE

8.1.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the FSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the FSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition. Employees will wash their hands before entering eating areas. ERM will have access to restrooms on the first floor of the building, which is open 24 hours per day

8.1.2 Sanitation and Potable Water

Containers used for drinking water will be equipped with a tap and capable of being tightly closed. In addition, the container will be labeled as "Drinking Water" or "Potable Water." Disposal cups will be stored in a sanitary condition and a receptacle for disposing of the cups will be near-by.

Potable and non-potable water containers and portable toilets (if used) will comply with OSHA 29 CFR 1910.141 requirements.

8.1.3 Temporary Facilities

This project will not require any temporary facilities.

8.1.4 Safety Equipment

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM vehicle.

The FSO will be responsible for ensuring that all fire extinguishers are inspected monthly as required by 29 CFR 1910.157 *Portable Fire Extinguishers*. The monthly inspections will be documented on a tag attached to each extinguisher or a master list of fire extinguishers and their location. If the duration of the project exceeds one year, the FSO will contract with an outside vendor to perform the annual maintenance on all fire extinguishers.

8.1.5 Communications

Telephones and two-way radios will be used for communication between the project team and the client. If cell phones are allowed, cell phones may be used as part of the communication method. However, cell phones cannot be used in operating process units or while driving any type of vehicle. Two-way radios will be utilized for communication between project team members.

8.2 SITE CONTROL

Exclusion Zone: Exclusion zones will be necessary during the excavation and injection tasks. The exclusion zone will consist of a coned off area around the perimeter of the work zone. Only authorized personnel will be allowed within this area. If the work is being performed in a high traffic area, then caution tape will be utilized to cordon off the area.

Support Zone: The support zone will consist of a coned off area away from the exclusion zone. The support zone will be free from contamination and may be safely used as a planning and staging area.

8.3 GENERAL SITE RULES

The following general rules will be adhered to at all times:

- All personnel entering the site must check in with the FSO.
- All individuals entering the site must demonstrate to the FSO that they have been adequately trained as defined in Section 3.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the FSO, who will document such conditions in the field log. The FSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- No smoking, eating, chewing gum or tobacco, taking medication, or applying cosmetics in the Exclusion Zone. Wash hands and face thoroughly prior to conducting the activities in the Support Zone.

- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.
- If PPE becomes torn or saturated with contaminated material, immediately leave the Exclusion Zone and replace the affected PPE. Additionally, wash any exposed skin thoroughly with soap and water.
- The FSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning. During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle. In the event of a tornado, site workers should seek shelter in a building, expect trailers, or in a low-lying area.

9.0 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination.

Equipment and materials used in the decontamination process may include the following:

- Phosphate-free detergent;
- Five-gallon bucket;
- Potable water;
- Distilled water;
- Paper towels; and
- Brushes.

9.1 PERSONNEL DECONTAMINATION

The following procedures will be utilized for personnel decontamination:

1. Clean rubber boots with water;
2. Remove all PPE and dispose of the PPE in the designated drums; and
3. Wash hands and any skin that may have come in contact with affected soil or ground water with moistened disposable towels, such as baby wipes, or soap and water.

Although ERM will have access to restrooms and there are hoses accessible to ERM located outside the building, they may not be located within the immediate work area. Therefore, portable water units/bottles shall be strategically positioned during work activities to offer quick drenching, as needed.

9.2 EQUIPMENT DECONTAMINATION

The following will be required for equipment and tool decontamination:

- Before leaving the work area, excess contamination will be removed from the equipment and tools and placed in approved, properly labeled containers.
- A decontamination area will be designated for cleaning all equipment that has been in contact with the site materials before leaving the site. All decontamination will be conducted on a pad with an impermeable synthetic liner and fluid-containment boom. Equipment will be placed

on the pad and rinsed, brushed and/or steam cleaned to remove any contamination.
- Disposal of fluids generated from the decontamination process will be in accordance with approved work plans.
- Disposal of all solids collected within the decontamination pad and the pad liner will be in accordance with approved work plans.

The following will be required for truck decontamination:

- The Contractor will be responsible for the construction of a truck and equipment decontamination pad. This will include the construction of entrance and exit pads from non-paved to paved areas, to limit tracking of Site soils outside the contamination reduction zones.
- The construction zone exit pad will be constructed using #2 crushed stone and shall be a minimum of 8-inches thick. The construction zone exit pad will be constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control, and detailed on the Construction Drawings and in the technical specifications. The number and location of construction zone exit pads will be determined by the Contractor, and included in the Contractor's Work Plan.
- All construction equipment exiting the contamination reduction zone must first be decontaminated regardless if the equipment has come in contact with contaminated materials.
- Additionally, to prevent spread of gross contamination, equipment in contact with Gross Contamination will be decontaminated after use.
- During remediation, soil and liquids adhered to construction vehicles and equipment will be removed in the decontamination area prior to such vehicles and equipment leaving the Site.
- After wetting with potable water, brooms or shovels will be utilized for the gross removal of soil from vehicles and equipment. The decontamination procedure for the removal of the remaining soil and liquids will consist of washing with potable water. Soil generated by the decontamination process will be stockpiled and tested, and transported offsite for disposal.
- Decontamination liquids will be collected and treated along with the dewatering liquids.

10.0 SPILL CONTAINMENT PROGRAM

The spill contamination program for this project will involve the use of preventative measures in order to reduce the potential for environmental releases. These preventative measures will include the following:

- Equipment inspection;
- Staging equipment on containment pads;
- Secondary containment for fuel storage tanks; and
- General housekeeping practices.

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over packed into an appropriate container.

Stormwater will also be managed at the Site in accordance with the Stormwater Pollution Prevention Plan (SWPPP).

11.0 CONFINED SPACE ENTRY PROCEDURES

Entry into permit-required confined spaces is not anticipated. If a project task or activity would involve entry into a permit-required confined space or if there is a question as to whether or not a job task or activity involves a permit-required confined space, the PM or FSO will contact the North America H&S Leader for assistance prior to entering the confined space.

12.0 EMERGENCY RESPONSE PLAN

This section describes possible contingencies and emergency procedures to be implemented at the site.

12.1 PERSONNEL ROLES AND LINES OF AUTHORITY

The FSO has primary responsibility handling emergency situations. This includes taking appropriate measures to ensure the health and safety of site personnel and the public. The FSO will be responsible for evacuating any person and providing decontamination, and arranging for medical treatment or first aid for any person injured or requiring medical attention.

Possible actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the FSO is not available, the CM or other ERM field staff will assume the FSO's responsibilities. All site personnel will assist as directed by the FSO in case of an emergency.

12.2 EMERGENCY ALARMS

There are no specific audible alarms used at Borinquen Court for emergencies. ERM understands that the standard emergency response procedure is to call the Field Safety Officer or Project Manager. However, this is a small site with people actively present due to the 24-hour nature of the facility. ERM anticipates that verbal communication as a means of communicating emergencies should be effective.

12.3 EVACUATION PROCEDURES AND ROUTES

In the event of an emergency requiring evacuation to an Assembly Point, the FSO will be responsible to account for the presence of all project team members and subcontractors on-site at the time of the emergency. When evacuating, it is important to be aware of the prevailing wind direction and evacuate upwind or crosswind.

ERM understands that the interior and exterior Assembly Points for building tenants are a) First Floor Community Room & b) Parking lot in front of building on E. 138th St respectively. However, if this primary Assembly Point is not the safest location based on the type and location of emergency, then ERM will move to the secondary Assembly Point located on the corner of E 138th St. and Alexander Ave across from the local precinct.

12.4 RESPONDING TO EMERGENCIES

In the event an actual or suspected incident where personal injury or illness occurs, the FSO should take the following actions sequentially as listed:

- Don appropriate PPE;
- Remove the exposed or injured person(s) from immediate danger;
- Decontaminate affected personnel as appropriate using nearby water hoses or portable bottles;
- Obtain ambulance transport to the local hospital in the event of any injury or illness deemed to require medical surveillance or treatment; and
- Evacuate other personnel until it is safe for work to resume.

12.5 REPORTING EMERGENCIES

At the earliest time practicable following the occurrence of the emergency situation, the FSO will contact the PM and ERM Coordinator to advise them of the situation. The PM will then be responsible for promptly informing the following parties about the emergency.

- Injured/involved personnel's supervisor;
- Partner-In-Charge; and
- Client Contact.

In the case of an Incident, the FSO, with the cooperation of the H&S Contact, will promptly begin formal documentation of and investigation into the root cases of the Incident following the occurrence of the incident. This process is defined in Section 13, below.

12.6 RESTARTING WORK FOLLOWING AN EMERGENCY

The FSO will determine when it is safe to resume work at the site following an emergency. Note that if there is any doubt regarding the safe condition of the area, work will not recommence until all safety issues are resolved.

12.7 EMERGENCY DRILLS

In accordance with the HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined on Table 12-1. All drills will be documented on the Emergency Drill Evaluation Form found in Appendix K. Drills do not need to be elaborate. A table-top scenario during the daily safety meeting is an adequate drill.

TABLE 12-1: Emergency Drill Frequency

Project Duration	*Drill Frequency*
Less than 30 days	None, cover during review/sign-off of HASP
Greater than one month but less than one year	Once
Greater than one year	Annually

13.0 REPORTING OF SAFETY EVENTS

Safety events are occurrences or conditions that may contribute to or result in an injury, occupational illness or property damage. ERM seeks to learn from the investigation of the following types of safety events:

- Unsafe acts and unsafe conditions;
- Near misses; and
- Incidents (injury, illness, property damage, fire, or chemical spill).

All safety events must be reported promptly. Immediate verbal notification to the project PM and PIC is required, as well as entry of the event into the Event Communication System (ECS), ERM's electronic safety event reporting system within 48 hours of the safety event occurring.

14.0 SITE SAFETY BRIEFINGS

14.1 COMMUNICATION AND REVIEW OF THE HASP

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. The following topics will be addressed during the briefing:

- Names of the FSO and any designated alternate;
- Hazardous chemicals that may be encountered during on-site activities;
- Physical hazards that may be encountered on-site;
- Special training requirements and Safe Work Practices;
- Work tasks;
- Emergency communication signals, codes, and location of emergency contact information;
- Emergency procedures for safety events, fires, and hazardous material incidents; and
- Emergency evacuation routes.

14.2 DAILY SAFETY MEETING

A daily safety meeting will be conducted each morning. The daily safety meeting will include a discussion of the following health & safety-related topics, among others:

- Who is doing what, where and how;
- The potential for overlapping site operations;
- Changes to the HASP or JHAs;
- Discussion of recent Incidents or safety observations; and
- Comments from the project personnel.

The meetings will be documented on the Daily Safety Meeting form found in Appendix N.

15.0 AUDITING AND HASP REVISIONS

Selected project field activities and project files shall be audited periodically. A full site audit for conformance with the HASP will occur at least once per year for projects with a field duration of 1 year or longer. Full site audits may also be conducted for shorter duration projects. Project documentation audits may be conducted periodically for shorter term projects.

Revisions made to the site HASP in response to audit feedback, lessons learned from Incidents, or other reasons will be explained to all site personnel at the first daily safety meeting following the institution of the HASP revision.

Site Location Map and Map to Hospital
THIS PAGE MUST BE POSTED ON-SITE

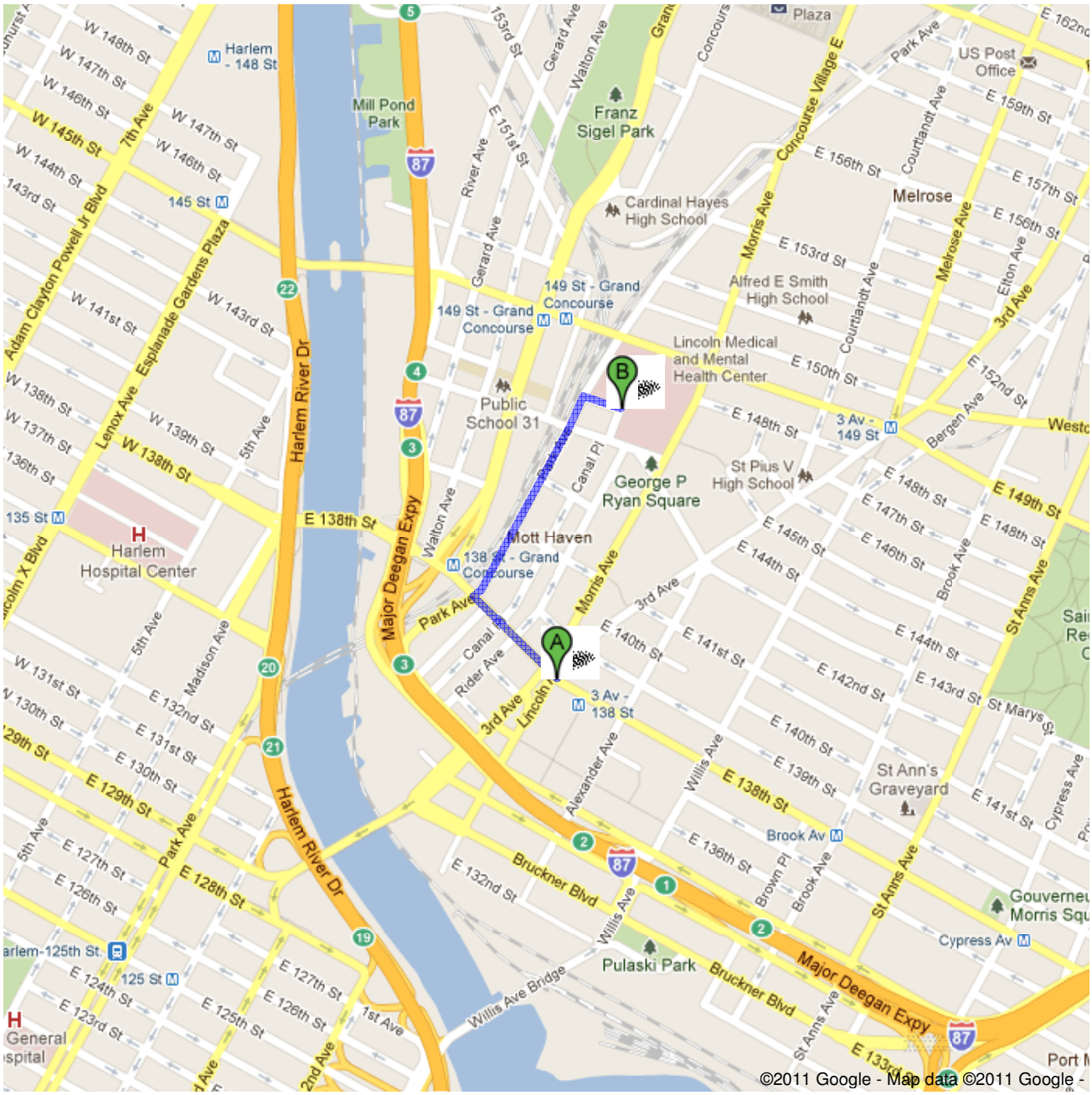
Appendix A

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Google maps

Directions to Lincoln Medical and Mental Health Center
234 East 149th Street, Bronx, NY 10451-5504 - (718) 579-5000
0.6 mi – about **2 mins**



285 E 138th St, Bronx, NY 10454

1.	Head **northwest** on **E 138th St** toward **Lincoln Ave**	go 0.2 mi total 0.2 mi
2.	Turn right onto **Park Ave** About 1 min	go 0.3 mi total 0.5 mi
3.	Turn right onto **E 146th St**	go 292 ft total 0.6 mi

Lincoln Medical and Mental Health Center
234 East 149th Street, Bronx, NY 10451-5504 - (718) 579-5000

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

Job Hazard Analyses

Appendix B

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

	SAFE WORK PRACTICE	
ERM	SOP #:	1
	Title:	Hazard Communication
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on meeting regulatory requirements and ensuring that the information necessary for the safe use, handling and storage of hazardous chemicals is provided and made available to employees.

DEFINITIONS

- **Hazardous Chemical –** Any chemical which is a physical hazard or a health hazard.

- **Hazard Warning –** Any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s).

- **Health Hazard –** A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

- **Physical Hazard –** A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

PROCEDURE

A. The Field Safety Officer will develop a chemical inventory of all known chemicals to be used or present as a potential contaminant at the job site.

B. The Field Safety Officer will ensure that all containers (drums, bottles, etc.) are labeled with the identity of the known hazardous chemical contained and any appropriate hazard warnings. Containers that are not labeled or where labels have faded or been removed will be relabeled immediately.

C. The Field Safety Officer will include NIOSH International Chemical Safety Data Cards for chemicals present as site constituents of concern and Material Safety Data Sheets (MSDSs) for chemicals brought to the site for the job. For assistance, contact a H&S team member.

D. The Field Safety Officer will ensure employees have been trained on site-specific HazCom, including:

1. Methods that may be used to detect a release of hazardous chemical(s) in the workplace;
2. Physical and health hazards associated with chemicals;
3. Protective measures to be taken;
4. Safe work practices, emergency responses and use of personal protective equipment (PPE); and
5. Information on the Hazard Communication Standard including:
   a. Labeling and warning systems, and
   b. An explanation of Material Safety Data Sheets.

E. The Field Safety Officer will identify PPE based on the task involved and the chemical properties.

F. The Field Safety Officer will inform employees of any non-routine tasks and the chemical hazards associated with the tasks. Review the safe work practices and use of required PPE prior to the start of such tasks.

G. The Field Safety Officer will provide information on hazardous chemicals known to be present to subcontractors and other employers on the site. Employers are responsible for providing necessary information to their employees. Ensure other onsite employers are provided with the applicable HazCom information.

H. All site personnel are required to report any incident of a chemical over-exposure or of a chemical spill to the Field Safety Officer. Follow the emergency response/spill response procedures described in the HASP.

REFERENCES

Regulatory References

- 29 CFR 1910.1200, Hazard Communication

Technical References

NIOSH Universal Chemical Safety Data Cards

Procedural References

- SWP 9, Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	2
	Title:	Medical Services / First Aid
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure describes the requirements for providing medical services and first aid at the job site.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will identify the mode by which medical services and first aid will be administered and document in the Health and Safety Plan (HASP). This will generally be recorded by identifying the nearest medical facility to the job site and providing a map with the location identified.

B. In the absence of reasonably accessible medical services (i.e., within 5 minutes by ambulance), the Field Safety Officer or a person certified in first aid will be available at the site to render first aid.

C. At jobsites where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, quick-drenching/eye washing facilities must be provided.

D. First aid supplies must be easily accessible at a job site, when required. The contents of the kit must be checked by the Site Safety Officer before being sent out on each job and weekly during the job, to ensure that items used are replaced.

E. Field first aid kits should contain the following items:

Band aids 3/4" x 3"
Non-stick pads, medium
Kling rolled bandage 2"
Triangular bandage 51"
Hypo-allergenic first aid cream
Adhesive Tape ½" x 5 yd
Scissors
Butterfly bandages
Antiseptic wipes
Burn cream, 8 oz.
Foil packs
Amoply, ammonia inhalants 0.33 ml.
Tylenol, extra strength
Oval eye pads
Examination gloves

REFERENCES

Regulatory References

- 29 CFR 1926.50, Medical Services and First Aid

Technical References

- ANSI Z308.1-1978, Minimum Requirements for Industrial Unit-Type First-aid Kits

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance on meeting regulatory requirements when airborne contaminants may be present at the job site. This procedure applies to all types of airborne contaminants which may cause adverse health effects. These contaminants may be in the form of dusts, mists, gases, vapors or fumes.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will develop an Air Monitoring Plan (AMP) for chemical constituents identified at the job site. The AMP must include the types of samples to be collected, such as real-time measurements, personal breathing zone and area samples, as well as identify the contaminants which will be monitored for.

B. Additional regulatory requirements may be triggered if a potential site contaminant is covered by an Occupational Safety and Health Administration (OSHA) substance-specific standard. The following list of contaminants have such regulations:

Asbestos	Coke Oven Emissions
13 Carcinogens	1,2-Dibromo-3-Chloropropane
Vinyl Chloride	Acrylonitrile
Inorganic Arsenic	Ethylene Oxide
Lead	Formaldehyde
Hexavalent Chromium	Methylenedianiline
Cadmium	1,3-Butadiene
Benzene	Methylene Chloride

CHEMICAL-SPECIFIC INFORMATION

Several chemicals listed in the table above are commonly encountered during ERM work on project sites. Additional information for more commonly-encountered chemicals is provided below.

Benzene

Potential employee exposure to benzene most commonly occur at ERM from installation, development, and sampling of groundwater wells, or from performing remediation activities involving benzene-contaminated soil. The occupational exposure limit for benzene is 1 ppm as an 8-hour time weighted average, with a short term exposure limit of 5 ppm as a 15-minute average.

As part of the industrial hygiene program at ERM, periodic eight-hour air samples are collected while ERM employees are performing tasks involving benzene-contaminated or potentially-contaminated soil or groundwater. Results of historical industrial hygiene monitoring and photoionization detector monitoring indicate that ERM employee exposure is well below the PEL.

A written program to reduce employee exposures below the permissible exposure limit is not required based on the results of historical air monitoring. If future monitoring results indicate an exposure over the permissible limit, a written program to reduce employee exposures will be developed and implemented.

Inorganic Lead
ERM employees are potentially exposed to lead from remediation activities where inorganic lead-contaminated soil is present. Past industrial hygiene monitoring has shown the potential for employee exposure to inorganic lead at or able the permissible exposure limit. ERM has developed a Lead Exposure Control Program outlining steps to be taken to control these exposures. The program is located at http://minerva.erm.com/Support/HS/AmericasHS/HS%20Program%20Documents/18.0%20Lead%20Exposure%20Compliance.pdf

REFERENCES

Regulatory References

- 29 CFR 1910.1000, Air Contaminants
- 29 CFR 1910.1001, Asbestos
- 29 CFR 1910.1003, 13 Carcinogens
- 29 CFR 1910.1017, Vinyl Chloride
- 29 CFR 1910.1018, Inorganic Arsenic
- 29 CFR 1910.1025, Lead
- 29 CFR 1910.1026, Hexavalent Chromium
- 29 CFR 1910.1027, Cadmium
- 29 CFR 1910.1028, Benzene
- 29 CFR 1910.1029, Coke Oven Emissions
- 29 CFR 1910.1044, 1,2-Dibromo-3-Chloropropane
- 29 CFR 1910.1045, Acrylonitrile
- 29 CFR 1910.1047, Ethylene Oxide
- 29 CFR 1910.1048, Formaldehyde
- 29 CFR 1910.1050, Methylenedianiline
- 29 CFR 1910.1051, 1,3-Butadiene
- 29 CFR 1910.1052, Methylene Chloride

Technical References

- ACGIH Threshold Limit Values
- NIOSH Pocket Guide to Chemical Hazards

Procedural References

- SWP Respiratory Protection
- SWP Confined Space Entry
- SWP Line Breaking/Blanking

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
12/21/2011	2	RLE	Added language specific to benzene and inorganic lead

SCOPE

This procedure provides work practices to minimize the impact of heat stress caused by exposure to hot environments or working conditions.

DEFINITIONS

- **Acclimatization –** The ability to adjust to hot working conditions. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

- **Heat Index –** An accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing heat stress-related health issues. Prevention techniques include:

1. Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from:
   - www.nws.nooa.gov
   - National Weather Service Phone Numbers
   - Weather Channel TV Network

2. Provide access to shade as close as feasible to work areas, with adequate ventilation, and permit access by employees at all times. If the temperature does not exceed 85° F, provide access to shade upon request. The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned and the air conditioner is on.
3. In situations where provision of shade is not safe or feasible, use alternative cooling measures that provide equivalent protection.
4. Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
5. Drink at least 6-8 ounces of cool water every 60 minutes for the entire work shift.
6. Review with employees during morning tailgate meetings the importance of drinking water and not waiting until they are thirsty, the number and schedule of water and rest breaks, the signs and symptoms of heat illness, and emergency response procedures in the HASP. When the temperature exceeds or is expected to exceed 90° F, encourage employees throughout the work shift to drink water and use shade for breaks and as needed to prevent overheating.
7. During a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9° F or more), the work day will be cut short, will be rescheduled (e.g.,

conducted at night or during cooler hours), or if possible cease for the day. If schedule modifications are not possible and workers have to work during a heat wave, increase the number of water and rest breaks, supervise workers to ensure that they stop work and take breaks, and observe closely all workers for signs and symptoms of heat illness.

8. Closely supervise employees during heat waves and when starting a new job, to ensure adequate acclimatization.
9. Use the buddy system and look for signs of heat stress. Any employee with signs of heat stress must immediately proceed to a shaded area. Signs and symptoms for various heat stress disorders and recommended first aid are listed in the following table.

Disorder	*Symptoms*	*Cause*	*Prevention/First Aid*
Heat Rash or Prickly Heat	♦ Rash ♦ Itching	♦ Hot, humid conditions ♦ Sweat doesn't evaporate easily ♦ Sweat ducts become clogged	♦ Ointments ♦ Keep skin clean and dry ♦ Good daily personal hygiene
Heat Cramps	♦ Sudden onset of muscle cramps usually in legs or arms ♦ Hot, moist skin ♦ Normal pulse ♦ Normal or slightly elevated temperature	♦ Loss of water (sweating) ♦ Loss of electrolytes ♦ Replacing water but not electrolytes	♦ Move into shade ♦ Loosen clothing ♦ Drink tepid electrolyte drinks or water ♦ Seek medical assistance if conditions persist
Heat Exhaustion	♦ Pale, clammy skin ♦ Profuse perspiration ♦ Thirst from dehydration ♦ Weakness ♦ Headache ♦ Nausea ♦ Loss of coordination	♦ Overexertion ♦ Excessive loss of water and electrolytes	♦ Move into shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by applying damp cool compresses or ice packs ♦ Drink tepid electrolyte drinks or water ♦ Summon medical assistance
Heat Stroke	♦ Elevated temperature (>103F) ♦ Flushed, hot, dry skin ♦ Absence of sweating ♦ Delirious ♦ Rapid pulse ♦ Nausea ♦ Headache ♦ Dizziness ♦ Unconsciousness	♦ Failure of body's cooling (sweating) mechanism	♦ Summon medical assistance ♦ Move to shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by fanning or applying damp compress or ice packs

10. The Field Safety Officer must verify that a work-rest cycle based on the heat index is implemented for site workers as applicable. Refer to the following three tables. To use the chart, read the temperature at the left and humidity across the top, the heat index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108. Determine what the associated risk level is, based on the heat index. Use the risk level and heat index to determine the appropriate work-rest cycle.

Heat Index Chart

Relative Humidity (%)														
Temperature (F)		**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	102	106	110	114	119	124	129	136			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	106	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	80	81	81	82	82	83	84	84	85	86	86	87

Heat Index Risk Level and Associated Health Effects

Heat Index	***Associated Risk***
>130	*Extreme Danger* Heat stroke highly likely with continued exposure
105-130	*Danger* Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity
90-105	*Extreme Caution* Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80-90	*Caution* Fatigue possible with prolonged exposure and/or physical activity

NOTES:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.

The work-rest cycle outlined below should be implemented based on the professional judgment of the Field Safety Officer and/or the Project Health and Safety Consultant. Workers must drink 8 ounces of cool water at each break.

Heat Index	*Risk Level*	*Work-Rest Cycle*
> 130	Extreme Danger	15 minute break every 30 minutes
105-130	Danger	15 minute break every 60 minutes
90-105	Extreme Caution	15 minute break every 90 minutes
80-90	Caution	15 minute break every 120 minutes

B. The Field Safety Officer and the Project and/or Construction Manager will observe workers to verify compliance with and effectiveness of prevention techniques.

C. When an employee displays possible signs or symptoms of heat illness, the Field Safety Officer will check the sick employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care. Do not leave a sick worker alone in the shade, as he or she can take a turn for the worse!

D. Call emergency service providers per procedures outlined in HASP if an employee displays signs or symptoms of heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face), does not look OK or does not get better after drinking cool water and resting in the shade. While the ambulance is in route, initiate/continue first aid (cool the worker: place in the shade, remove excess layers of clothing, place ice pack in the armpits and join area and fan the victim). Do not let a sick worker leave the site, as they can get lost or die (when not being transported by ambulance and treatment has not been started by paramedics) before reaching a hospital!

E. In the event a heat stress related incident occurs, the Field Safety Officer will report the incident following guidelines in the HASP.

F. Supervisors will be trained on these written procedures prior to being assigned to supervise other workers. Employees will be trained on these procedures via review of the site HASP and through participation in daily site tailgate meetings.

REFERENCES

Regulatory References
Heat Illness Prevention Standard – Title 8 California Code of Regulations Section 3395

Technical References

- NOAA – National Weather Service, Heat Index, Measure of How Hot it Feels

Procedural References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
8/3/2011	1	RLE	Revised to incorporate CA Heat Illness Prevention Standard

	SAFE WORK PRACTICE	
ERM	SOP #:	5
	Title:	Cold Stress
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to minimize the impact of cold stress caused by exposure to cold environments or working conditions.

DEFINITIONS

- **Frostbite –** Occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

- **Hypothermia –** This is the most severe form of cold stress and results from a drop in the body's core temperature. Hypothermia can occur in relatively mild temperatures if there is a wind and the person's clothing becomes wet. The signs or symptoms of hypothermia are:
  - First, uncontrollable shivering and the sensation of the cold;
  - Heartbeat slows and may become irregular;
  - Pulse weakens and blood pressure changes;
  - As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion;
  - When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities; and
  - Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing cold stress-related health issues. Prevention techniques include:

1. Require the use of additional protective clothing.
2. Allow workers to change clothes that have become wet.
3. Provide thermal insulating materials on metal handles of tools and equipment.
4. In snowy or icy conditions, require the use of UV eye protection, as well as from blowing crystals.
5. Provide a warm and sheltered area for changing clothes and taking breaks.
6. Provide hot liquids, such as soups, warm drinks, etc. in the break area.

7. Use the buddy system and look for signs of cold stress. Any employee observed with signs of cold stress shall immediately proceed to the break area.

B. The Field Safety Officer and the Project and/orConstruction Manager will observe to verify compliance with and effectiveness of prevention techniques.

C. The Field Safety Officer will provide first aid treatment for cold stress related health issues include moving to warm area. Seek medical attention if signs or symptoms of hypothermia or frostbite are present.

REFERENCES

Regulatory References
None.

Technical References
None.

Procedural References
None.

REVISION LOG

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12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance for determining appropriate means for handling natural hazards that may be encountered while conducting fieldwork.

DEFINITIONS

None.

PROCEDURE

Potential exposure to natural hazards during performance of projects performed in the outdoor environment can range from minimal to substantial. The hazards discussed in this document may be present on any outdoor project and should be guarded against. Infrequent hard freezes may allow insects and snakes to be active all year round in some parts of the United States. Refer to Attachments 1 through 3 for photos and more thorough descriptions of the more common natural hazards, which might be encountered.

A. Identify type of natural hazard present.

B. When natural hazards (such as poisonous plants, feral animals, insects and snakes) are encountered, back away and evaluate the situation.

C. Develop a plan which may include any of the following:

1. Remove the natural hazard if it can be done safely.
2. Avoid the natural hazard if it cannot be removed. Additionally, use appropriate PPE or outer clothing for protection from the hazard. Refer to SWP for Personal Protective Equipment.
3. Get assistance in removing or working around the natural hazard. In some instances, this may require professional help from animal control or an insect expert.

D. In the event there is contact with the natural hazard, if it appears to be a life threatening situation, such as anaphylactic shock or a snake bite, seek medical attention immediately.

POISONOUS PLANTS

1. Poison ivy is in the form of a vine, while oak and sumac are bush-like.
2. All produce a delayed allergic hypersensitivity.
3. The plant tissues have an oleoresin, which is active in live, dead, and dried parts and may be carried through dust, contaminated articles, and the hair of animals.
4. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters.
5. The best antidote for poisonous plants is recognition and avoidance.
6. Should exposure to any of these plants occur, notify the Field Safety Officer and wash the affected area with a mild soap and water, but do not scrub the area.

TICKS

1. Ticks attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission.
2. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.
3. Periodically during the workday employees should inspect themselves for the presence of ticks. A thorough inspection should be performed at the end of the workday.
4. Notify the Field Safety Officer of any tick bites as soon as possible, medical attention may be required.

SPIDERS

1. Black Widow
    a. The black widow is a common venomous spider found in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles.
    b. If disturbed, they typically will retreat to a corner of their web but can be induced to bite only if pressed against the skin.
    c. Notify the Field Safety Officer if bitten, because neurotoxins are injected, it is important to seek immediate medical attention.

2. Brown Recluse
   a. The brown recluse or Fiddle Back Spider is another common venomous spider.
   b. It hides in dark niches and corners, where it may spin a poorly organized, irregular web.
   c. It is shy and will try to run from a threatening situation but will bite if cornered.
   d. Check boots and protective clothing for spiders prior to putting them.
   e. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Notify the Field Safety Officer if bitten.
   f. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop.

FIRE ANTS

1. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers.
2. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations.
3. The first ant sting releases a chemical substance that triggers other ants of the colony to sting.
4. Anyone seeing fire ant mounds present at the work site should notify the Field Safety Officer, who will then notify the rest of the crew so the mounds may be avoided if possible.

CHIGGERS

1. Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite.
2. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush.
3. The larvae attach themselves to the clothing of people or to the fur of passing animals.
4. Wear loose-fitting clothing (if possible) when working outdoors. Apply a repellent containing DEET (N,N-diethyl-meta-toluamide), to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions

5. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
6. Flowers of sulfur is another repellant of chiggers. Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.
7. Shower or bathe at the end of each workday to ensure chiggers are removed.

FLYING INSECTS

1. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur.
2. Wear long-sleeved clothes and long pants treated with repellent. Do not treat unexposed skin. Use the repellent according to the manufacturer's recommendations provided on the container.
3. Personnel should report flu-like symptoms to the Field Safety Officer, medical attention may be needed.

SNAKES

1. The most effective way to prevent snakebites is to avoid snakes.
2. Personnel should avoid walking in high grass and underbrush.
3. Visual inspection of work areas should be performed prior to activities taking place.
4. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg.
5. No attempts at killing snakes should be made; many people are bitten in such an attempt.
6. If a snake bites someone, notify the Field Safety Officer and seek medical services.

ALLIGATORS

1. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators.
2. Do not dump food or scraps into or near the water. This can attract alligators.
3. Always be aware of your surroundings and use caution and common sense.
4. If at any time personnel observe alligators at the site they will immediately inform the Field Safety Officer, who will then notify the rest of the employees and local wildlife personnel.

FERAL ANIMALS

1. Feral animals such as rats or other wildlife may be encountered during fieldwork.
2. If an animal is diseased, injured or tending a nest, they may become aggressive.
3. Notify the Field Safety Officer if feral animals are at the site, who will then notify the rest of the employees and local wildlife personnel.

ATTACHMENTS

Attachment 1, Poisonous Plants
Attachment 2, Insects
Attachment 3, Snakes
Attachment 4, Other Natural Hazards

REFERENCES

Regulatory References

None

Technical References

None

Procedural References

SWP Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
7-30-12	1	DH	Last sentence corrected

Attachment 1

Poisonous Plants

Most species of poison ivy, oak, and sumac have three leaflets; hence, the saying, "Leaves of three, let it be." These plants vary significantly in appearance in different regions of the country, but in most species the flower and fruit structures arise in the angle between the leaf and the twig, the flowers are greenish in spring, and the plant's mature fruit is off-white or pale yellow-green.

Several varieties, including two species each of poison ivy, poison oak, and poison sumac and six subspecies of poison ivy (*Toxicodendron radicans*), are found in the United States. Poison ivy (see figure A below) generally grows east of the Rocky Mountains and poison oak in the West. Both poison ivy and poison sumac are found along the Gulf Coast. Poison oak prefers swampy areas in the Southeast.

Figures A1, A2: Courtesy of Lisa A. Gamer, MD; figure A3: staff photo; figure A4: Janet Robidoux

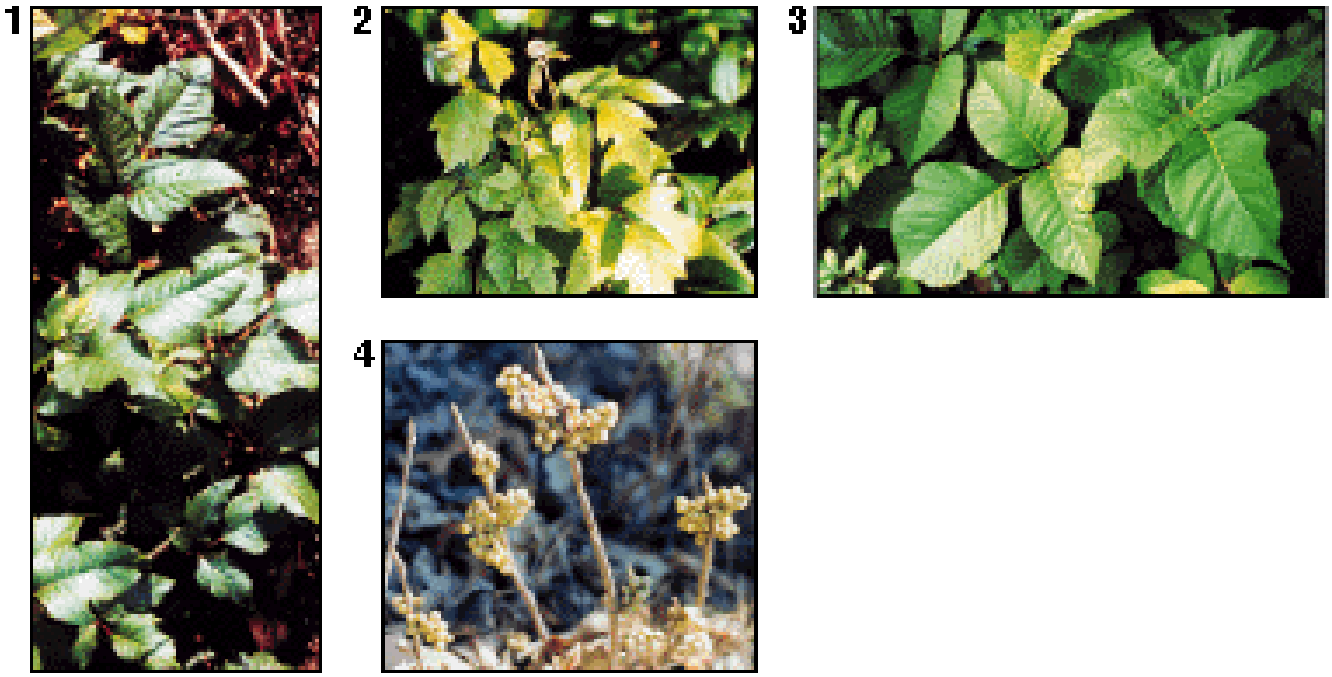


Figure A. Poison ivy (Toxicodendron radicans) can grow as a shrub or vine, but all varieties are characterized by glossy leaves that grow in clusters of three leaflets. The varieties shown here are found in Texas (1,2) and Minnesota (3). The off-white or pale yellow-green berries of poison ivy (4) often remain on the plant through the winter.

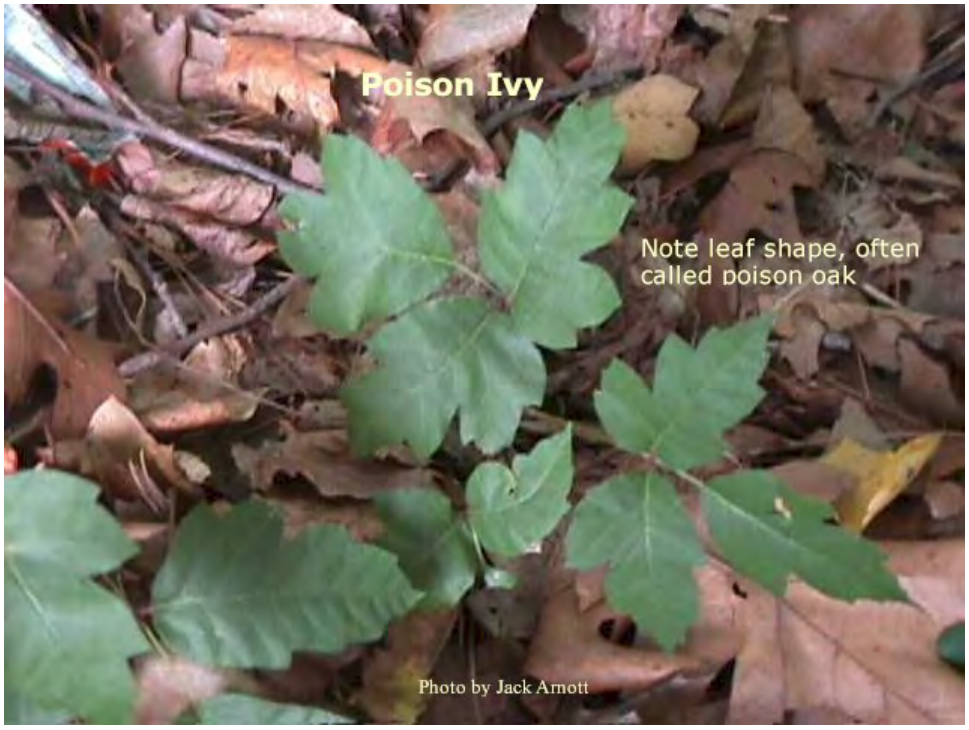
Poison Ivy

A climbing vine with three serrated-edge, pointed leaves grows in the East, Midwest and South. In the northern and western states, poison ivy grows as a non-climbing shrub.

The appearance of these plants is variable. Leaves are alternate and normally consist of three leaflets with the stalk of the central leaflet being longer than those of the other two are but can be found with five or even seven leaflets. The leaflets are two to four inches long, dull or glossy green with pointed tips. The middle leaflet is generally larger than the two laterals. The edges of the leaflets may be toothed, lobed, or smooth. Virginia Creeper (*Parthenocissus quinquefolia*) is non-poisonous vine with five leaflets that is often mistaken for poison ivy.

Poison ivy can be a shrub or a woody vine. Yellowish-green flowers occur in compact clusters in leaf axils, in June or July followed by waxy, gray-white berries about three-sixteenths of an inch in diameter in late summer.


Virginia Creeper
Parthenocissus quinquefolia
Poison Ivy
Toxicodendron radicans
Photo by Jack Arnott


Poison Ivy
Note leaf shape, often called poison oak
Photo by Jack Arnott

Poison Oak

Poison oak also has three leaves. It grows in the sandy soil of the Southeast as a small shrub. In the western United States poison oak is a very large plant that grows as a standing shrub or climbing vine. Eastern poison oak has the most "oak-looking" leaves of any of the species. It usually has multi-lobed leaves, no aerial roots on the stems, and fuzzy fruits and leaves. It loves sandy soils. Western poison oak is found only along the Pacific coast and into the mountains and it usually has aerial roots extending from the main stem.

Poison Sumac

A shrub or bush with two rows of 7-13 leaflets, most common in the peat bogs of the Northern United States and in swampy Southern regions of the country. A water loving swamp shrub (dendritic) or bush with two rows of 7-13 leaflets; growing from 6 to 20 feet in height, the Poison Sumac is found in the east from Quebec to Florida and westward along the coast to far west Texas between Shelby and Hardin counties.

Listed below are recommended actions to take to reduce the potential exposure to poisonous plant:

- Determine what types of poisonous plants may be present at the specific site.
- Use repellant sprays and coatings.
- Use netting or long sleeves with cuffs and long pants.
- Regularly inspect skin.
- Maintain a first aid kit on hand.

Attachment 2
Insects

Chiggers

Chiggers, also known as "red-bugs" or "harvest mites", are the immature stages of a tiny red mite. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush. The larvae attach themselves to the clothing of people or to the fur of passing animals. Before settling down to feed, chiggers move to a constriction, such as sock tops, waistbands, or armpits. Feeding chiggers inject a salivary fluid, which dissolves the host's cells, and then they suck up the liquefied tissue. Within a few hours, small, reddish, intensely itching welts appear. These bites may continue to itch for several days up to two weeks after the chigger is dislodged. Following are suggestions that should provide some protection from chiggers:

- Stay out of areas where chiggers are likely to be present including wood lots, pastures, roadside ditches, or other areas with tall grasses and weeds. Chiggers are especially common in moist low-lying areas.
- Wear loose-fitting clothing (if possible) when working outdoors. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
- Apply a repellent containing DEET to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.
- Another repellant of chiggers is flowers of sulfur. Flowers of sulfur is powdered elemental sulfur available at a drug store or pharmacy as an over-the-counter preparation. It has a slight, rotten egg smell. Areas on the body that have tight clothing up against them such as socks, waistbands, etc. may be dusted with sulfur powder. Surveyors and other field personnel state that they fill a sock with sulfur and are able to dust these areas efficiently.

Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

- Immediately after possible exposure to chiggers, take a bath, thoroughly scrubbing the body with hot soapy water. This will kill or dislodge many of the chiggers. The clothes that were worn when the bite(s) occurred should be placed in a plastic bag for temporary storage until they can be laundered.
- When bites begin to itch, one course of treatment is to apply rubbing alcohol, followed by one of the nonprescription local anesthetics. A baking soda paste, calamine lotion, or product such as "After-Bite" also will help reduce discomfort. Avoid scratching bites since this only increases irritation and may lead to a secondary infection of the bite.

Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the FSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

Spiders

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally, Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. In addition, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

Another venomous spider common in the southern United States is the Brown Recluse or Fiddle Back Spider. The Brown Recluse is about 1/4 to 1/2 inches in body length (most adults are about the size of a United States dime to a US quarter with legs extended). Coloration ranges from tan to dark brown, with the abdomen often darker than the rest of the body. The feature that most distinguishes the brown recluse from many other harmless spiders is a

somewhat darker violin-shaped marking on top of the leg-bearing section of the body. The neck of the violin "silhouette" points towards the rear (abdomen) of the spider. The brown recluse roams at night seeking its prey. During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. Eggs are deposited in 1/2 inch long off-white silken egg sacs, often appearing flattened beneath and convex above. It is shy and will try to run from a threatening situation but will bite if cornered. People are sometimes bitten while they are asleep because they roll onto a brown recluse spider while it is hunting in the bed. More often the victim is bitten while putting on a shoe or piece of clothing that a spider has selected for its daytime hiding place. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.[1]

Fire Ants

Fire ants are approximately 1/4-inch long and live in underground chambers that typically contain over 1,000 ants. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations. The first ant sting releases a chemical substance that triggers other ants of the colony to sting. Anyone seeing fire ant mounds present at the work site should notify the SSHO, who will then notify the rest of the crew so the mounds may be avoided if possible.

Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Section 3.4.4 discusses problems associated with them. Mosquitoes can be the vectors for diseases such as the West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,N-diethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

There is currently no vaccine to protect humans against Saint Louis Encephalitis or West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, for example, heavy, long

sleeve work shirts and heavy dungarees/jeans may be indicated. Activity at projects where disposable coverall use (i.e., Tyvek®) is specified, further reduces the risk of mosquito bites.

- For activities where only Level D PPE is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 30 percent DEET. In concentrations greater than 35 percent, DEET provides no additional protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent reapplication or saturation is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.
- When additional protection against mosquitoes is necessary, commercially prepared "clothing and gear" insect repellants containing 0.5 percent permethrin may be used. These repellants, such as Repel Permanone™ are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer's recommendations provided on the container.
- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the FSO.

West Nile Virus

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

Saint Louis Encephalitis

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.

Table 1

Flying Insect Information

Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellant and wear gloves. Stay in windy areas.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid Nest. Do not swat at them.
Bee	Generally have yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Attachment 3
Snakes

Copperhead


Coral

Cottonmouth


Diamondback Rattlesnake


Water Moccasin

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part still
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility

Attachment 4
Other Natural Hazards

Alligators

Alligators live in nearly all Louisiana parishes but are most common in the major river drainage basins and large lakes in the southern portion of the state. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June - July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Do not dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the SSO, who will then notify the rest of the crew and local wildlife personnel.

Feral Animals

Feral animals such as rats or other wildlife may be encountered during fieldwork. Typically, feral animals are as afraid or more afraid of humans and when encountered will run away from human contact. However, if an animal is diseased, injured or tending a nest, they may become aggressive. The most common disease encountered with feral animals is rabies. Signs of a rabies-infected animal include:

- Changes in an animal's behavior;
- General sickness;
- Difficulty swallowing;
- An increase in drool or saliva;
- Wild animals that appear abnormally tame or sick;
- Animals that may bite at everything if excited;
- Difficulty moving or paralysis; and
- Death.

Animals in the early stage of rabies may not have any signs, although they can still infect you if they bite you. The incubation period is the time from the animal bite to when signs appear. In rabies, it is usually 1-3 months. However, it can last as long as several years. Once the virus reaches the brain or spinal cord, signs of the disease appear. **In the event an animal is encountered on the site, do not approach it.** If it exhibits one or more of the signs listed above, call local wildlife personnel to get assistance.

	SAFE WORK PRACTICE	
ERM	SOP #:	7
	Title:	Personal Protective Equipment
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance for determining appropriate Personal Protective Equipment (PPE) to be worn at the job site, based on new tasks and chemical or physical agents identified in the field. The initial determination for proper PPE is completed as part of development of the HASP.

DEFINITIONS

None.

PROCEDURE

A. The Field Safety Officer will complete a hazard assessment of the tasks involved and identify the appropriate PPE based on the task and the chemical or physical agents involved. The written hazard assessment certification must be documented in the HASP.

B. The Field Safety Officer will communicate to employees the PPE requirements for the tasks involved.

C. The Field Safety Officer will provide PPE that properly fits the employee(s).

D. The Field Safety Officer will conduct daily site walks to verify appropriate use of PPE.

E. A H&S team member or Field Safety Officer will provide training to the employees which includes at least the following:

1. When PPE is necessary;
2. What PPE is necessary;
3. How to properly don, doff, adjust and wear PPE;
4. The limitations of the PPE; and
5. The proper care, maintenance, useful life and disposal of the PPE.

F. Re-training by the Field Safety Officer may be required if:

1. Changes at the job site make previous training obsolete.
2. Changes in the types of PPE make previous training obsolete.
3. Inadequacies in an affected employee's knowledge or use of PPE indicate the employee requires additional training.

G. Types of PPE include the following:

1. Eye and Face Protection

a. All eye and face protection must comply with ANSI Z87.1-1989.
b. Safety glasses
   - Side shields must be worn when there is a hazard of flying objects.
   - Prescription glasses must meet the ANSI Z87.1-1989 requirements or must have eye protection over them meeting the ANSI standard requirements.
c. Chemical goggles
d. Face shield

2. Head Protection
   a. All head protection (hard hats) must comply with ANSI Z89.1-1989.

3. Foot Protection
   All foot protection must comply with ANSI Z41-1991.
   a. Safety-toed shoes
   b. Rubber boots or rubber safety-toed boots

4. Hand Protection
   Hand protection must be selected based on the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use and the hazards and potential hazards identified. A member of the H&S team must verify and document selection of appropriate chemical resistant gloves.
   a. Work gloves, such as leather or cotton
   b. Chemical gloves, such as nitrile, neoprene, Viton, butyl rubber
   c. Cut-resistant gloves, such as Kevlar

5. Hearing Protection
   a. Ear plugs
   b. Ear muffs

6. Respiratory Protection (Refer to SOP – 9)

7. Other PPE
   a. Disposable Coveralls
   b. Fire Resistant Clothing

REFERENCES

Regulatory References

- 29 CFR 1910.132, Personal Protective Equipment, General Requirements
- 29 CFR 1910.133, Eye and Face Protection
- 29 CFR 1910.135, Head Protection

- 29 CFR 1910.136, Foot Protection
- 29 CFR 1910.138, Hand Protection

Technical References

- ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection
- ANSI Z89.1-1989, American National Standard for Personal Protection – Protective headwear for Industrial Workers – Requirements
- ANSI Z41-1991, American National Standard for Personal Protection – Protective Footwear

Procedural References

- SWP Respiratory Protection

REVISION LOG

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	SAFE WORK PRACTICE	
ERM	SOP #:	8
	Title:	Respiratory Protection
	Last Rev.:	1/12/2011
	Page:	1 of 4

SCOPE

This procedure identifies the work practices and regulatory requirements with regard to respiratory protection.

DEFINITIONS

- **Escape Respirators** – Respiratory devices providing protection only during escape from hazardous atmospheres.

- **Hazardous Atmosphere** - (1) Any atmosphere containing a toxic or disease-producing gas, vapor, dust, fume, or mist, either immediately or not immediately dangerous to life or health; or (2) Any oxygen-deficient atmosphere.

- **Immediately Dangerous to Life or Health (IDLH)** – A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate, or delayed, permanent adverse healths effects, or prevent escape from such an environment.

- **Oxygen Deficient Atmosphere** – An atmosphere containing less than 19.5 percent oxygen by volume.

PROCEDURE

A. The Field Safety Officer must verify that all employees required to wear respiratory protection at the jobsite are qualified (i.e., have completed a medical evaluation, been fit-tested and are trained.)

B. An H&S team member will select respiratory protection based on the hazards at the jobsite. Selection of respiratory protection will be completed as part of the hazard assessment when completing the HASP. If unanticipated conditions are encountered at the jobsite requiring a change in respiratory protection, follow the respiratory protection upgrade process defined in the site specific HASP. Additionally , the Field Safety Officer should contact a H&S team member to re-evaluate PPE requirements

C. Inspection

1. All workers must inspect all non-emergency respirators before each use and during cleaning.
2. The Field Safety Officer must inspect respirators used for emergency use, at least monthly and in accordance with the manufacturer's recommendations, and must check for proper function before and after each use. See Section G of this SOP for situations requiring emergency use respirators.
3. Respirator inspection shall include:

- Check for tightness of connections.
- Check condition of inlet coverings, head harness, valves, connecting tubes, harness assembly, hoses, filter, cartridges, canisters, end-of-service-life indicator, electrical components, and shelf-life date(s).
- Check all rubber and elastomeric parts.
- Check all air cylinders for proper charge.
- For respirators maintained for emergency use, the inspection must be documented with the date of the inspection, the name of the inspector, the findings, remedial action taken, and a serial number or other means if identifying the respirator. A tag or label must be affixed to the storage compartment and replaced with a subsequent inspection tag/label.

4. Any respirator that does not pass inspection shall be immediately removed from service to be repaired or replaced.

D. Use

1. No facial hair is allowed which could come between the sealing surface of the face piece and the face, or interfere with the valve function.
2. Eye protection must be worn such that it does not interfere with the face piece seal.
3. Conduct a seal-check (positive and negative pressure) every time the respirator is donned.
4. The Field Safety Officer must evaluate continuing respirator effectiveness
   - Maintain surveillance of work area to assess jobsite conditions and respirator wearer(s) exposure or stress levels have not changed;
   - Direct respirator wearers to leave the work area:
     - to wash their faces and face pieces to prevent eye or face irritation associated with respirator use;
     - if a respirator wearer detects vapor or gas breakthrough, changes in breathing resistance or leakage of the face piece;
     - to replace the respirator filter, cartridge or canister elements.
   - If a respirator wearer detects breakthrough, changes in breathing resistance or leakage, they must replace or repair the respirator before returning to the work area. Change schedules for substances other than particulates will be addressed in the HASP or Job Hazard Analysis.

E. Maintenance

1. Clean and sanitize respirator after each use.
2. If respirators are not assigned, each respirator must be cleaned and sanitized before being used by a different employee.

3. Respirators being used for emergency use shall be cleaned after being used. These respirators must contain a tag or label on them telling the last date they were inspected and who inspected them.
4. Each respirator shall be cleaned in warm water (not exceeding 110^0F or 43^0C) with sanitizers that effectively clean the respirator and contain an antibacterial agent. For additional cleaning procedures, refer to 29 CFR 1910.134, Appendix B-2, Respirator Cleaning Procedures (Mandatory).
5. Replacement of parts or repairs may be done only by persons trained in proper respirator maintenance and assembly.
6. Replacement parts used shall be only those designated specifically for the respirator being repaired.
7. Any respiratory equipment not repairable, must be destroyed and discarded.

F. Site workers must store respirators to protect them from:

1. physical damage including face piece or valve deformation;
2. contamination;
3. dust;
4. sunlight;
5. extreme temperatures;
6. excessive moisture; and
7. damaging chemicals.

G. Special Circumstances (including but not limited to Immediately Dangerous to Life and Health (IDLH) or unknown concentrations)

ERM employee entry into areas where atmospheres are IDLH or of unknown/suspected high concentrations is not authorized unless the NAHSD concurs. If the Field Safety Officer or Project/Construction Manager encounters special circumstances in the field which were not anticipated in the HASP, such as an IDLH atmosphere or an atmosphere with unknown concentrations or unknown constituents, contact a H&S team member for assistance. Conditions requiring Self-Contained Breathing Apparatus (SCBA) or airline respiratory protection may require additional medical evaluation, fit-test of a different face piece and additional training. Additionally, when using supplied air, additional criteria apply regarding breathing air quality, quantity and flow. For additional information, refer to 29 CFR 1910.134(i).

REFERENCES

Regulatory References

- 29 CFR 1910.134, Respiratory Protection

Technical References

None

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	SAFE WORK PRACTICE	
ERM	SOP #:	9
	Title:	Confined Space Entry
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements for working in confined spaces and to ensure that proper planning has occurred as part of development of the HASP. It is meant as an information document for ERM subcontractors who perform confined space entry. There are two types of confined spaces covered by this procedure: a permit-required confined space and a non-permit confined space.

ERM employees are not authorized to enter confined spaces. If an emergency circumstance occurs where entry into a permit-required confined space is required, the NAHSD must be consulted and must concur with the entry.

DEFINITIONS

- **Confined Space –** An area which:
  - Has adequate size and configuration for employee entry;
  - Has limited means of access or egress; and
  - Is not designed for continuous employee occupancy.

- **Entry into a Confined Space –** The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

- **Non-permit Confined Space** - A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

- **Permit-Required Confined Space –** A confined space that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
  - Contains any other recognized serious safety or health hazard.

PROCEDURE

A. It is ERM's standard policy and practice to never enter into a confined space, as defined above. In situations where an ERM subcontractor enters a confined space, a detailed written Confined Space Entry Program must be developed for the specific site and

specific conditions anticipated to be encountered. Under these circumstances, the subcontractor's Confined Space Entry Program must be reviewed and approved by the NAHSD, and attached as part of the site specific HASP.

B. Additionally, specific training must be completed for any individual(s) involved in confined space entry in accordance with 29 CFR 1910.146.

REFERENCES

Regulatory References

- 29 CFR 1910.146, Permit-Required Confined Spaces

Technical References

None

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DATE	REV. #	APV'D	COMMENTS
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	SAFE WORK PRACTICE	
ERM	SOP #:	10
	Title:	Drum Handling
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure identifies the work practices and regulatory requirements regarding drum handling at the jobsite.

DEFINITIONS

None.

PROCEDURE

A. When handling drums, follow the general drum handling requirements listed below:

1. Hazardous substances and contaminated, liquids and other residues must be handled, transported, labeled, and disposed of in accordance with 29 CFR 1910.120(j).
2. When practical, drums and containers must be inspected and their integrity must be assured prior to being moved.
3. Unlabeled drums and containers must be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
4. Drums must be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling as much as possible.
5. Drums and containers that cannot be moved without rupture, leakage, or spillage must be emptied into a sound container using a device classified for the material being transferred.
6. A ground-penetrating system or other type of detection system or device will be used to estimate the location and depth of buried drums or containers.
7. Soil or covering material must be removed with caution to prevent drum or container rupture.
8. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, must be on hand and ready for use to control incipient fires.

B. When opening drums and containers, such as for sampling or waste characterization purposes, handling shock sensitive wastes, radioactive wastes, or when shipping drums, a site specific drum handling plan must be developed, reviewed by the NAHSD, and included in the HASP

REFERENCES

Regulatory References

- 29 CFR 1910.120(j), Handling Drums and Containers

- 29 CFR 1926.65(j), Handling Drums and Containers

Technical References
None

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SCOPE

This procedure provides requirements and safe work practices for personnel involved in excavation work. Please review the Excavation Safety Checklist (Attachment 1) in verifying that this procedure is being followed.

DEFINITION

- **Accepted Engineering Practices** – those requirements, which are compatible with standards of practice required by a registered professional engineer.
- **Benching (Bench System)** – a method of protecting employees from cave-ins by excavating the sides of an excavation from one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- **Cave-in** –the separation of a mass of soil or rock from the sides of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity to entrap, bury, or otherwise injure and immobilize a person.
- **Competent Person** - one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them
- **Excavation** - any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- **Face or Sides** – the vertical or inclined earth surfaces formed as a result of excavation work.
- **Hazardous Atmosphere** – an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
- **Protective System** –a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective Systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- **Registered Professional Engineer** – a person who is registered as a professional engineer in the state where the work is to be performed.
- **Shield (Shield System)** –a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect workers with in the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses.

- **Shoring (Shoring System)** – a structure such as a metal hydraulic lift, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- **Sloping (Sloping System)** –a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation. The angle of incline required to prevent a cave-in varies with differences in factors such as the soil type, environmental conditions of exposure, and application of surcharge loads.
- **Support System** – means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

PROCEDURE

A. Prior to the start of excavation, the Project/Construction Manager must complete the ERM subsurface clearance procedure to verify clearance of subsurface hazards at the excavation site. Subcontractor Contact should identify the location of utility installations (e.g., sewer, telephone, electric, water lines, etc.) that may be expected to be encountered during excavation.

1. Contact the utility company (-ies) and advise of proposed work requesting them to establish the location of the underground installations.
2. Underground installations must be protected, supported, or removed as necessary to safeguard employees.

B. When equipment is operated adjacent to an excavation or is required to approach the edge of an excavation, a warning system, such as barricades, hand or mechanical signals, or stop logs must be utilized. The system should be inspected:

1. Prior to the start of work and as needed throughout the shift.
2. After every rainstorm or other site condition change that could increase the instability of the excavation.

C. To prevent exposure to harmful levels of atmospheric contaminants or oxygen deficiency (atmospheres containing less than 19.5% oxygen), the following requirements apply:

1. The atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet in depth per SWP 9 Confined Space Entry
2. The proper respiratory protection should be provided per SWP 8 Respiratory Protection.

3. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to verify that the atmosphere remains safe.

D. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment should be attended when in use.

E. Employees should not work in excavations where water has accumulated or is accumulating, unless protective measures such as special support or shield systems to protect from cave-ins have been implemented to protect the employees against the hazards posed by water accumulation.

1. If water is controlled or prevented from accumulating by the use of water removal equipment, a competent person must monitor the water removal equipment and operations.

2. Diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide drainage of the area adjacent to the excavation.

3. Excavations subject to runoff from heavy rains require an inspection by a competent person.

I. Stability of other structures endangered by excavation operations must be stabilized by support systems such as shoring, bracing, or underpinning for the protection of employees. A registered professional engineer should be consulted for determination of stability of structures that may be affected during the excavation work.

K. The ERM subcontractor contact should verify materials and equipment are free from damage or defects that might impair their proper function.

L. Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. A helpful excavation safety checklist is provided as Attachment 1.

ATTACHMENT

- Excavation Safety Checklist

REFERENCES

Regulatory References

- 29 CFR 1926.650 Scope,Application, and Definitions Aapplicable to this Subpart (Subpart P).
- 29 CFR 1926.651 Specific Excavation Requirements.
- 29 CFR 1926.652 Requirements for Portective Systems.

Technical References

None

Procedural References

ERM's Subsurface Clearance Procedure

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ATTACHMENT 1: EXCAVATION SAFETY CHECKLIST

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Prior to starting the job, were utilities notified and underground services located?	☐	☐	☐	Have the supervisors and workers been trained in excavation safety laws and procedures?	☐	☐	☐
Were overhead transmission lines noted and precautions taken to ensure that equipment does not come in contact with them?	☐	☐	☐	Have building, utility poles, trees and any other surface encumbrances or destabilizing forces been taken into consideration?	☐	☐	☐
Have adequate signs been posted and barricades provided?	☐	☐	☐	Has soil classification been done?	☐	☐	☐
Are the workers wearing reflective vests, if necessary?	☐	☐	☐	Has the appropriate means of safeguarding the excavation by OSHA requirements been determined by a Competent Person?	☐	☐	☐
Are vehicles, equipment, and spoil piles correctly placed to allow for the safe passage of traffic and the progress of the construction?	☐	☐	☐	For excavations 4 feet (1.2 meters) deep or more, are ladders, steps or ramps available within25 feet (7.6 meters) of lateral travel?	☐	☐	☐
Has traffic control (fire depts., etc.) been notified?	☐	☐	☐	Are all open pits or shafts either covered or barricaded?	☐	☐	☐

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Is the appropriate safety gear on site?	☐	☐	☐	Are spoil piles at least 2 feet from the edge of the excavation and properly sloped?	☐	☐	☐
Have undermined structures been shored, braced or underpinned, or has a registered Prof. Engineer determined that such measures are not necessary?	☐	☐	☐	Have confined-space atmospheric hazards been considered?	☐	☐	☐
Are utilities crossing the excavation supported from above and does protection from falling materials exist?	☐	☐	☐	Do bridges and walkways have standard guardrails?	☐	☐	☐
				Have means been provided to remove water from the excavation?	☐	☐	☐
				Competent person available on site at all times.	☐	☐	☐

NOTE: Shoring and shielding must be removed in a manner that ensures the safety of workers, and excavations must be back filled as soon as work is completed.

	SAFE WORK PRACTICE	
ERM	SOP #:	13
	Title:	Hand Tools
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure defines minimum expectationse for the safe use and maintanence of tools and equipment, including tools and equipment which may be furnished by employees.

DEFINITIONS

Torque: The circular or rotating motion in tools such as drills, impact wrenches, saws, etc. which results in a strong twisting force

PROCEDURE

A. HAND TOOLS

1. Every tool was designed to do a certain job and employees should use tools only for their intended purpose.
2. Maintain hand tools in good condition - sharp, clean, oiled. .
3. Do not force tools beyond their capacity or use "cheaters" to increase their capacity. Do not use tools for pry bars.

B. PORTABLE POWER TOOLS

1. GUARDING

Guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.

C. OPERATING PRACTICES

1. Loose clothing, rings, and other jewelry must not be worn around operating machines. Keep sleeves buttoned or rolled up.
2. Keep fingers away from moving parts. Shut off machines to remove waste. Use a brush to clean up and debur. Be sure machine is fully stopped and not coasting.
3. Inspect at least daily before start-up. Look for loose or damaged parts and inadequate lighting.
4. Use clamps or vise to hold work.
5. Many machines have Safety Interlocking devices. Verify their operation prior to use , and NEVER BYPASS SAFETY INTERLOCK DEVICES.
6. Examine each power tool before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.

7. Some machines use both pneumatic and electric power. Both must be shut off to make repairs or to adjust moving parts. Bleed down tool to remove any stored energy left in the system.
8. Be prepared in case of jamming**.** Maintain good footing; and use two hands, Circular saws, chain saws and percussion tools shall not be equipped with a locking switch or trigger
9. Flying objects **c**an result from operating almost any power tool. Be aware of others working around you and use proper eye protection.
10. Keep moving parts directed away from your body. Never touch a powered part unless power source is disconnected (such as drill chucks, blades, and bits).
11. Ground Fault Circuit Interrupters (GFCI**) a**re required when using electrical power tools.

REFERENCES

Regulatory References

- 29 CFR 1910.241 Definitions.
- 29 CFR 1910.242 Hand and Portable Powered Tools and Equipment, General.
- 29 CFR 1910.243 Guarding of Portable Power Tools.
- 29 CFR 1910.244 Other Portable Tools and Equipment.
- 29 CFR 1926.300 General Requirements.
- 29 CFR 1926.301 Hand Tools.
- 29 CFR 1926.302 Power-operated Hand Tools.

Technical References

None

Procedural References

SWP 7 Personnel Protective Equipment

REVISION LOG

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	SAFE WORK PRACTICE	
ERM	SOP #:	14
	Title:	Fall Prevention and Fall Protection
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements regarding fall prevention/fall protection for all employees working 6 feet or more above a lower level.

DEFINITIONS

None.

PROCEDURE

A. Fall prevention/protection is required when there is an unprotected side or edge which is 6 feet or more above a lower level. Example situations include but are not limited to:

1. Horizontal walking/working surfaces;
2. Leading edges;
3. Holes in flooring or walls;
4. Formwork and reinforcing steel;
5. Ramps, runways and other walkways;
6. Excavations;
7. Roof work;
8. Precast concrete erection; and
9. Walking/working surfaces not otherwise addressed.

B. In addition, protection from falling objects must also be provided to employees working below, by requiring the use of head protection as well as one of the following methods:

1. Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or
2. Erect a canopy structure and keep potential objects far enough from the edge so they would not go over if they were accidentally misplaced; or
3. Barricade the area into which the objects could fall and prohibit employees from entering into the barricaded area.

C. Where fall prevention, in the form of a physical barrier, is not feasible, and a fall hazard exists, fall protection is mandatory. Fall protection can take on many forms depending on the job task being performed, i.e., permanent and temporary vertical and horizontal lifeline systems, full body harness, shock absorbing lanyards, nets, retractable devices, etc. These are some of the most common methods of fall protection available.

D. In the event work is to be conducted at a height greater than 6 feet, fall prevention and/or fall protection requirements must be incorporated into the HASP. The H&S team must develop a fall prevention/protection plan which will incorporate the use of

physical barriers, administrative controls or fall protection equipment. This plan will be included in the HASP for the site.

E. Additionally, training must be completed for any individual who will be using fall prevention / fall protection equipment. The Field Safety officer must verify all workers have received the appropriate training relative to fall prevention / fall protection.

REFERENCES

Regulatory References

- 29 CFR 1926.501, Duty to Have Fall Protection
- 29 CFR 1926.502, Fall Protection Systems Criteria and Practices

Technical References

None

Procedural References

None

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SCOPE

This procedure defines requirements for safe operation of heavy equipment operation. Heavy equipment includes backhoes, cranes, derricks, dozers, loaders, skid steers, and trucks. It is meant as a reference document to supply to ERM subcontractors to communicate minimum requirements for these activities.

ERM personnel are not authorized to operate heavy and materials handling equipment discussed in this Safe Work Practice.

DEFINITIONS

- **Crane** - means a mechanical device, intended for lifting or lowering a load and moving it horizontally, in which the hoisting mechanism is an integral part of the machine. A crane may be a fixed or mobile machine.
- **Derrick** - A "derrick" is an apparatus consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

PROCEDURE

A. TRAINING

1. Equipment operators must demonstrate training and experience with each piece of equipment before receiving authorization to begin work.

B. INSPECTION

1. All heavy equipment must meet applicable design standards (i.e., ANSI, etc.).
2. The equipment must have a copy of the most recent annual and periodic inspections onboard.
3. The Subcontractor Contact or a designated qualified person must inspect all heavy equipment prior to operation (See Crane and Derrick Inspection Checklist), to verify proper working condition.
4. A copy of the manufacturer's operating manual must be carried on all heavy equipments. The manual must include a load-rating chart that indicates safe loads in various configurations, wire and cable minimums and maximums, and any special operating considerations.

C. OPERATION

1. The Subcontractor must have a standard operating procedure that is implemented for heavy equipment operation.
2. Equipment must be operated in accordance with the manufacturer's instructions and recommendations.
3. Before starting equipment, the equipment operator must make sure no one is working on or near the machinery. If equipment must be operated in close proximity to other operations, a spotter will be required to work with the equipment operator. The spotter and equipment operator must be in radio communication
4. Equipment operators must wear seatbelts and operate equipment in accordance with safe operating speeds and loading
5. When working on slopes, the equipment should be positioned perpendicular to the slope with the center of gravity of the equipment on the lower edge of the slope.
6. Dump trucks must lower their beds **PRIOR** to moving from the dump site
7. All employees should wear appropriate personal protective equipment in accordance with SWP 7 Personal Protective Equipment.
8. Equipment operators should not get on or off a moving machine.

Note: If heavy equipment is located near overhead power lines, contact a member of the H&S team to determine safe working distances.

ATTACHMENTS

- Crane and Derrick Inspection Checklist

REFERENCES

Regulatory References

- 29 CFR 1910.181 Derricks.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.600 Equipment.
- 29 CFR 1926.601 Motor Vehicles.
- 29 CFR 1926.602 Material Handling Equipment.

Technical References

None

Procedural References

SWP 7 Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

ATTACHMENT 1

CRANE AND DERRICK INSPECTION CHECKLIST

Prior to operation each day, inspect:

1. ☐ All control mechanisms for maladjustment interfering with proper operation.
2. ☐ All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. ☐ All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
4. ☐ All chords and lacing.
5. ☐ All hydraulic and pneumatic systems - with particular emphasis given to those which flex in normal operation of the crane.
6. ☐ Hooks and latches for deformation, chemical damage, cracks, and wear.
7. ☐ Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer's specifications.
8. ☐ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
9. ☐ Hydraulic system for proper oil level.
10. ☐ Tires for recommended inflation pressure (mobile cranes).
11. ☐ Wedges and supports for looseness or dislocation (climbing tower cranes).
12. ☐ Braces and guys supporting crane masts; anchor bolt base connections for looseness or loss of preload (tower cranes and derricks).
13. ☐ Derrick mast fittings and connections for compliance with manufacturer's recommendations.
14. ☐ Barge or pontoon ballast compartments for proper ballast; deck loads for proper securing; chain lockers, storage, fuel compartments, and battening of hatches; fire fighting and lifesaving equipment in place and functional; hull void compartments sounded for leakage (floating cranes and derricks).

	SAFE WORK PRACTICE	
ERM	SOP #:	17
	Title:	Personnel Platform (Man Basket) and Aerial Work Platform
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the use, testing, loading and safe work practices for the personnel and aerial platforms. It has been developed as a reference document to provide ERM subcontractors.

ERM personnel are not authorized to operate equipment referenced in this Safe Work Practice.

DEFINITIONS

- **Aerial Device** - An "Aerial device" is any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel.
- **Platform** – A "Platform" is any personnel-carrying device (basket or bucket) which is a component of an aerial device.

PROCEDURE

A. USE

Personnel platforms should only be used when the erection, use and dismantling of conventional means such as a ladder, stairway, , elevated work platform or scaffold, would be hazardous, or is not feasible because of structural design or work site conditions. Only trained persons shall operate personnel and aerial platforms.

B. TESTING

Trial lift, inspection and proof testing.

1. A trial lift with unoccupied personnel platform loaded at least to the anticipated lift weight shall be made from ground level.
2. Daily trial lift shall be performed immediately prior to placing personnel on the platform.
3. The lift operator shall determine daily that all systems, controls and safety devices are activated and functioning properly.
4. The operator is to remain under the 50 percent limit of the hoist's rated capacity.
5. The primary attachment shall be centered over the platform.

C. PERSONNEL PLATFORM

1. Must support its' own weight and five times the maximum intended load.

2. Handrail must comply with Subpart M of the OSHA standard.
3. The platform shall be enclosed from the toeboard to the mid-rail
4. A grab rail must be installed inside the entire perimeter of the platform.
5. Swing out gate access face shall be equipped with a restraining device to prevent accidental opening.
6. Overhead protection is necessary when employees are exposed to falling objects.
7. The platform must be posted or permanently marked indicating weight of platform and maximum rated load capacity.

D. WORK PRACTICES

1. All body parts are to be kept inside the platform during the raising and lowering of the Personnel Platform.
2. Before employees enter or exit a hoisted personnel platform, the platform shall be secured to the structure unless this creates an unsafe condition.
3. Employees occupying the personnel platform shall use a body harness system capable of supporting a fall impact for employees using the anchorages. Employees working over or near water shall comply with OSHA standard 1926.106.
4. The personnel platform shall not be used as a material hoist.

E. PRE-LIFT MEETING

1. A pre-lift meeting attended by the lift operator and his foreman, signal person, and employees to be lifted and their foreman shall be held to review the appropriate provisions of the procedure.

NOTE: Refer to OSHA standard 1926.550 cranes and derricks for additional information.

REFERENCES

Regulatory References

- 29 CFR 1910.67 Vehicle-mounted Elevating and Rotating Work Platforms.
- 29 CFR 1926.552 Material Hoists, Personnel Hoists, and Elevators. Standard.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.106 Working over or near water

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM, clarified ERM position on employees operating powered personnel platforms and aerial work platforms

	SAFE WORK PRACTICE	
ERM	SOP #:	19
	Title:	Lockout/Tagout
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the control hazardous of energy to prevent injury to employees due to unexpected start-up or release of stored energy.

DEFINITIONS

- **Affected Employee**

  Any employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout/tagout or whose job requires them to work in an area in which such servicing or maintenance is being performed.

- **Authorized Employee**

  Any employee who locks out or initiates a tagout procedure on machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this procedure.

- **Circuit Breaker**

  Switch (housed in a distribution panel) controlling the flow of electricity (on/off) to the electrical equipment.

- **Control Switch**

  The switch controlling the flow or electricity between the disconnect switch source and the electrical equipment. Also called:

  a. Start-Stop button.
  b. Butterfly switch.
  c. Control station.

- **Disconnect Switch**

  Switch (normally housed in an electrical control room) controlling the flow of electricity (on/off) to the equipment and its control switch. This switch is also called:

  a. Combination starter switch.
  b. Switch and starter.

- **Zero Mechanical or Energy State**

  That state of a machine in which every power source that can produce machine member movement has been locked out. This includes blocking, controlling or isolation of electric, kinetic or potential energy sources

- **Multi-Lockout Devices**

  A multi-lockout hasp mechanism which can be used so more than one lock can be attached during a lockout. Lock boxes are another alternative for using multiple locks.

- **Personal Lock**

  A safety lock used by authorized personnel that is durable and capable of withstanding excessive force. Any authorized employee uses it to lock out equipment. All locks will be on a "One Lock, One Key, One Employee" system.

- **Tags**

  A standard tag signed and dated shall be attached to the individual's lock. The tag shall be attached by passing the grommet through the lock shackle. The legend on the tag shall read, "DANGER, DO NOT OPERATE". Tags shall be capable of withstanding the environment to which they are exposed for a maximum period of time that exposure is expected.

PROCEDURE

1. The Project/Construction Manager shall inform the affected party responsible for the machinery or equipment being repaired or serviced that the equipment needs to be shut down so it can be locked out, tagged out and tried (electrical only).
2. The authorized party shall be responsible for the de-energizing switches, circuit breakers, pneumatic valves, or hydraulic valves, which control the operations of machinery or equipment that contains or ever contained hazardous energy.
3. Prior to the start of any work, all machines and equipment must be brought to a "zero mechanical/energy state. The Authorized Employee conducting the lockout should attempt to activate ("Try") the equipment with the starting device, to verify the equipment does not show any sign of stored energy.
4. Each authorized employee shall remove their personal lock and tag when they have completed their job and are no longer required to perform any other task on the equipment.
5. When work continues beyond the shift, an individual's lock and tag may remain in place if the Site allows. However, when returning to continue the work, each individual shall check their own lock and tag prior to starting work. Each individual must re-date their tag daily through out the duration of the job. The re-dating will confirm that the individual checked their personal lock, assuring the equipment remains locked out.
6. Shift change and new crews coming in requires the change-out of locks and tags.

A. GROUP LOCKOUT

1. When it is impractical because of the magnitude or complexity of large jobs such as major facility shutdown or overhaul, group lockout can be utilized.

    a. The Project/Construction Manager shall be responsible for arranging the shutdown for energized equipment to be locked and tagged out.
    b. The Subject Matter Expert shall apply locks and tags to all disconnect switches to be worked on.
    c. The keys shall be placed in a group lockbox or comparable mechanism. It shall have a hasp and keeper, which will permit application of a "Lockout Device" so it can accommodate more than one lock.
    d. Each authorized employee shall affix their personal locks and tag with their name and date to the "Lockout Device" on the "Group Lockbox".
    e. Each authorized employee is to test by "Trying" the control switch to assure the equipment has been electrically de-energized before starting work.

REFERENCES

Regulatory References

- 29 CFR 1910.147 The Control of Hazardous Energy (Lockout/Tagout).

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	20
	Title:	Wall and Floor Penetrations
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides guidance on the minimum safety requirements for wall / floor penetrations. Potential hazards that may exist when wall / floor openings are made (in addition to fall hazards) include but are not limited to, concealed pipes, existing electrical wiring, telephone lines and fire alarms.

PROCEDURE

Prior to cutting into walls/floors, visually survey the area of penetration to see if there are any pipes or electrical services that my present an obstacle. If blueprints are available, the Subcontractor should review the prints to determine if any services are present that may be hidden in the wall/floor. Hidden hazards should be expected. Services may be supplied from adjacent floors, rooms or concealed in floors.

Prior to cutting / penetrating walls / floors:

1. Determine if the wall is bearing or nonbearing.
2. For interior walls, remove the ceiling tiles to help determine what services may be hidden in the wall.
3. Cutting both faces of the wall at the same time is prohibited.
4. Barricade both sides of the wall or floor.
5. When it has been determined that utilities are in the wall or floor, and may present a hazard / interference, SWP 19 "Lockout/Tagout Procedure" must be implemented.
6. All floor or wall openings must comply with OSHA 29 CFR 1910.23 "Guarding Floor and Wall Openings and Holes".
7. Before any power saws are used on masonry walls or floors, a visual inspection of both sides of the surface must be made for all utilities.
8. On hollow core walls, exploratory openings shall be made prior to creating an enlarged opening utilizing power tools.
9. The Subsurface Clearance Process must be followed for poured floors requiring core boring.

REFERENCES

Regulatory References

- 29 CFR 1910.23 Guarding Floor and Wall Openings.

Technical References

None

Procedural References

ERM Subsurface Clearance Procedures

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance to ERM employees on the minimum safety requirements for work in areas where ionizing radiation is an employee exposure concern as a known or suspected hazard, as required by Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.96, "Ionizing Radiation," and the requirements of 10 CFR, Part 20, "Standards for Protection Against Radiation" (applicable to environmental consultants). It does not address hazards for non-ionizing forms of radiation such as infrared, ultraviolet, microwave, radio waves, and so on. Health and safety plans (HASP) for work sites with known or suspected ionizing radiation shall include this SWP or the associated Job Hazard Analysis (JHA) as an attachment. General guidelines, exposure limits, and procedures are discussed below.

1.0 GENERAL GUIDELINES

ERM intends to keep all employee radiation exposure levels as low as reasonably achievable (ALARA). Field workers should use a combination of engineering controls, administrative controls, and personal protective equipment (PPE) to limit external and internal radiation doses. Basic protection control measures that apply to all forms of radiation include (1) reducing exposure time, (2) increasing distance from the radiation source, and (3) using a shield between the radiation source and employees. Additional guidelines are listed below.

- Personnel will be protected from internal and external radiation exposure hazards through general and site-specific training, use of PPE, adherence to strict work practices, and proper decontamination procedures.
- Ingestion of contaminated material will be prevented through good personal hygiene. Eating, drinking, and smoking are not permitted in potentially contaminated areas. Washing hands when leaving a contaminated area and before eating is required.
- Employees with open cuts or abrasions are not allowed to handle contaminated material because handling may allow entry of the material into the bloodstream.
- Pregnant employees will be advised not to work in areas with known or suspected radiation hazards. However, if a pregnant woman wants to work, limits on declared pregnant workers defined in 10 CFR, Part 20 apply.

The field safety officer (FSO) is responsible for ensuring that personnel are appropriately monitored for exposure to ionizing radiation. A radiation safety officer (RSO) may be assigned to a site to assist the FSO as conditions dictate.

2.0 EXPOSURE LIMITS

Ionizing radiation presents a hazard as both a source of external exposure and as a contaminant of surfaces and media. Radiation exposure limits as established by the Nuclear Regulatory Commission (NRC) are presented below.

Type of Exposure	Annual Limit
Whole body (head and trunk), active blood-forming organs, or gonads	5 roentgen equivalent in man (rem) per year, total effective dose
Lens of the eye	15 rem per year
Extremities	50 rem per year
Skin of the whole body	50 rem per year

In addition to the whole-body doses listed above, the NRC has also established derived air concentrations (DAC) for airborne radioactive materials (RAM) exposures. Table 1 of Appendix B, 10 CFR, Part 20, lists DACs for RAMs. The DAC values are designed to maintain internal exposure doses below the annual limit for intake (ALI), assuming a 40-hour per week exposure period. Total body dose calculations must factor in the contribution of airborne RAM to the total dose. The table in 10 CFR, Part 20, should be consulted when calculating internal exposures through inhalation of specific radionuclides.

3.0 PROCEDURES

The following sections discuss procedures related to personal monitoring, environmental monitoring, restricted areas, training, PPE, decontamination, and exposure and medical records associated with work at sites involving potential exposure to radiation.

3.1 PERSONAL MONITORING

Each individual working at a site with the potential for radiation exposure will participate in a monitoring program designed to measure worker external and internal radiation doses. The instrument and devices used for this monitoring as well as monitoring procedures and protocol are discussed below.

3.1.1 External Radiation Dosimetry

In most cases, external radiation exposure will be measured by thermoluminescent dosimeters (TLD), film badges, or pocket dosimeters. The determination of the appropriate dosimeter for a specific project will be made based on site history and potential risk for exposure to external ionizing radiation. Specific badge handling procedures will be provided on a case-by-case basis.

TLDs that measure x-ray, beta, and gamma radiation are general use dosimeters that measure external ionizing radiation levels to which personnel are exposed. They are analyzed after each calendar quarter to comply with Occupational Safety and Health Administration (OSHA) and NRC requirements. ERM shall provide TLDs to field workers who routinely work in areas with potential radiation hazards. If TLDs are needed for long-term projects lasting more than 5 months, the division health and safety leader or NAHSD will provide additional guidance to ERM employees.

Employees scheduled for short-term field work where potential radiation hazards exist should use pocket dosimeters. Pocket dosimeters should be used for field work lasting 1 to 2 days. Pocket dosimeters can be used along with TLDs to provide real-time exposure monitoring. Employees using a pocket dosimeter in areas exceeding the applicable radiation exposure action levels must record the radiation dose daily in a field logbook. A copy of recorded exposures above background levels must be submitted to the safety team within 15 calendar days of field work completion. If the pocket dosimeter indicates that an individual has received a radiation dose of 100 millirems or more, the individual will be removed from field work and his or her TLD will be processed immediately. Pocket dosimeters must be requested through the ERM safety team.

In the event of a lost or damaged TLD, the site FSO and/or RSO will determine a dose estimate for the individual by using values recorded on direct-reading instruments. If such a dose cannot be determined, the maximum permissible radiation dose for the time period in question for the affected employee will be recorded in the field logbook.

3.1.2 Airborne Radioactive Material Measurement

Airborne RAM may enter the body during inhalation resulting in an internal radiation dose. NRC regulations require the measurement of airborne RAM concentrations whenever inhalation exposures may result in an intake in excess of 10 percent of the ALI for that RAM as defined in Appendix B, Table 1, of 10 CFR, Part 20. In accordance with principles of ALARA, ERM shall require monitoring of airborne RAM under all circumstances of potential exposure.

Airborne RAM may be emitted by processes involving RAM or from radioactive contamination in dirt, debris, and on surfaces that have been disturbed. Monitoring shall be conducted using air sampling devices appropriate for personal monitoring and shall account for all potential periods of exposure. Samples shall be submitted to an accredited laboratory for analysis as soon as possible.

3.2 ENVIRONMENTAL MONITORING

The types of radiation sources, RAM, and types and extent of impacts to the site (such as superrficial contamination), will determine which survey instruments are necessary to characterize the site. Both area radiation levels and surface contamination levels will be monitored. Survey instruments will be specified in the HASP. ERM can obtain the necessary radiation survey instruments for area monitoring through equipment vendors.

If used on field projects, ERM personnel will monitor site conditions with direct-reading instruments when site information is sufficient to show that the potential for ionizing radiation exposure exists or when specific site information is not sufficient to eliminate the possibility of radiation sources or contamination. The initial site evaluation will include a review of available site data, including site history.

Upon startup of field activities, regular monitoring will be conducted if necessary to track the locations and intensities of RAM. Monitoring of airborne RAM within work areas and at the site's downwind perimeters is also required.

Results of radiation and contamination surveys shall be documented in the field logbook and the logbook shall remain on site for the duration of site activities. As work progresses at the site, survey and contamination maps shall be updated accordingly.

3.3 RESTRICTED AREAS

Restricted areas are designated to control personnel exposures to RAM and to prevent the spread of contamination out of the area. The posting of warning signs around restricted areas shall follow the requirements of 10 CFR, Part 20, Subpart J. Restricted areas shall be designated in the HASP as the exclusion zone or a portion of the exclusion zone.

3.4 TRAINING

Specific training requirements for work assignments involving potential exposure to RAM or radioactive contamination should be included in the site-specific HASP. Training requirements are not specified in 10 CFR, Part 20. However, ERM will require employees working with or

potentially exposed to RAM to receive specific training on RAM and the hazards associated with the specific site. General RAM training will include the following topics:

- Types and properties of ionizing radiation
- Acute and long-term health effects of exposure to ionizing radiation
- Exposure routes
- PPE for RAM
- Administrative and engineering exposure controls
- Personal, area, and contamination monitoring devices and their uses
- Basic requirements of 10 CFR, Parts 19 and 20

Site-specific training will address the following topics:

- Types of RAM and ionizing radiation at the site
- Locations of RAM at the site
- Designated restricted and contaminated areas
- Decontamination methods
- Personal, area, and contamination monitoring devices designated for the site
- Emergency procedures for RAM incidents

3.5 PERSONAL PROTECTIVE EQUIPMENT

A minimum of full Level C protection with disposable coveralls must be worn in any potentially radiation-contaminated area. ERM personnel will use air purifying respirators with high-efficiency particulate air (P100) cartridges to prevent inhalation of airborne alpha particles and radionuclides. This level of protection will prevent or minimize radioactive material from contacting skin. PPE must be thoroughly decontaminated with extreme care to prevent the spread of contamination to other areas. Contaminated material on the skin must be removed as quickly as possible. Supplied air respirators can also be used depending on the hazard and work activity.

3.6 DECONTAMINATION

Generally, decontamination procedures for RAM are the same as for hazardous waste; however employees should take the following additional precautions:

- Know where contamination is and avoid tracking equipment and personnel through it
- Use proper decontamination techniques
- Use straight detergent, soap and water, or commercially prepared solutions to remove RAM (solutions containing ethylenediamine tetraacetic acid, such as Radiacwash®, will bind up RAM and maintain the RAM in solution before rinsing)
- Consider all decontamination materials to be contaminated; decontamination waste will contain RAM and must be disposed of properly

3.7 EXPOSURE AND MEDICAL RECORDS

ERM shall maintain records of radiation exposure of all employees for whom personnel monitoring was conducted. Records will be evaluated to verify that exposures are maintained at ALARA levels. ERM is obligated to evaluate ionizing radiation exposure data to verify that exposures are maintained at ALARA levels and will provide a yearly summary exposure report to each participating employee. If quarterly results indicate high exposure, the employee will be notified immediately. Retained radiation exposure records will indicate exposure in millirems per calendar quarter, DAC hours of airborne radiation exposure, and the calculated combined dose for the total body (summary of the external and internal doses) using methods for calculating total body dose presented in 10 CFR, Part 20.1202.

Special medical examinations may be necessary when excessive external or internal doses of radioactive materials are suspected to have occurred. Medical evaluation needs will be established on a case-by-case basis with the advice of the ERM consulting physician. Any instance of suspected overexposure should be reported immediately to the FSO. The FSO will contact the appropriate safety team personnel for recommendations on how to proceed with follow-up medical evaluations.

ERM shall maintain exposure records for former employees along with their medical records in accordance with applicable regulations. These records will be available to former employees within 30 days of receipt of a written request for them.

	SAFE WORK PRACTICE	
ERM	SOP #:	22
	Title:	Safe Use of Portable and Dedicated Electrical Submersible Pump Systems to Mitigate Hazard of Electrical Shock
	Last Rev.:	5/24/2011
	Page:	1 of 3

SCOPE

This procedure defines minimum expectations for the safe use of portable and dedicated electrical submersible pump systems, including tools and equipment to be used by employees.

DEFINITIONS

AC Voltage Detector: sensor used to detect the presence of electricity. The closer it comes to live electrical lines, the louder the signal becomes.

Pump System: comprised of all equipment and materials required to purge/sample groundwater from within a constructed groundwater well.

1. Submersible Pump
2. Control Box
3. Electrical Cables

PROCEDURE

A. VISUAL INSPECTION

1. Inspect all electrical pump system wires, insulation, and plugs. For dedicated pumps that cannot be removed from the well for inspection without use of a drilling rig, inspect all at-grade system components. Establish a schedule for regular removal and inspection/maintenance of dedicated pump systems.
2. Maintain sampling equipment in good condition – dry, clean, rust-free, etc.
3. Ensure power source has a built-in ground fault circuit interrupter (GFCI).
4. Ensure well head is properly fastened to well casing and is crack free.

B. ELECTRICAL POWER SUPPLY

1. Properly attach all power components (i.e., plugs, control boxes, etc.)
2. Conduct a second thorough visual inspection to confirm the sample network is properly setup.
    i. Confirm that pump control box switch is in **OFF** position.
    ii. Ensure that all plugs are properly connected.
3. Do not touch any part of the wellhead. Turn on power supply.
4. Turn on pump control box.
5. Use AC voltage detector to confirm that all external parts of the pump system (i.e., sample port, sample riser, well head, tubing, etc.) are not electrically charged.

C. OPERATING PRACTICES

1. Inspect sample equipment before start-up at each well location. Look for loose or damaged parts and inadequate jacketing/insulation.
2. Examine each piece of equipment before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.
3. Shut off power and use formal lockout-tagout (LO/TO) program to make any repairs, perform maintenance, or adjust moving parts. Only qualified employees who have been authorized by ERM and trained by ERM in LO/TO procedures can perform this work.
4. Never touch a powered/live part unless power source is disconnected (such as control box, electical converter, sample riser, etc.) Note that some pump control boxes have an embedded capacitor which remains charged for a period of time after the power is disconnected. Often, a visual indicator, such as an LED light, will extinguish once the unit is fully de-energized. Do not touch a powered/live part until this LED light fully extinguishes.
5. The use of insulated rubber electrical gloves when handling external parts of the pump system while system is powered is recommended.
6. GFCI**s** are required when using an industrial generator as the power supply. The use of a safety switch is not required in low-voltage scenarios (i.e., 12 volts).
7. Do not sample well if pump system is faulty and none of the above mentioned safety measures can be applied.

D. TRAINING REQUIREMENTS

1. Field personnel are familiar with and trained on the proper use of
    i. Sampling equipment (i.e., submersible pump, control box, generator, etc.)
    ii. AC Voltage Detector
2. ERM personnel may not perform LO/TO unless they have been authorized by ERM to do so, including attending ERM LO/TO training.

REFERENCES

Regulatory References

None

Technical References

Grundfos, 2006. *SQ, SQE Installation and Operating Instructions*. May.

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
5/3/2011	0		
5/23/11	1		Incorporated comments from ERM internal review team

Applicable Safe Work Practices

Appendix C

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

North America Job Hazard Analysis
Operating Vehicles

Project Name: Project Number: Job / Task Name: JHA No.: 5

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Operating vehicles for work, including personal vehicles, company-owned non-commercial small trucks, and rental vehicles.

Hazard Analysis:

Task Step	Hazard	Control Measures
Inspect the Vehicle	Tire pressure, brakes, steering, headlights and other vehicle equipment malfunction can contribute to vehicle accidents and property damage. Loose articles inside the vehicle and carried in truck beds or on trailers can shift and cause distractions or traffic accidents.	Use the "ERM Vehicle Safety Form" to document daily inspections of the vehicle. In certain cases, a client-required form may be used instead. Do not operate any vehicle if its safety is in question. During vehicle inspection make sure any loose articles either inside the vehicle or in truck beds/on trailers are well-secured.
Get in and out of the Vehicle	Hands, hair, or loose clothing can be caught in doors, trunk covers, and other vehicle equipment, causing injury.	When entering or exiting a vehicle, pay attention to what you are doing. ERM has had incidents occur simply from being rushed and not paying attention during vehicle entry/exit.

North America Job Hazard Analysis
Operating Vehicles

Project Name: Project Number: Job / Task Name: JHA No.: 5

Task Step	Hazard	Control Measures
Drive the Vehicle	Operating a vehicle presents many different hazards to employees that must be simultaneously mitigated.	Only allow ERM employees to drive motor vehicles (authorized employees with a current drivers license). Before moving vehicles always put your seat belt on, and stop using handheld electronics. Make sure any food or drink is secured and any electronics are programmed (GPS). When moving vehicles, follow all posted speed limits and posted signs. Do not pick up hitch-hikers, and never transport people in truck beds.
Driving when Fatigued	Operating a vehicle after a full day of work or when you are fatigued drastically decreases focus and response time, and increasing the risk of being involved in a vehicle accident.	Avoid driving more than 8 hours in one workday. If the number of hours driving to/from a jobsite combined with the number of hours to be worked on the site will equal more than 14 total hours, alternate arrangements should be arranged. Be aware of your fatigue level while driving and stop to rest if you feel overly tired.
Stay Focused on the Road	Doing anything that distracts you from the road for more than 2 seconds highly increases the risk of being involved in a vehicle accident. In particular, driver inattention due to hand-held mobile phone use is currently thought to be responsible for approximately 80% of all vehicle accidents.	Do not operate a hand-held mobile phone while driving. Use a hands-free mobile solution instead, such as a Bluetooth headset or hardwired earpiece. In some cases, all mobile phone use while driving (including answering and dialing), may be prohibited by our client. Do not perform activities while driving that will take your attention off the road for more than 2 seconds. A few of these types of activities could include programming GPS', applying makeup, changing the radio, or eating while driving. When these sorts of activities must be performed, pull to the side of the road and stop.

North America Job Hazard Analysis
Operating Vehicles

Project Name: Project Number: Job / Task Name: JHA No.: 5

Task Step	Hazard	Control Measures
Pull a Trailer	Many drivers are unfamiliar or inexperienced with pulling trailers, increasing the risk of being involved in a vehicle accident.	If you are uncomfortable pulling a trailer do not do so. Arrange for an alternate, experienced driver. Be aware that it takes longer to speed up and slow down when pulling a trailer, and that visibility may be reduced significantly. Make sure your vehicle is capable to pull the weight of the trailer and its contents. Inspect the trailer to ensure brake and turn signals work properly and in concert with the main vehicles signals, and that tire pressure is acceptable. Make sure trailer is attached securely to the main vehicle and the safety chain or other backup attachment device is in-place. Evenly distribute weight on any trailers pulled.
Leaving the Vehicle	Leaving personal valuables and company equipment/documents in abandoned vehicles may attract thieves.	Turn off the engine and lock any vehicle being left for even a short period of time when not on a secure jobsite. If the vehicle will be left for long periods or overnight, remove any company documents, computers, and equipment, personal valuables, or any items that would attract thieves.
Report and Document Vehicle Accidents and Property Damage	Improper documentation of vehicle accidents and property damage caused by vehicle operation place ERM at risk.	No matter how minor a vehicle accident or property damage event is, report it as a safety event. If involved in a vehicle accident, always call the police so a report will be available, to protect your liability, and to protect ERM liability. Take as many pictures as you can of the accident scene if you can do so without placing yourself in further danger.

North America Job Hazard Analysis
Operating Vehicles

Project Name: Project Number: Job / Task Name: JHA No.: 5

Task Step	Hazard	Control Measures
Drive a Commercial Vehicle	Driving vehicles alone or in combination (with a trailer, for example) with Gross Motor Vehicle Weight (GMVW) greater than 10,000 pounds carries additional regulatory requirements. Not addressing these requirements places ERM at risk.	Check the plaque on the inside of the driver-side door for the GMVW. If the weight is greater than 10,000 pounds contact a member of the North America Safety Team for further assistance. Do not operate the vehicle unless you have received proper training and have required supplies (such as logbooks).
Rent a Vehicle	Only certain car rental agencies have negotiated contracts, rates, and insurance coverage with ERM. Renting a vehicle from another agency exposes you and ERM to unnecessary liability and risk.	If possible, rent vehicles using the Cain Travel website, and from an ERM authorized car rental agency. If not possible to rent from one of these, you must purchase collision damage and personal accident insurance at the time of rental. Currently, authorized rental car agencies include: • Enterprise Car Rental • Hertz Car Rental

Personal Protective Equipment Required for this Task:

Type	Description
Vehicle Safety Kit for Personal or Company-Owned Vehicles	Includes small fire extinguisher (ABC), first aid kit, spare tire/jack, jumper cables, flashlight, flares or lighted triangles, reflective vest, and disposable or digital camera (for documenting accidents)

Training Required for this Task:

Type	Description
ERM Safe Driving	E-learning course instructing employees on ERM vehicle safety policy and practice.

Forms Associated with this Task:

Type	Description
ERM Vehicle Safety Form	Includes items that should be inspected regularly on motorized vehicles.

North America Job Hazard Analysis
Operating Vehicles

Project Name: Project Number: Job / Task Name: JHA No.: 5

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name: Project Number: Job / Task Name: JHA No.: 6

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing drilling.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name: Project Number: Job / Task Name: JHA No.: 6

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers (if needed) for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure critical zones have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:
Project Number:
Job / Task Name:
JHA No.: 6

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Oversee setup of drilling equipment	Overhead electrical/other lines may come in contact with drill rigs. Materials stored in the vicinity of drill rigs may pose various hazards to employees.	Ensure drill rigs are set up in areas where they will not contact overhead lines when being positioned. The minimum distance for drill rig clearance is 25 feet unless special permission is granted by the utility company. When a drill rig must be maneuvered in tight quarters, the presence of a second person is required to ensure adequate clearance. If backing-up is required, two ground guides will be used: one in the direction the rig is moving and the other in the operator's normal field of vision. Move tools, materials, cords, hoses, and debris to prevent trip hazards and contact with moving drill rig parts. Secure tools and equipment subject to displacement or falling. Store any flammable materials away from ignition sources and in approved containers.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name: Project Number: Job / Task Name: JHA No.: 6

Task Step	Hazard	Control Measures
Physically Clear all Ground Disturbance Locations	Employees performing physical clearance could contact underground utility/service lines.	Use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use.
	Drill rig could damage electrical/utility/service lines if not physically cleared first.	Mechanical ground penetration should not commence until a ground disturbance location is physically cleared. In certain situations drilling may occur without physical clearance – consult with the project PIC prior to making this determination.
Commence Drilling Operations	Rotating equipment could pull employees into equipment.	Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working around rotating equipment. Tuck shirt-tails into pants. Never walk directly behind or beside drill rigs without the drill rig operator's knowledge. Keep all non-essential personnel out of the drill rig work area.
	Poorly functioning drill-rig equipment could expose employees to hazardous conditions.	Ensure drill rigs and other machinery used is inspected daily by competent, qualified individuals. Instruct drill rig operators to report any abnormalities such as equipment failure, oozing liquids or unusual odors so they can be dealt with before proceeding with work. Do not eat, drink, or smoke near the drill rig.
	Noisy environments may make it difficult to communicate by vocal means.	Wear hearing protection at all times when in the vicinity of the drill rig, or when you must raise your voice to be heard by co-workers. Maintain visual contact with the drill rig operator at all times and establish hand-signal communications for use when verbal communication is difficult.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name: Project Number: Job / Task Name: JHA No.: 6

Task Step	Hazard	Control Measures
Complete Drilling Operations	Equipment allowed to remain running poses pinch-point and potential explosion hazards to employees.	Shut down drill rigs before repairing or lubricating parts (except those that must be in motion for lubrication). Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Drill Rig Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of drill rigs. This form should be provided by the drill rig operating company. Completed forms should be kept with the

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name: Project Number: Job / Task Name: JHA No.: 6

	HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name: Project Number: Job / Task Name: JHA No.: 7

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing excavations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name: Project Number: Job / Task Name: JHA No.: 7

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure excavation buffers have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name: Project Number: Job / Task Name: JHA No.: 7

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Establish Excavation Buffers	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	For at least 2 feet in all directions from an identified subsurface structure, use non-conductive tools and physically remove soil.
Notify Equipment Operators where Excavation Buffers are Located	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	If physically clearing is performed, use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use. DO NOT DIG INSIDE AN EXCAVATION BUFFER WITH MECHANICAL EQUIPMENT.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name: Project Number: Job / Task Name: JHA No.: 7

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Excavation Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of excavations. Completed forms should be kept with the HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in High Noise Environments

Project Name: Project Number: Job / Task Name: JHA No.: 8

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for safe work in any environment with elevated noise levels.

Hazard Analysis:

Task Step	Hazard	Control Measures
Prepare for Work	Not having hearing protection or noise monitoring equipment could expose employees to unknown levels of elevated noise.	For work environments known or suspected to present elevated noise hazards, ensure hearing protection is procured and available at the jobsite. For any employee working on the site who has not attended hearing conservation training within the past year, review this JHA with them and document their training. Determine whether noise monitoring has been done on other projects with similar scopes of work by contacting your Safety Team representative. If work on the project will last 30 days or more, procure a noise dosimeter and perform personnel monitoring at the site to document noise levels.
Conduct the Work	Damage to hearing from sustained elevated noise or intermittent impact noise.	If noise dosimetry is not being conducted at the project, use the following rule of thumb to determine whether hearing protection is required: If you are standing within 3 feet of another person and have to raise your voice to be understood by them when talking, hearing protection must be worn.

North America Job Hazard Analysis
Work in High Noise Environments

Project Name: Project Number: Job / Task Name: JHA No.: 8

Task Step	Hazard	Control Measures
Report Dosimetry Monitoring Results	Lack of consolidated noise dosimetry monitoring results can result in other employees on different projects not being aware of typical noise levels.	OSHA allows noise dosimetry monitoring results collected when working with specific equipment to be used on any other project site where the same equipment is in-use. Report dosimetry monitoring results to your Safety Team representative so they can be included in a North America-wide listing of typical noise levels.

Personal Protective Equipment Required for this Task:

Type	Description
Hearing Protection	

Training Required for this Task:

Type	Description
Hearing Conservation	

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name: Project Number: Job / Task Name: JHA No.: 9

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for managing safety of ERM-hired subcontractors to ensure they work safely and ERM liability is minimized.

Hazard Analysis:

Task Step	Hazard	Control Measures
Choose Subcontractor to Perform Work	Lack of executed contractual documentation may increase ERM liability.	The project PIC and/or PM must ensure a signed, executed contract is in-place prior to subcontractors performing work on the jobsite for ERM.
	Insurance documents collected during the safety prequalification process may not be sufficient to meet specific client contractual requirements.	The project PIC and/or PM must ensure that insurance certificates on-file for subcontractors meet or exceed contractual insurance requirements mandated by ERM clients. If the insurance certificate on-file is out-of-date or does not represent sufficient coverage, the project PIC and/or PM must obtain an updated insurance certificate from the subcontractor prior to the subcontractor performing work on the jobsite for ERM.
	Selecting subcontractors that do not meet ERM minimum safety criteria can result in poor safety performance on ERM projects.	Consult the North America "Subcontractor Information" page and select a subcontractor that meets ERM minimum safety criteria. If selection of an already-prequalified subcontractor is not possible due to business considerations or client wishes, provide enhanced subcontractor oversight on the jobsite.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:
Project Number:
Job / Task Name:
JHA No.: 9

Task Step	Hazard	Control Measures
Prepare Site HASP Documents	Not informing ERM-hired subcontractors of ERM safety requirements for their work may expose employees to hazardous conditions and cause unnecessary project delays.	The project PIC and/or PM must ensure the subcontractor has received a copy of the ERM HASP and supporting documentation prior to mobilization to the jobsite. The subcontractor must be made aware that their personnel must follow provisions in the ERM HASP at a minimum, but that they may not rely on ERM documents for their employee's health and safety protection.
	Not obtaining authorized subcontractor signatures on ERM HASPs may expose ERM to additional liability.	Prior to any jobsite work proceeding, obtain the signature of an authorized representative for the subcontractor on the ERM HASP. Also, have the subcontractor's authorized representative designate one of their employees, by name, to serve as the jobsite contact for ERM safety concerns. List the jobsite safety contact in the ERM HASP.
	The lack of a specific scope of work for an ERM subcontractor opens the possibility of whether ERM or the subcontractor is responsible for certain aspects of jobsite work.	Specify both the ERM and the subcontractor's scope of work in the ERM HASP document. Ensure that any subcontractor personnel on-site has reviewed and signed the site HASP.
	Any ERM attempt to author safety documents for use during completion of tasks on jobsites by subcontractors may not be sufficient to fully control site safety hazards posed by subcontractor work.	In all cases, require the ERM subcontractor to either develop their own site-specific HASP, or develop Job Hazard Analyses (JHA) for the specific tasks they will perform. Attach these documents to the ERM HASP as appendices.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name: Project Number: Job / Task Name: JHA No.: 9

Task Step	Hazard	Control Measures
Conduct the Work	On jobsites where ERM uses subcontracted services, additional liability arising from the OSHA "Multi-Employer Worksite Rule" may be present.	Ensure subcontractor work is overseen by ERM personnel at all times. Whenever subcontractor personnel are present on a jobsite performing work, an ERM employee should be present and engaged in the work being performed. Always include subcontractor personnel in daily jobsite tailgate safety meetings and have them indicate their presence and understanding of the information presented by signing the ERM form documenting the meeting. ERM personnel at the jobsite should perform regular safety inspections of the site, including subcontractor activities. Any deficiencies noted during inspections should be forwarded to the subcontractor's jobsite safety contact for resolution and report-back to ERM. For imminent danger situations (those that may cause loss of life or limb), the ERM inspector should stop the subcontractor's work and ensure all on site retreat until the imminent danger hazard is abated. Do not supply subcontractor personnel with personal protective equipment (PPE). If PPE must be provided to subcontractors, ERM personnel must inspect the PPE and document the inspection prior to providing it to subcontractor personnel. If ERM is performing air monitoring for the subcontractor, ensure calibration of air monitoring equipment is done before and after each use. At a minimum, air monitoring equipment must be calibrated at least once per day. Document equipment calibration and file with the site HASP.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name: Project Number: Job / Task Name: JHA No.: 9

Task Step	Hazard	Control Measures
After Job Completion, Forward Comments to ERM North America Safety Team	Obtaining services from subcontractors who have met ERM minimum safety criteria but have performed poorly on jobsites poses risk to ERM employees on future jobsites.	Submit any comments about the subcontractor's safety performance while working on the ERM jobsite to the ERM North America Safety Team. These comments will be stored in our database and provided to ERM PICs and/or PMs seeking quality subcontractors for future work.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
Subcontractor Safety Prequalification Checklist	ERM form given to subcontractors that collects information necessary to determine whether the subcontractor meets ERM's minimum safety criteria.
Subcontractor Insurance Certificate	Subcontractor-supplied form issued by the subcontractor's insurance carrier or broker evidencing current insurance coverage.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name: Project Number: Job / Task Name: JHA No.: 9

North America Job Hazard Analysis
Hazard Communication

Project Name: Project Number: Job / Task Name: JHA No.: 10

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for communicating hazards posed by the storage and/or use of chemicals.

Hazard Analysis:

Task Step	Hazard	Control Measures
Storing Chemicals in the Office Setting	Chemicals stored in ERM offices or Field Project Offices may lead to employee chemical exposure, chemical spills, or fires from flammable materials.	If at all possible, do not store chemicals in the office environment. For each chemical product used by ERM employees or stored in an ERM field or office location, a MSDS sheet must be obtained and kept on-file. A chemical inventory list must be prepared and updated as new or different chemicals are procured. Chemical containers must be labeled in accordance with OSHA regulations. Train all employees who will use or be present in the general vicinity of chemicals annually about hazard communication. If new or updated chemicals are procured, hazard communication training must be given to affected employees prior to using or storing the chemical.

North America Job Hazard Analysis
Hazard Communication

Project Name: Project Number: Job / Task Name: JHA No.: 10

Task Step	Hazard	Control Measures
Using Chemicals	Employees may be exposed to chemical hazards via skin contact, ingestion, inhalation, or punctures in the skin.	Before using any chemical, make sure a jobsite WARN Health and Safety Plan (HASP) has been prepared and taken the chemical being used into account. Wear protective equipment as specified in the HASP. If chemicals are being used by subcontractors, ensure all employees on the jobsite have been told about the chemical in-use and are protected. If chemical exposure occurs, even if medical symptoms are not present, inform the Field Safety Office or Office H&S Contact.
Large Chemical Spills	Large chemicals spills may expose employees to significant health hazards.	For large chemical spills (generally anything larger than 1 gallon in size), HAZWOPER training is required to perform any action other than retreating from the area and contacting appropriately-trained personnel to mitigate the spill. Do not attempt to stop or clean-up a spill without current HAZWOPER training, current medical clearance, current respirator training, and a current respirator fit-test.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Hazard Communication	An annually-required training discussing general chemical hazards, MSDS sheets, and how to respond to general chemical emergency situations.

North America Job Hazard Analysis
Hazard Communication

Project Name: Project Number: Job / Task Name: JHA No.: 10

Forms Associated with this Task:

Type	Description
Material Safety Data Sheet (MSDS)	An informational document containing information about chemical composition, hazardous properties, and steps to take in emergency situations involving chemicals.
International Chemical Safety Card	A chemical-specific document developed by the National Institute of Occupational Safety and Health providing abbreviated information similar to a MSDS.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 11

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Description of specific chemical air contaminants requiring additional regulatory actions.

Hazard Analysis:

Task Step	Hazard	Control Measures

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 11

Task Step	Hazard	Control Measures
Exposure to specific OSHA-regulated chemical hazards during work	Certain chemicals have been found to present more significant long-term health hazards to employees when they are exposed to them, including sensitization, development of certain cancers, and others.	If the following chemicals are being used on a jobsite, and work will occur for more than 30 consecutive days, OSHA regulations generally require a plan to mitigate exposures, additional training, and medical monitoring in some cases. • 13 carcinogens (see 29 CFR 1910. • Asbestos • Vinyl chloride • Inorganic arsenic • Lead • Hexavalent chromium • Cadmium • Benzene • Coke oven emissions • 1,2-dibromo-3-chloropropane • Acrylonitrile • Ethylene oxide • Formaldehyde • Methylenedianiline • 1,3-butadiene • Methylene chloride
Exposure to reproductive chemical hazards during work	Certain chemicals have been found to affect the reproductive systems in males and females and require additional personnel protection if used.	Chemicals posing reproductive hazards will be specified in site-specific HASPs. Follow all provisions of the HASP to minimize or eliminate exposure to reproductive hazards.

Personal Protective Equipment Required for this Task:

Type	Description
Varies	PPE varies depending on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 11

Training Required for this Task:

Type	Description
Varies	Training that must be given to employees varies on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Natural Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 12

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for mitigating natural hazards such as poisonous animals and plants, and terrain-related hazards.

Hazard Analysis:

Task Step	Hazard	Control Measures
Performing fieldwork in the presence of various natural hazards	Exposure to natural hazards can lead to injuries such as twisted ankles or to more complex medical emergencies such as poisonous plant or insect encounters.	Identify the expected types of natural hazards during the safety planning/HASP-writing stage of a project and verify conditions once onsite. If conditions differ, put protective steps in-place to mitigate the natural hazard if possible. Mitigation of natural hazards may involve removal of the hazard prior to work beginning, or avoiding the hazard during work.
Working around poisonous plants	Poisonous plant exposure	Poison ivy, oak, and sumac are common in North America and should be avoided. For sites with these hazards present, have a poison ivy wash available for employees on-site. If exposure occurs and no poison ivy wash is available, employees should wash in cool water and use soap.

North America Job Hazard Analysis
Natural Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 12

Task Step	Hazard	Control Measures
Working around poisonous insects	Danger to health from bites, stings, and/or disease transmission	Liberally use insect repellant containing DEET at all times on the jobsite. Periodically throughout the day and at the end of the day, perform a thorough "tick-check" to ensure ticks or other insects are found and removed promptly. Avoid obvious conical mounds of dirt that may indicate ants, wasps, or other flying insects. Before reaching into dark or damp spaces such as monitoring well-heads, inspect the area thoroughly to ensure spiders are not present. Always take a shower as soon as possible after leaving a jobsite for the day to remove any insects, such as chiggers.
Working around snakes	Snake bites and potential poisoning	Visually inspect the work are prior to beginning any work to located areas with high grass and underbrush. Do not walk through these areas if at all possible to avoid snakes. Wear leather steel-toe boots and snake chaps in areas where snakes are suspected or confirmed to be present. Do not attempt to kill snakes, as people are commonly bitten attempting this.
Working around feral animals	Animal bites and possible transmission of disease	High rat populations within an enclosed space present a hazard of Hanta virus. Spray such areas with bleach solution prior to performing any work in the area (10 parts water to 1 part household bleach). Feral dogs may become aggressive, especially if guarding their young or if they become very hungry. If dogs or other animals are spotted that are acting strangely, do not approach them. Contact the local animal control center for assistance.

North America Job Hazard Analysis
Natural Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 12

Task Step	Hazard	Control Measures
Working on uneven terrain	Slip, trip, and fall injuries may occur when working on uneven terrain or terrain with holes	At a minimum, wear ankle-height steel-toed boots when working on project sites. Keep work areas free from clutter so that ground surfaces can be easily seen by employees. Do not read phone emails or text while walking. Identify all scattered materials presenting a slip, trip, or fall hazard with high visibility paint markings if possible, or cordon the area off with caution tape. Keep all heavy equipment as low to the ground as possible when being stored, such as forklift tines, excavator buckets, etc. Place ladder bases on even, non-slippery ground. If this is not possible obtain help when going up or down the ladder.

Personal Protective Equipment Required for this Task:

Type	Description
Ankle-height boots	ERM standard steel-toe boot requirement specified ankle-height, chemical-resistant boots.
Snake chaps	Chaps worn to prevent snakebites in areas with known high concentrations of snakes.

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
None	

North America Job Hazard Analysis
Natural Hazards

Project Name: Project Number: Job / Task Name: JHA No.: 12

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work On or Near Public Roadways

Project Name: Project Number: Job / Task Name: JHA No.: 32

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. Site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Work on or near active parking lots and public and private roadways.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Not having the proper safety equipment when needed on a project site.	When developing the health and safety plan, include specific equipment needs known at the time to ensure it is available for use at the site.
Exclusion zone setup	A vehicle may enter the work area and cause an employee injury or property damage if traffic is not channeled away by using protective guarding.	Setup a channeling devices consisting of cones, tubular markers, vertical panels, drums, barricades or temporary raised islands. See the Manual on Uniform Traffic Control Devices (MUTCD) for more information and consult your local H&S leader for guidance.

North America Job Hazard Analysis
Work On or Near Public Roadways

Project Name: Project Number: Job / Task Name: JHA No.: 32

Task Step	Hazard	Control Measures
Performing work near vehicle traffic.	Worker struck by a moving vehicle in parking lot or along a roadway because of decreased visibility of worker.	Any worker in the right of way on a federally funded highway exposed to equipment or traffic must wear high visibility safety apparel, including reflectivity that conforms to ANSI 107-2004 Performance Class I, II or III Voluntary Standards. Class I – <25 mph (Standard Traffic Safety Vest)  Class II - >25 mph, <50mph  Class III - >50 mph
	Pedestrian or cyclist injured by obstacles on worksite and/or by insufficient signage.	Keep worksite neat and clean and provide a dedicated pedestrian/cyclist path for safe navigation in-between vehicle traffic and worksite. Ensure that protective measures (including physical barriers and signage) are sufficient to prevent unauthorized entry when the worksite is unattended.

North America Job Hazard Analysis
Work On or Near Public Roadways

Project Name: Project Number: Job / Task Name: JHA No.: 32

Personal Protective Equipment Required for this Task:

Type	Description
Traffic Safety Vest	Type I, II or III safety vest as noted above

Forms Required for this Task:

Type	Description
Permit	Permits may be required by a local official in the jurisdiction, town or city where the work is to be performed.
Traffic Management Plan	Details the type of roadway present near or on which the work will be performed, type of protective barriers to be used, signage and personal protective equipment to be used.

Training Required for this Task:

Type	Description
None	None

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Personal Protective Equipment

Project Name: Project Number: Job / Task Name: JHA No.: 13

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for selection and use of personal protective equipment (PPE). PPE is only to be used after engineering and administrative controls have been considered and found to be non-feasible. Guidance for respiratory protection and fall protection is included in separate JHAs

Hazard Analysis:

Task Step	Hazard	Control Measures
General fieldwork	A head injury could occur from a falling or flying object, or a head injury could be sustained from bumping into something. Wearing a "typical" hardhat around electrical equipment may result in electrical shock.	A hard hat meeting the American National Standards Institute (ANSI) Z-89.1 standard must be worn. These hardhats contain an inner suspension system that should be checked regulatory to ensure straps are not worn and that space exists between the shell of the hardhat and the suspension straps. Electrical shock protection hardhats – Class A for low voltage (up to 2,200 volts), Class B for high voltage (up to 20,000 volts), and Class C for no electrical shock protection.
General fieldwork	A foot injury could occur from a falling or rolling object, or an object may pierce the sole of the shoe. Electrical shock may occur with steel-toe boots.	Steel toe protective footwear should be worn that meets or exceeds the American Society for Testing and Measurement (ASTM) F2413-05 standard. Footwear worn around electrical circuits should also be non-conductive.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name: Project Number: Job / Task Name: JHA No.: 13

Task Step	Hazard	Control Measures
Cutting by hand	Hand injury could occur from handling an object with sharp edges of a fixed open-blade knife.	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves (such as Kevlar) must be worn and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should wear high-visibility gloves to encourage awareness of where hands are being placed.
Handling chemicals by hand	Dermal exposure to hands from chemicals during soil and/or groundwater sampling.	Wear nitrile or latex protective gloves when handling sample media. Double-layering these gloves is a good idea for added protection. If acidic or caustic chemicals are present, wear outer neoprene or rubber gloves.
O&M or Subsurface Injection	Dermal exposure to body from chemicals during operations and maintenance activities or subsurface liquid injection activities.	When working with commercial, full-strength chemicals ensure splash protection is worn (such as a polyethylene coated suit) and that gloves and boots are taped to the suit to prevent liquid splash.
General fieldwork Work around liquid splash and/or flying particle hazards	Foreign object or liquid splash to the eye.	Safety glasses conforming to the ANSI Z-87 standard must be worn for field activities. Safety glasses are appropriate for use when general eye protection is needed. For liquid splash hazards or hazards from flying particles, tight-fitting safety goggles should be worn. A faceshield should be considered for use when splash hazards from commercial, full-strength chemicals.
Work around active roadways	Struck by moving vehicles when working outside or along a roadway.	High-visibility safety vests should be worn when working in parking lots or by active roadways. Class I may be used when traffic is below 25 mph, Class II for 25-50 mph, and Class 3 for >50 mph.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name: Project Number: Job / Task Name: JHA No.: 13

Task Step	Hazard	Control Measures
Work in high noise environments	Hearing damage from noise exposure greater than 85 decibels.	Attempt to perform work when elevated noise is not an issue. If work must be performed during high noise, wear hearing protection in the form of earplugs or earmuffs. Further details are given in the "Work in High Noise Environments" JHA.
O&M or Lockout/Tagout/Tryout	Electrical shock	Lockout/tagout/tryout should be performed by licensed electricians or others that have been specifically authorized by ERM to do so. PPE appropriate to this work includes a cotton t-shirt, Class II Electrical Arc Protection suit, Class O (low voltage) gloves, and non-conductive footwear.

Training Required for this Task:

Type	Description
Personal Protective Equipment	PPE training, normally included in 8-hour refresher training, provides guidance on the selection, inspection, use, maintenance, and decontamination of different types of PPE

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in Hot Environments

Project Name: Project Number: Job / Task Name: JHA No.: 14

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working in areas where heat stress may occur.

Hazard Analysis:

Task Step	Hazard	Control Measures

Personal Protective Equipment Required for this Task:

Type	Description

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description

North America Job Hazard Analysis
Work in Hot Environments

Project Name: Project Number: Job / Task Name: JHA No.: 14

None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in Cold Environments

Project Name: Project Number: Job / Task Name: JHA No.: 15

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working in areas where cold stress may occur.

Hazard Analysis:

Task Step	Hazard	Control Measures

North America Job Hazard Analysis
Work in Cold Environments

Project Name: Project Number: Job / Task Name: JHA No.: 15

Task Step	Hazard	Control Measures
1. Work in cold environments	Cold-related disorders; cold stress, hypothermia, frostbite, trench foot, etc.	1. Monitor ambient conditions and plan for cold weather extremes (suspend outdoor activities as necessary). Factors compounding cold temperature include: • Wind velocity; • High humidity causing condensation; • Dampness; • Contact with cold water or surfaces. 2. Know signs and symptoms of cold-related disorders and take action if symptoms persist (see training ppt – preventing cold weather disorders) 3. In the event work must be performed in extremely cold temperatures, the recommended limits for properly clothed workers for periods of work at temperatures below freezing are found in **Table 2**. The recommended exposure times are based on the *wind chill factor* (see **Table 3**), a scale based on air temperature and wind speed. The work-break schedule applies to any four-hour period with moderate or heavy activity. The warm-up break periods are of 10 minute duration in a warm location. The schedule assumes that "normal breaks" are taken once every two hours. At the end of a 4-hour period, an extended break (e.g. lunch break) in a warm location is recommended. Keep in mind, older workers or workers with circulatory problems may require special protection against cold injury.

North America Job Hazard Analysis
Work in Cold Environments

Project Name: Project Number: Job / Task Name: JHA No.: 15

Task Step	Hazard	Control Measures
		4. Adequate insulating dry clothing to maintain core temperature above 96.8 °F (36 °C) must be provided to workers if it is performed at air temperatures below 40°F (4°C). The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. An equivalent chill temperature can be computed using the air temperature and the wind velocity (see **Table 3**). "Wind chill factors" can also be heard on local weather broadcasts. 5. For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of 25.6 °F (-3.2 °C). Superficial or deep local freezing will occur only at temperatures below 30.2 °F (-1 °C), regardless of wind speed.

North America Job Hazard Analysis
Work in Cold Environments

Project Name:
Project Number:
Job / Task Name:
JHA No.: 15

Table 2.

Work/Warm-Up Schedule for Four-Hour Shift											
Air Temperature		**Calm**		**5 mph wind**		**10 mph wind**		**15 mph wind**		**20 mph wind**	
^{o}C	^{o}F	Max Work Period	Number of Breaks	Max Work Period	Number of Breaks	Max Work Period	Number of Breaks	Max Work Period	Number of Breaks	Max Work Period	Number of Breaks
-26^{o} to -28^{o}	-15^{o} to -19^{o}	Normal Breaks	1	Normal Breaks	1	75 min.	2	55 min	3	40 min	4
-29^{o} to -31^{o}	-20^{o} to -24^{o}	Normal Breaks	1	75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32^{o} to -34^{o}	-25^{o} to -29^{o}	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Cease non-emerg. work	
-35^{o} to -37^{o}	-30^{o} to - 34^{o}	55 min.	3	40 min.	4	30 in.	5	Cease non-emerg. work			
-38^{o} to -39^{o}	-35^{o} to -39^{o}	40 min	4	30 min	5	Cease non-emerg. work					
-40^{o} to -42^{o}	-40^{o} to -44^{o}	30 min	5	Cease non-emerg. work							
-43^{o} & below	-45^{o} & below	Cease non-emerg. work									

North America Job Hazard Analysis
Work in Cold Environments

Project Name: Project Number: Job / Task Name: JHA No.: 15

Table 3.

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*												
Estimated Wind Speed (in mph)	**Actual Temperature (°F)**											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (°F)											
Calm	**50**	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
5	**48**	**37**	**27**	**16**	**6**	**-5**	**-15**	**-26**	**-36**	**-47**	**-57**	**-68**
10	**40**	**28**	**16**	**4**	**-9**	**-24**	**-33**	**-46**	**-58**	**-70**	**-83**	**-95**
15	**36**	**22**	**9**	**-5**	**-18**	**-32**	**-45**	**-58**	**-72**	**-85**	**-99**	**-112**
20	**32**	**18**	**4**	**-10**	**-25**	**-39**	**-53**	**-67**	**-82**	**-96**	**-110**	**-121**
25	**30**	**16**	**0**	**-15**	**-29**	**-44**	**-59**	**-74**	**-88**	**-104**	**-118**	**-133**
30	**28**	**13**	**-2**	**-18**	**-33**	**-48**	**-63**	**-79**	**-94**	**-109**	**-125**	**-140**
35	**27**	**11**	**-4**	**-20**	**-35**	**-51**	**-67**	**-82**	**-98**	**-113**	**-129**	**-145**
40	**26**	**10**	**-6**	**-21**	**-37**	**-53**	**-69**	**-85**	**-100**	**-116**	**-132**	**-148**
(Wind speeds greater than 40 mph have little additional effect.)	*LITTLE DANGER* In < hr with dry skin. Maximum danger of false sense of security.				*INCREASING DANGER* Danger from freezing of exposed flesh within one minute.				*GREAT DANGER* Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

North America Job Hazard Analysis
Work in Cold Environments

Project Name: Project Number: Job / Task Name: JHA No.: 15

Personal Protective Equipment Required for this Task:

Type	Description
Appropriate Cold-Weather Clothing	• An outer wind-breaker layer that allows some ventilation (e.g., Gore-Tex, nylon); • A middle layer of wool or synthetic fabric that absorbs sweat and retains insulation in a damp environment; and • An inner layer of cotton or synthetic-weave fabric that allows ventilation. • Insulated protection for feet, hands, face, and head (hat and gloves, as a minimum), to protect against cold and dampness. Up to 40 percent of body heat may be lost when the head is exposed. • A change of clothing is to be kept available and changed into immediately if work clothes become wet (to prevent hypothermia).

Training Required for this Task:

Type	Description
Preventing Cold Weather Disorders	Powerpoint presentation can be located on ERM North American Minerva page at the following link. http://minerva/erm/globalsupport/healthandsafety/NA/HS%20Training%20Materials/Home.aspx

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Respiratory Protection

Project Name: Project Number: Job / Task Name: JHA No.: 17

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for selection, use, and maintenance of respiratory protection.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Employee chemical exposure could occur or unqualified personnel could be put at risk if not specified early in the planning process.	The health and safety plan must specify the need for respirators, including the requirement that employees working on the project must be medically cleared to wear a respirator and have a current respirator fit-test on the type and model respirator they will be expected to wear. If organic vapor cartridges are to be used, develop a cartridge change schedule. Include the following exposure limits for each contaminant if they are available. The lowest exposure limit of these should be used as the trigger to don respiratory protection: • OSHA Permissible Exposure Limit (PEL) • NIOSH Recommended Exposure Limit (REL) • ACGIH Threshold Limit Value (TLV) • Immediately Dangerous to Life or Health (IDLH) Additionally, respirator cartridge types must be specified in the health and safety plan and available on-site.

North America Job Hazard Analysis
Respiratory Protection

Project Name: Project Number: Job / Task Name: JHA No.: 17

Task Step	Hazard	Control Measures
Prior to Using Respirator	Respirators that are not cleaned, inspected, or maintained well will not provide protection as designed.	Prior to donning a cartridge-type respirator, inspect to ensure it is in good condition, including straps, rubber sealing surfaces, and non-visible parts such as inhalation and exhalation valves. Do not use respirators with cracked rubber parts or stretched straps unless repaired. Clean if necessary using an alcohol wipe or mild soap and water solution. Cartridge-type respirators may not be used if chemical exposures exceed 10 times the OSHA PEL or are at IDLH levels. Inspect supplied air (SCBA at least monthly, and prior to each use. Inspections of SCBAs and other emergency-type respirators must be documented.
Don the Respirator	Incorrect seal on the respirator could cause employee chemical exposures.	Prior to donning respirators, personnel must be clean-shaven in areas of the face where the respirator seal touches, including any inner nose cups. For cartridge-type respirators, place the cartridges on the respirator facepiece. Cartridges should not be torqued to tighten (only slightly tightened). The respirator must be donned prior to other personal protective equipment in the head/neck area so that nothing comes between the respirator straps and the head surface. Safety glasses, hard hats, etc. must be donned after the respirator. Because of this, ERM prefers employees wear full-face respirators when possible. For cartridge-type respirators, perform a positive and negative fit-check to make sure the seal of the respirator is good.

North America Job Hazard Analysis
Respiratory Protection

Project Name: Project Number: Job / Task Name: JHA No.: 17

Task Step	Hazard	Control Measures
Performing Work Wearing Respirators	Tendency to readjust respirator facepieces when sweating is high, and can result in chemical exposures. Particulate cartridge clogging may occur, or chemicals may break through chemical cartridges.	Excessive sweating may cause the respirator facepiece to slide on the wearer's face resulting in a compromised respirator seal. If this occurs, stop work and move to an area with no chemical contamination (go through the decontamination line if present), readjust the respirator, and perform positive and negative fit-checks to ensure a proper face seal. If using particulate cartridges (N, R, or P-types), and it becomes difficult to breathe, move to a clean area and change cartridges. If using chemical cartridges other than organic vapor-types, change cartridges if any amount of chemical odor breaks through the respirator cartridge. For organic vapor cartridges, change respirator cartridges according to the cartridge change schedule in the health and safety plan.
Doffing Respirators	Chemical exposure could occur if respirators are taken off incorrectly.	If a decontamination line is present, proceed through the line as directed. If no decontamination line is being used, all other personal protective equipment except gloves should be removed before taking the respirator off. Once removed, respirator cartridges should be discarded and facepieces cleaned. If sharing respirators, the respirator must be cleaned and sanitized before use by another employee.

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Respiratory Protection

Project Name: Project Number: Job / Task Name: JHA No.: 17

Training Required for this Task:

Type	Description
Respirator Training	Annually-required training necessary for employees to wear positive or negative-pressure respirators.
Respirator Fit-Test	An annually-required test of the fit of a certain model and type respirator to an employee's face. All negative-pressure (filter or cartridge-type) and supplied-air facepieces must be fit-tests. Employees must be fit-tested on each model and type of respirator to be worn.

Forms Associated with this Task:

Type	Description
SCBA Inspection Checklist	Checklist documenting monthly inspection of self-contained breathing apparatus units (SCBA).

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name: Project Number: Job / Task Name: JHA No.: 19

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working around heavy equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Untrained workers operating heavy equipment pose potential life-threatening hazards to employees.	ERM policy and practice is that our employees do not operate heavy equipment except in unusual circumstances. If ERM personnel are to operate heavy equipment, this must be stated in the health and safety plan for the project. Only employees with training and/or demonstrated experience operating heavy equipment may do so. Subcontractor personnel operating heavy equipment must be trained and/or have demonstrated experience operating such equipment. ERM must be in possession of evidence of training and/or experience prior to Subcontractor personnel operating such equipment. All heavy equipment must meet applicable design standards (ANSI, etc.). A copy of the operating manual must be carried on all heavy equipment, including a load-rating chart and any special operating considerations.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:
Project Number:
Job / Task Name:
JHA No.: 19

Task Step	Hazard	Control Measures
Heavy Equipment Operation	Injury to operator and those in immediate vicinity.	Before starting operations, operators must ensure no one is working on or near machinery. If equipment is to be operated in close proximity to other workers, a spotter must be working in tandem with the operator. All heavy equipment must be inspected daily to ensure good working order. Critical safety items, such as brakes, backup alarms, horns, etc. must be in working order. Machinery with critical safety items in disrepair may not be used until they are fixed. Operators must operate equipment while wearing seatbelts, if provided, and at reasonable speeds. Mounting/dismounting a moving machine is prohibited. Do not transport personnel or equipment in machinery not designed for this purpose. Overhead obstructions must be assessed before operating machinery. If equipment is to be operated in close proximity to overhead obstructions, a spotter must be working in tandem with the operator. Safe working distances must be specified in the health and safety plan or JHA supplied by the subcontractor.
Ending Heavy Equipment Operations	Leaving equipment in a non-neutral position poses contact hazards.	All heavy equipment must be placed in a neutral position when not in operation. Dump truck beds must be lowered, buckets must be at ground level, forklift tines must be at ground level, etc. Keys must be removed from all heavy equipment when not in use4.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name: Project Number: Job / Task Name: JHA No.: 19

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility safety vest	Vest worn by equipment operators and those working in the area impacted by moving machinery

Training Required for this Task:

Type	Description
Heavy Equipment Operation	Operators must be trained and/or have demonstrated experience for each type of heavy equipment they will operate.

Forms Associated with this Task:

Type	Description
Heavy Equipment Inspection form	Form for documenting daily heavy equipment inspections

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name: Project Number: Job / Task Name: JHA No.: 20

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable hand and power tools.

Hazard Analysis:

Task Step	Hazard	Control Measures
Gather tools to take to jobsite	An improper tool available at jobsites encourages unsafe behaviors and could lead to injury.	Ensure tools taken to jobsites are kept in optimal condition (sharp, clean, oiled, etc.) to ensure efficient operation. Tools must only be used for their intended purposes – tools should not be used as pry-bars. Ensure power cords attached to powered-equipment are not damaged. Any damaged tool or electrical cord must be tagged and taken out of service.
Using cutting tools	Major and/or minor cuts to personnel	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves must be worn while using them and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should must high-visibility gloves to encourage awareness of where hands are being placed.

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name: Project Number: Job / Task Name: JHA No.: 20

Task Step	Hazard	Control Measures
Using screwdrivers	Puncture injuries	Do not hold objects in the palm of your hand and press a screwdriver into it – these objects should be placed on a flat surface. Do not use screwdrivers as hammers, or use screwdrivers with broken handles. Use insulated screwdrivers for work on electrical equipment.
Using hammers	Creation of sparks	Use brass hammers in areas where creating sparks would pose ignition hazards.
	Particles may lodge in employee's eyes	Always use safety glasses when striking any object with a hammer. If hammer-head shows signs of mushrooming, replace it immediately.
	Loose handles may create a projectile hazard	Replace any hammer with a loose handle so the hammer-head does not detach and cause injuries.

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility glove	Gloves typically in fluorescent green, orange, or yellow.
Cut-resistant glove	Limited protection is afforded by leather gloves from cuts. Kevlar gloves provide more protection when significant cut/puncture hazards exist.

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name: Project Number: Job / Task Name: JHA No.: 20

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name: Project Number: Job / Task Name: JHA No.: 21

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for permit-required and non permit-required confined space entry operations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Entering confined spaces poses various life-threatening hazards to employees.	ERM policy and practice prohibits our employees from entering a permit-required confined space, except in unusual circumstances. If permit-required confined spaces are to be entered by either ERM personnel or Subcontractor personnel, a North America Safety Team member must be consulted, and a confined space entry program must be instituted.
Onsite Work	Entering confined spaces poses various life-threatening hazards to employees.	Any person entering a permit-required confined space must have received confined space entry training. For subcontractors performing confined space entry, a minimum of three subcontractor personnel are required for this task (supervisor, attendant, and entrant).

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name: Project Number: Job / Task Name: JHA No.: 21

Training Required for this Task:

Type	Description
Permit-Required Confined Space Entry	Training on confined space entry operations, normally lasting 16-24 hours.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name: Project Number: Job / Task Name: JHA No.: 22

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working on or around electrically energized equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Locks, tags, and trained personnel may not be present at the jobsite when needed.	The health and safety plan for projects involving work on or oversight of work on electrical equipment must include provisions for lockout-tagout. Locks and tags must be on-hand. Also, after-hours contact information for employees that will apply locks and/or tags must be obtained and documented in the health and safety plan. Personnel performing lockout-tagout operations must have received documented lockout-tagout training. Staff these projects with personnel who have attended this training. Collect training certificates from subcontractors who will perform this work.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name: Project Number: Job / Task Name: JHA No.: 22

Task Step	Hazard	Control Measures
Work on Energized Equipment	Electrocution may occur if lockout-tagout is not performed correctly.	Before working on electrically-energized equipment, it should be brought to a "zero-energy state". This may involve turning the equipment's power source off, or turning specific electrical breakers to the off position. "Zero-energy" is not attained until the individual working on the machinery attempts to turn the machine on and is unsuccessful. The individual(s) performing lockout-tagout must inform other personnel in the area that work on equipment is about to occur, and to not attempt to turn equipment on for any reason. Locks AND tags must be placed on equipment power sources by each individual performing work on the equipment using personally-identifiable locks. Tags must read "DANGER – DO NOT OPERATE" and be resistant to wear and tear by the environment they are being used in. In certain situations, the use of locks may not be possible (machinery must be kept energized to perform required work). In these cases the Project Manager and Field Safety Officer must be directly involved when tagout is taking place.
Remove locks and tags	Removing locks and/or tags prematurely may lead to electrocution.	Do not allow anyone other than the individual who placed a lock/tag in-place to remove it. If the individual who placed the lock/tag is not immediately available to remove it, work must be suspended until he/she becomes available. If the individual who placed the lock/tag has left the jobsite, use the contact information located in the health and safety plan to attempt to contact them. If they are unable to be contacted, their lock/tag may only be removed through a joint decision from the PM, FSO, and Subcontractor supervisor.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name: Project Number: Job / Task Name: JHA No.: 22

Task Step	Hazard	Control Measures
Lockout Tagout Process Inspection on Sites Longer than 1 Year	Changes to electrically-energized equipment may cause lockout-tagout procedures to become obsolete.	For all sites where work extends beyond 1 year, a lockout-tagout process inspection must occur. The inspection will verify, for each piece of electrically-energized equipment normally worked on, that lockout-tagout procedures in-place are still valid. These process inspections must be documented.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Lockout-Tagout	Lockout-tagout training describes the process of de-energizing electrical equipment prior to performing work or maintenance on the equipment, and the safeguards that must be used to ensure electrical hazards to employees are controlled.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Fall Protection

Project Name: Project Number: Job / Task Name: JHA No.: 23

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Any work at heights exceeding 6 feet.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Not having fall protection when needed on a project site. Untrained employees may not understand how or when to use fall protection.	When developing the health and safety plan, include specific fall protection equipment needs known at the time to ensure it is available for use at the site. Using fall protection requires that employees have received formal training. Staff projects requiring fall protection with employees who have attended fall protection training.
Work at heights exceeding 6 feet from any lower level	Significant injury could occur if employees are not wearing fall protection in these instances or other protective devices are not installed.	For work greater than 6 feet higher than a lower level (could be the ground or other situation with multiple levels) ensure employees are wearing appropriate fall protection. Provide protection to employees below by putting protection from falling objects in place (described below). Provide means of quickly rescuing any person wearing fall protection on projects or ensure the employee can self-rescue.

North America Job Hazard Analysis
Fall Protection

Project Name: Project Number: Job / Task Name: JHA No.: 23

Personal Protective Equipment Required for this Task:

Type	Description
Fall Protection	Fall protection can take on many forms depending on the task(s) involved, including vertical/horizontal lifeline systems, full body harnesses, shock absorbing lanyards, nets, retractable devices, and others. Check with the North America Safety Team for guidance when fall protection is required on your project. All fall protection must meet applicable ANSI, ASTM, or OSHA requirements.
Protection from Falling Objects	Protection from falling objects can take on many forms, including toeboards/screens/guardrail systems, canopy structures, or work practices preventing people from entering areas where objects may fall from heights.

Training Required for this Task:

Type	Description
Fall Protection Training	Training on the use, care, and maintenance of fall protection equipment.
Fall Protection Retraining	Must be done after incident involving fall protection, when using new fall protection equipment, or when wearing fall protection on a new jobsite.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Ladder Use

Project Name: Project Number: Job / Task Name: JHA No.: 24

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable ladders.

Hazard Analysis:

Task Step	Hazard	Control Measures
Select ladder for use	Selection of a ladder with oil/grease on its surface or a defective/poorly-maintained ladder may lead to not having a suitable ladder at the jobsite. Conductive ladders used around energized equipment could cause electrocution.	Inspect ladders before taking them to jobsites to ensure they are clean, sturdy, and appear well-maintained. Any ladder found to be unusable must be tagged and taken out of service. For work around energized electrical equipment, choose a non-conductive ladder or one with non-conductive side rails.
Loading/Unloading ladder	Muscle strain or other injury may occur from improper lifting of ladders.	Before lifting ladders onto or off of a transport vehicle, pause and determine if the lift is safe to do alone. If not, get help from other individuals.
Placing ladder	Ladders may not be in good working order. Ladders placed on uneven ground or slippery locations may cause ladder failure. Overhead electrical lines may cause electrocution.	Always inspect ladders each time before they are used. Do not use a ladder that appears to be poorly maintained. Place ladders on stable and level surfaces. If not possible, secure the ladder to prevent accidental movement. Use slip-resistant ladder feet in slippery locations. These do not take the place of proper placement or holding a ladder in-place. Ensure no contact between ladders and overhead lines.

North America Job Hazard Analysis
Portable Ladder Use

Project Name: Project Number: Job / Task Name: JHA No.: 24

Task Step	Hazard	Control Measures
Going up/down ladder	Employee may lose balance and fall when going up or down a ladder.	Whenever employees are on ladders they should be facing the ladder, including going up and down. Keep hands free and grasp the ladder with one hand at all times. Do not carry loads in your hands on ladders.
Working from ladder	Various hazards could cause employees to lose balance and fall.	Only one person may be on a ladder at any one time. Keep both feet on the ladder rungs – do not place one foot off the ladder onto other equipment. If you must stand backwards on the ladder, and anytime an unstable situation exists, fall protection must be provided and used by employees. In these situations barricade or rope-off the area being worked in to avoid potentially hurting others. Follow any label directions about standing on the top steps of ladders to perform work. If no label exists, do not stand on the top two rungs of the ladder to perform work. Secure all tools and supplies to ensure they do not fall and hurt others. Do not perform extended reaches during work. If at least one foot cannot stay in contact with ladder rungs, dismount the ladder and move to a more convenient location.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Ladder Use

Project Name: Project Number: Job / Task Name: JHA No.: 24

Forms Associated with this Task:

Type	Description
Ladder Inspection Checklist	A checklist that may be used to document inspections of portable ladders

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Process Safety Management

Project Name: Project Number: Job / Task Name: JHA No.: 26

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working on jobsites requiring compliance with the OSHA Process Safety Management (PSM) standard.

Hazard Analysis:

Task Step	Hazard	Control Measures

Personal Protective Equipment Required for this Task:

Type	Description

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description

North America Job Hazard Analysis
Process Safety Management

Project Name: Project Number: Job / Task Name: JHA No.: 26

None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Hazardous Waste Operations and Emergency Response

Project Name: Project Number: Job / Task Name: JHA No.: 27

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working on jobsites requiring compliance with the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard.

Hazard Analysis:

Task Step	Hazard	Control Measures

Personal Protective Equipment Required for this Task:

Type	Description

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

North America Job Hazard Analysis
Hazardous Waste Operations and Emergency Response

Project Name: Project Number: Job / Task Name: JHA No.: 27

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

Subsurface Clearance Requirements

Appendix D

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Subsurface Clearance Field Process Checklist

Site Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Project Basics	Yes	No	N/A	Comments
Contact Person requested and identified				
Subcontractors meet ERM's minimum safety criteria				
Subcontractors understand their role in the SSC Process				
SSC Experienced Person with current SSC training assigned				
Project staff with current SSC training assigned				
UXO / MEC risks assessed: UXO / MEC IS NOT present				

General Field Activity & Site Walk	Yes	No	N/A	Comments
HASP read, understood and signed by project team				
Site walk Visual Clues / site features (below) integrated into Site Services Model				

Identified Visual Clue	Yes	No	Identified Visual Clue	Yes	No
Lights			Pipeline markers		
Signage			Fire hydrants		
Sewer drains / cleanouts			Sprinkler systems		
Cable markers			Water meters		
Utility poles with conduit leading to the ground			Natural gas meters		
Utility boxes			UST fill ports and vent pipes		
Manholes			Steam lines		
Pavement scarring			Remote buildings with no visible utilities		

Comments / Others:

Contact Person Approval of Ground Disturbance Locations (indicate verbal approval by printing **"Verbal" in the signature space)**

Name (Print)	Company	Name (Sign)	Date / Time

Pre-Clearance	Yes	No	N/A	Comments
Public Utility Markout completed				
Private Utility Markout completed				
Final Critical Zone determinations made by the SSC Experienced Person				

Critical Zones

Are there any ground disturbance locations known or suspected to be inside Critical Zones?

☐ **Yes.** PIC must approve work within the Critical Zone. The SSC Location Disturbance Permit or equivalent is required for those locations.

☐ **No.** Physical Clearance will proceed to the deeper of: 0.6m / 2 feet below the frost line or 1.2m / 4 feet below ground level, whichever is deeper.

Clearance for Point Disturbances	Yes	No	N/A	Comments
Adequate overhead clearance at ground disturbance locations				
There are disturbance locations known or suspected to be inside Critical Zones				
Physical Clearance successfully completed at all locations				

Clearance for Excavations	Yes	No	N/A	Comments
Adequate overhead clearance at ground disturbance locations				
Communicate excavation plan and Excavation Buffer location(s) to subcontractor				
There are disturbance locations known or suspected to be inside Critical Zones				
De-energize below ground services prior to beginning excavation				

SSC Process Completed By (SSC Experienced Person)

Name (Print)	Name (Sign)	Date / Time

Site Inspection Checklist

Appendix E

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Heavy Equipment

Observation	Yes	No	N/A	Comments
Are daily equipment inspection checklists completed?				
Are safety deficiencies immediately repaired or has the equipment been taken out of service?				
Do the back-up alarms work?				
Does the operator use three-points of contact when getting on/off equipment?				
Is heavy equipment operated within its design capacity?				
Is equipment operated at safe speeds for site conditions?				
Are fire extinguishers present and in good working order on all equipment?				
Are keys or control panels removed when equipment is not in use?				
Are workers working with or near heavy equipment operations wearing high visibility clothing (i.e. traffic vest?				

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Ground Disturbance and Excavations

Observation	Yes	No	N/A	Comments
Has the sub-surface checklist been completed and signed off by all appropriate parties?				
Are all sub-surface processes or utility lines clearly identified?				
Is there at least one competent excavation person on site at all times?				
Is a copy of the competent excavation person training records available for review?				
Are excavations properly sloped shored or benched?				
Are excavations properly protected by hard or soft barricade?				

Hand and Powered Hand Tools

Observation	Yes	No	N/A	Comments
Are all hand tools in good working order and appropriate for the task?				
Are electrical cords in good repair and inspected prior to use?				
Are external GFCI'S used and routinely inspected?				
Are guards and other safety devises present and in good working order?				
Are workers wearing hearing protection when using high noise producing tools?				
Are workers wearing appropriate PPE when using electrical or pneumatic tools?				
Are pneumatic hoses in good condition?				
Is/are fire extinguishers located nearby portable compressors or generators?				
Are generators or compressors shut down prior to fueling?				
Are malfunctioning tools tagged and taken out of service?				

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Hand and Foot Protection

Observation	Yes	No	N/A	Comments
Are the appropriate gloves being worn by site workers as identified by the HASP or JHA?				
Is the appropriate footwear worn by site workers as identified by the HASP or JHA?				
Are disposable gloves and footwear disposed of properly?				

Respiratory Protection

Observation	Yes	No	N/A	Comments
Are copies of employee respiratory training records, fit test and fit to work statements current and available on site?				
Are workers following respirator cartridge change out schedule?				
Are workers following proper respirator donning procedures?				
Are respirators cleaned and stored properly when not in use?				

Condition of Protective Clothing

Observation	Yes	No	N/A	Comments
Is protective clothing worn by workers in good condition? (no rips or tears)				
Is the type of protective clothing selected appropriate for the task? (see HASP or JHA'S)				
Are workers correctly wearing the protective clothing? (e.g., Zippers zipped, proper taping of sleeves)				
Is contaminated clothing properly disposed?				

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Work Zones

Observation	Yes	No	N/A	Comments
Are exclusion, decontamination and safe zones clearly identified and maintained?				
Are workers following proper decontamination procedures?				
Is equipment decontamination procedures followed?				
Is the decontamination station adequately stocked?				
Is the "Buddy System" adhered to?				

Ambient Work Conditions

Observation	Yes	No	N/A	Comments
Is sufficient lighting available to safely do the work?				
If the temperature is above 85 F (29 C), are there liquids available such as Gatorade / water?				
Is there proper ventilation at the job site?				

General PPE Matters

Observation	Yes	No	N/A	Comments
Are hardhats being worn?				
Are workers utilizing appropriate eye protection for the?				
Are workers utilizing the appropriate foot protection for the task?				
Is hearing protection required and utilized?				
Are workers using and wearing the appropriate hand protection for the task?				

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Are worker hygiene facilities, toilets, hand-wash stations, lunch area maintained and adequately stocked?				
Are warning signs legible?				
Are tools properly stored?				
Is trash picked up regularly and properly disposed?				
Is used PPE properly disposed?				
Are all containers properly labeled?				
Is there accumulated snow or ice over footpaths or roadways?				

Emergency Preparedness

Observation	Yes	No	N/A	Comments
Have workers been informed of the site emergency response procedures?				
Do workers know the nearest assembly point for their work area?				
Do workers know the location/s of the nearest eyewash/shower?				
Do workers know the location of the nearest first-aid kit				
Is there at least one first aid trained person on site at all times?				
Do workers know how to report an emergency?				
Do workers know the type of alarm used to identify an emergency or evacuation at the site?				
Has a site emergency evacuation drill been conducted?				

Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.

Instructions: Complete the checklist below. Record any observed Unsafe Acts or Unsafe Conditions using a separate form for each. For additional comments use the back of these pages. Start all comments by identify applicable section for reference.

Personnel Administrative

Observation	Yes	No	N/A	Comments
Did all site workers attend site orientation and HASP?				
Are workers attending and signing daily toolbox safety meeting?				
Are workers reporting unsafe acts and conditions?				

Site

Observation	Yes	No	N/A	Comments
Are MSDS'S available for each chemical at the site?				
Are flammable liquids stored away from ignition sources and in a secure place when not in use?				
Are spill kits readily available?				
Are fire extinguishers inspections current and strategically located?				
Are adequate hygiene facilities available for site workers?				
Have smoking and eating areas been established?				
Are JHAs completed and reviewed by workers in accordance with the HASP				
Do workers comply with site speed limits and traffic rules?				
Do workers comply with site cell phone policy?				

Housekeeping

Observation	Yes	No	N/A	Comments
Is site kept clean, neat and orderly?				

Personal Safety Contract Cards

Appendix F

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Date: _____

Name: _____

PPE Requirements

- ☐ Hardhat
- ☐ Safety glasses
- ☐ Steel toed shoes/boots
- ☐ Hearing protection
- ☐ Gloves
- ☐ Tyvek/Protective clothing
- ☐ Respirator
- ☐ Traffic vest/orange shirt
- ☐ Other _____

Emergency Preparedness

1) Location of nearest fire extinguisher?

_____

2) Location of nearest eyewash station?

_____

3) Location of nearest first-aid kit?

_____

4) Who is the Site Safety Officer?

_____

Task Assigned

_____

List the Hazards & Mitigations Associated with the Assigned Task

Hazard	Mitigation

Date: _____

Name: _____

PPE Requirements

- ☐ Hardhat
- ☐ Safety glasses
- ☐ Steel toed shoes/boots
- ☐ Hearing protection
- ☐ Gloves
- ☐ Tyvek/Protective clothing
- ☐ Respirator
- ☐ Traffic vest/orange shirt
- ☐ Other _____

Emergency Preparedness

1) Location of nearest fire extinguisher?

_____

2) Location of nearest eyewash station?

_____

3) Location of nearest first-aid kit?

_____

4) Who is the Site Safety Officer?

_____

Task Assigned

_____

List the Hazards & Mitigations Associated with the Assigned Task

Hazard	Mitigation

Date: _____

Name: _____

PPE Requirements

- ☐ Hardhat
- ☐ Safety glasses
- ☐ Steel toed shoes/boots
- ☐ Hearing protection
- ☐ Gloves
- ☐ Tyvek/Protective clothing
- ☐ Respirator
- ☐ Traffic vest/orange shirt
- ☐ Other _____

Emergency Preparedness

1) Location of nearest fire extinguisher?

_____

2) Location of nearest eyewash station?

_____

3) Location of nearest first-aid kit?

_____

4) Who is the Site Safety Officer?

_____

Task Assigned

_____

List the Hazards & Mitigations Associated with the Assigned Task

Hazard	Mitigation

Date: _____

Name: _____

PPE Requirements

- ☐ Hardhat
- ☐ Safety glasses
- ☐ Steel toed shoes/boots
- ☐ Hearing protection
- ☐ Gloves
- ☐ Tyvek/Protective clothing
- ☐ Respirator
- ☐ Traffic vest/orange shirt
- ☐ Other _____

Emergency Preparedness

1) Location of nearest fire extinguisher?

_____

2) Location of nearest eyewash station?

_____

3) Location of nearest first-aid kit?

_____

4) Who is the Site Safety Officer?

_____

Task Assigned

_____

List the Hazards & Mitigations Associated with the Assigned Task

Hazard	Mitigation

Daily Safety Observations/Notes

Personal Safety Contract (PSC) for Project

_____

- *A PSC Card must be completed for each assigned task*
- *Keep this PSC Card on your person for the duration of the workday*
- *Turn in all PSC Cards to your supervisor at the end of each day*

You see it, You own it!

Rev.: 08-10

Daily Safety Observations/Notes

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Rev.: 08-10

Daily Safety Observations/Notes

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Rev.: 08-10

Daily Safety Observations/Notes

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You see it, You own it!

Rev.: 08-10

Work Permit Forms

Appendix G

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Subsurface Clearance and Ground Disturbance Permit

Ref No.: WP-SSC-

FSO retains in site project files

Pre-Mobilization Activity Confirmation: Any "No" Answer will require an approved MoC prior to proceeding				
Confirmation Item	**Yes**	**No**	**NA**	**Comments**
Contact Person requested and identified				
Subcontractors have "BP RM Endorsement"				
Subcontractors understand their role in the SSC Process				
ERM SSC EP with current SSC training assigned				
Qualified line locator with 5+ years experience will be used				Name:
Project staff with current SSC training assigned				
UXO / MEC risks assessed: UXO / MEC IS NOT present				
Enviro. / archeological effects considered & addressed				

General Field Activity & Site Walk	**Yes**	**No**	**NA**	**Comments**
TSEA / SOP / HASP understood and signed by team				
Visual Clues integrated into Site Services Model (attached)				
Energize electrical services to aide line location				

Identified Visual Clue	Yes	No		Identified Visual Clue	Yes	No
Lights				Pipeline markers		
Signage				Fire hydrants		
Sewer drains/cleanouts				Sprinkler systems		
Cable markers				Water meters		
Utility poles w/ conduit to the ground				Natural gas meters		
Utility boxes				UST fill ports and vent pipes		
Manholes				Steam lines		
Pavement scarring				Remote buildings with no visible utilities		
Comments / Others:						

Contact Person Approval of Ground Disturbance Locations (if approved verbally, print "Verbal" in the block)			
Name (Print)	Company	Name (Sign)	Date / Time

Pre-Clearance Activity	**Yes**	**No**	**NA**	**Comments**
Public Utility Markout completed and lines marked				
Private Utility Markout completed and lines marked (attach copy of locator's Competency Certification to the permit)				
Site Services Model sketch updated / plot plan marked up by the SSC EP				
Final Critical Zone determinations made by the SSC Experienced Person				

Critical Zone Confirmation		
Are there any ground disturbance locations in known / suspected Critical Zones?	☐	Yes. PIC must approve work in the Critical Zone. The SSC Critical Zone Addendum is required. Confirm with the AA regarding the need for an Encroachment Agreement.
	☐	No. Physical Clearance for Point Disturbances will proceed to the deeper of: 0.6m / 2 feet below the frost line or 1.2m / 7 feet below ground level, whichever is deeper.

Complete Subsurface Clearance for Point Disturbances	**Yes**	**No**	**N/A**	**Comments**
LOTO / de-energize services if possible (if Yes, ensure use of ICR / LOTO Work Permit)				
Confirm adequate overhead clearance (if No, relocate or consider Overhead Utilities Work Permit)				
Inspections of equipment used for physical clearance (e.g., vac trucks) complete and documented prior to use				
There are disturbance locations known or suspected to be inside Critical Zones & PIC Waiver has been granted				
All anticipated services have been identified. Those close to the work area have been exposed.				
Encroachment / Crossing Agreement completed				
Physical Clearance successfully completed at all locations				

Complete Subsurface Clearance for Excavations	**Yes**	**No**	**N/A**	**Comments**
LOTO / de-energize services if possible (if Yes, ensure use of ICR / LOTO Work Permit)				
Confirm adequate overhead clearance (if No, relocate or consider Overhead Utilities Work Permit)				
Communicate excavation plan and Excavation Buffer location(s) to subcontractor				
All anticipated services have been identified. Those close to / crossing through the work area have been exposed.				
Encroachment / Crossing Agreement completed				
There are disturbance locations known or suspected to be inside Critical Zones				

SSC Complete: SSC EP – Sign and Date Below		
Name (Print)	Name (Sign)	Date / Time

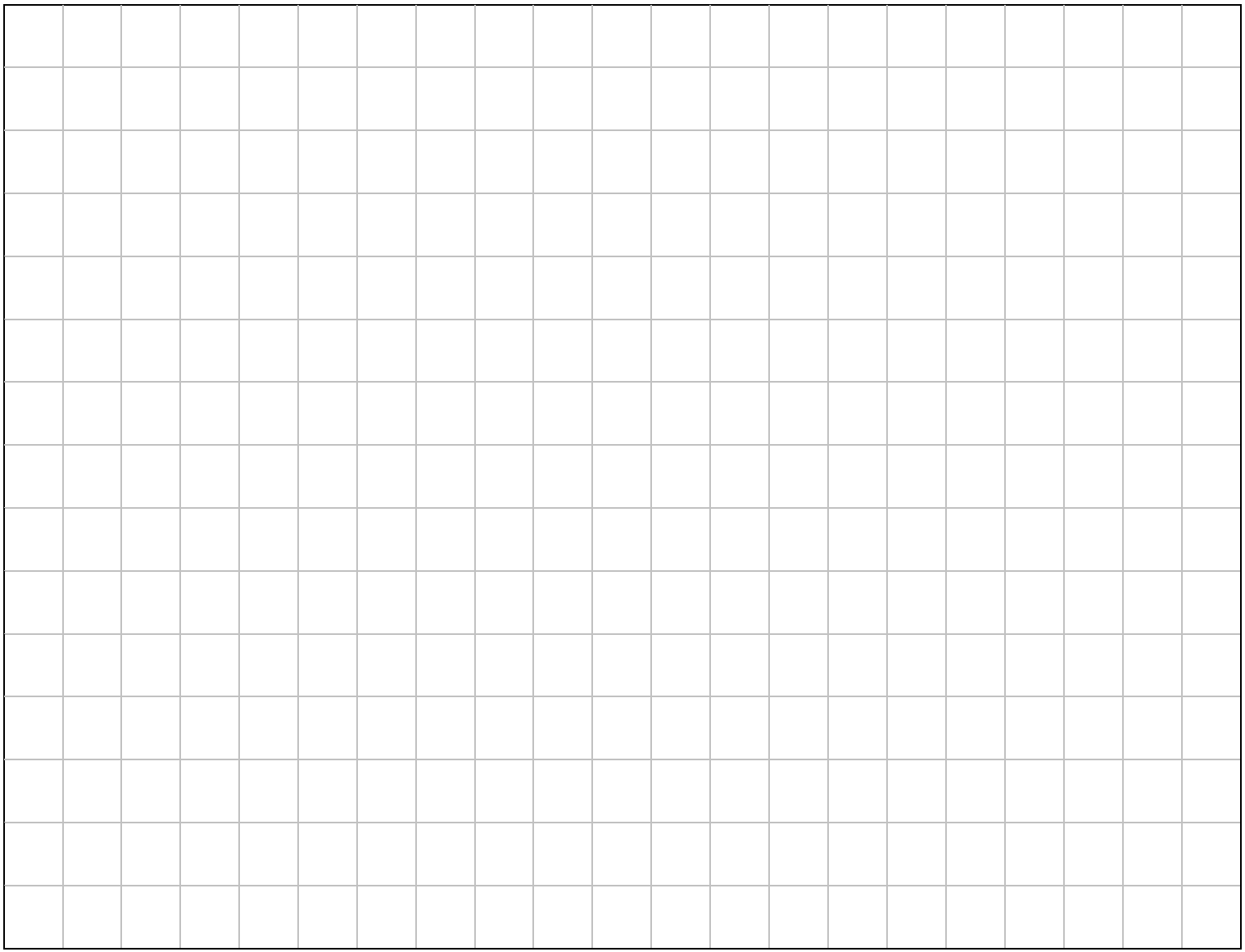
FOR ENVIRONMENTAL DRILLING OPERATIONS

Confirmation Items	Yes	No	N/A	Comments
Confirm personnel involved in drilling know / understand the CoW System Environmental Drilling Standard				
Drilling works TSEA / SOP reviewed. HASP read & signed by field team. This Permit reviewed.				
Additional linked permits identified & obtained (link on the Permit Cover Sheet)				

FOR EXCAVATION & TRENCHING OPERATIONS

Confirmation Items	Yes	No	N/A	Comments
Confirm personnel involved in drilling know / understand the CoW System Trenching & Excavation Standard				
Excavation / Trenching works TSEA / SOP reviewed. HASP read & signed by field team. This Permit reviewed.				
Additional linked permits identified & obtained (link on the Permit Cover Sheet)				
New non-metallic underground facilities are being installed with line locating capability				
The Excavation Design & Construction Checklist has been completed for the initial work				
Trench Safety Daily Field Report will be completed each day prior to the start of work				
Risk has been adequately assessed regarding open excavations and protections of the general public				

AUTHORIZATION PRIOR TO GROUND DISTRUBANCE
COMPLETE SIGNATURES ON PERMIT COVER SHEET
REVIEW THIS INFORMATION EACH TIME THE PERMIT IS RE-VALIDATED



REQUIRED

1. Create or attach a sketch of the area that includes:
   a. The disturbance location
   b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)
   c. Critical landmarks and Subsurface Structures (tanks, transformers, wells, racks, etc.)
   d. Underground services:
      i. Identified in the HASP Site Service Model
      ii. Marked by Public or Private utility markouts
      iii. As related by the Contact Person
      iv. Nearest shutoff / isolation mechanism for each.
   e. Any surface clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)
   f. The site property boundary.
2. Use your sketch to mark Critical Zones (3m or 10 feet) around critical landmarks and underground structures / services.
3. For Excavations: use your sketch to mark Excavation Buffers (0.6m or 2 feet) from Subsurface Structures.
4. If the disturbance location falls inside the Critical Zone, the preferred course of action is step out to a safe location outside a Critical Zone.
5. Disturbance within a Critical Zone can only proceed with PIC approval.

SITE SERVICES MODEL

List the utilities or other below ground services present on site. Do we know the locations of these services, their conveyance on site (to the site boundary, as appropriate) and the location of isolation switches or valves? If "Present" and not located or "Unknown", comment on how those gaps will be addressed.

Utility / Service	Present	Expected Depth	Located & Exposed		Confirmed Absent	Unknown	Comment
			Yes	No			
Electricity							
Gas							
Water							
Sewer							
Telephone / Data							
Plant air / steam							
Fuel / oil							
Fire suppression							

Universal Chemical Safety Data Cards

Appendix H

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Project Material Safety Data Sheets

Appendix I

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium permanganate monohydrate Massachusetts RTK: Sodium permanganate monohydrate TSCA 8(b) inventory: Sodium permanganate monohydrate SARA 313 toxic chemical notification and release reporting: Sodium permanganate monohydrate

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS C: Oxidizing material. CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 06:34 PM

Last Updated: 11/01/2010 12:00 PM

Solubility: Soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with reducing agents, organic materials, metals, acids. Reactive with moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 9000 mg/kg [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Exposure can cause nausea, headache and vomiting. Material is corrosive to the mucous membranes.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 5.1: Oxidizing material.

Identification: : Sodium permanganate : UN1503 PG: II

Precautions:
Keep away from heat. Keep away from sources of ignition. Keep away from combustible material Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as reducing agents, organic materials, metals, acids, moisture.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Oxidizing materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 5 (mg/m3) from ACGIH (TLV) [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Powdered solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 159.94 g/mole

Color: Red.

pH (1% soln/water): 7 [Neutral.]

Boiling Point: Not available.

Melting Point: Decomposes.

Critical Temperature: Not available.

Specific Gravity: 2.47 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of combustible materials. Flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Oxidizing material. Do not use water jet. Use flooding quantities of water. Avoid contact with organic materials.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes.

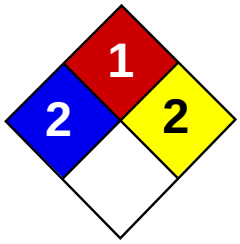
Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Oxidizing material. Stop leak if without risk. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage



Material Safety Data Sheet
Sodium permanganate monohydrate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium permanganate monohydrate

Catalog Codes: SLS4345

CAS#: 10101-50-5

RTECS: SD6650000

TSCA: TSCA 8(b) inventory: Sodium permanganate monohydrate

CI#: Not applicable.

Synonym: Permanganic acid, sodium salt

Chemical Name: Sodium permanganate monohydrate

Chemical Formula: NaMnO4.H2O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium permanganate monohydrate	10101-50-5	100

Toxicological Data on Ingredients: Sodium permanganate monohydrate: ORAL (LD50): Acute: 9000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

FMC Corporation believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable where such product is used in combination with any other materials or in any process. It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Further, since the conditions and methods of use are beyond the control of FMC Corporation, FMC Corporation expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

HMIS

Health	2
Flammability	0
Physical Hazard	1
Personal Protection (PPE)	J

Protection = J (Safety goggles, gloves, apron & combination dust & vapor respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	2
Flammability	0
Reactivity	1
Special	OX

SPECIAL = OX (Oxidizer)

NFPA (National Fire Protection Association)

Degree of Hazard Code:
4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #9, dated April 30, 2006.
Changes in information are as follows:
Section 1 (Product and Company Identification)
Section 3 (Composition / Information on Ingredients)
Section 4 (First Aid Measures)
Section 14 (Transport Information)
Section 15 (Regulatory Information)
Section 16 (Other Information)

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CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Product Identification Number: 1457

Hazard Classification / Division: D2B, E, C
Ingredient Disclosure List: Calcium hydroxide
Domestic Substance List: All components are listed or exempt.

INTERNATIONAL LISTINGS

Calcium peroxide:
Australia (AICS): Listed
China: Listed
Japan (ENCS): (1)-190
Korea: KE-04597
Philippines (PICCS): Listed
New Zealand: Listed

Calcium hydroxide
Australia (AICS): Listed
China: Listed
Japan (ENCS): (1)-181
Korea: KE-04518
Philippines (PICCS): Listed
New Zealand: Listed

HAZARD AND RISK PHRASE DESCRIPTIONS:

EC Symbols:	Xi	(Irritant)
	O	(Oxidizer)
EC Risk Phrases:	R8	(Contact with combustible material may cause fire)
	R41	(Risk of serious damage to eyes.)

16. OTHER INFORMATION

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME: Calcium Peroxide

OTHER INFORMATION:

CANADIAN TRANSPORT (TDG):
Proper Shipping Name: Calcium Peroxide
UN Number: 1457
Primary Hazard Class / Division: 5.1 (Oxidizer)
Packing Group: II

Place spilled product in suitable container and wash residue with plenty of water.

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15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 311 HAZARD CATEGORIES (40 CFR 370):
Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: None

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
This product does not contain any toxic chemicals subject to the reporting requirements of Section 313, Title III of the SARA (Superfund Amendments and Reauthorization Act) of 1986.

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
Calcium Peroxide (unlisted), RQ = 100 lbs., Ignitability

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):
All components are listed or exempt.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):
Waste Number: Calcium Peroxide, D001

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dissolve in water to allow the release of oxygen and dispose via a treatment system in accordance with governmental agencies regulations. Contact appropriate regulatory agency prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME:	Calcium Peroxide
PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 1457
PACKING GROUP:	II
LABEL(S):	5.1 (Oxidizer)
PLACARD(S):	5.1 (Oxidizer)
MARKING(S):	Oxidizing solid, N.O.S. (calcium peroxide), UN 1457
REPORTABLE QUANTITY (RQ):	Not applicable
ADDITIONAL INFORMATION:	49 STCC Number: 49187717 This material is shipped in 30 lb and 100 lb. fiber drums, as well as 1000-2000 lb. IBC's (supersacks).

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:	Calcium Peroxide

ADR - EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD

PROPER SHIPPING NAME:	Calcium Peroxide

INCOMPATIBLE MATERIALS:	Grinding mixtures with organics (oxidizable materials can be ignited by grinding and may become explosive); heavy metals.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen that supports combustion and calcium hydroxide.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: Severely irritating to unwashed eyes.
Minimally irritating to washed eyes. (rabbit) [Ref. FMC I88-1053]

SKIN EFFECTS: Non-irritating (rabbit) [FMC Ref. I88-1054]

DERMAL LD_{50}: > 10 g/kg (rat) [FMC Study Number: ICG/T-79.026]

ORAL LD_{50}: > 5 g/kg (rat) [FMC Ref. I88-1052]

INHALATION LC_{50}: > 17 mg/l (1 h) (rat) [FMC Ref. ICG/T-79.026]

TARGET ORGANS: Eyes and respiratory passages

ACUTE EFFECTS FROM OVEREXPOSURE: Dust is irritating to eyes, nose, throat, and lungs.

CHRONIC EFFECTS FROM OVEREXPOSURE: No data available for the product.

CARCINOGENICITY:

NTP:	Not listed
IARC:	Not listed
OSHA:	Not listed
OTHER:	ACGIH: Not listed

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Effect of low concentrations on aquatic life are unknown.
[Ref. NIOSH RTECS No. 79-100]

CHEMICAL FATE INFORMATION: As indicated by chemical properties oxygen is released into the environment.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Chemical goggles or face shield.

RESPIRATORY: Use approved dust respirator with full face piece.

PROTECTIVE CLOTHING: Long sleeve shirt, impervious apron or clothing. Rubber or neoprene footwear.

GLOVES: Rubber or neoprene gloves. Thoroughly wash the outside of gloves with soap and water prior to removal. Inspect regularly for leaks.

---

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	None
APPEARANCE:	White to yellow powder
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	Not applicable
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	27 lb/ft^3 bulk density
EVAPORATION RATE:	Not applicable (Butyl Acetate = 1)
MELTING POINT:	Decomposes on heating (About 275ºC)
ODOR THRESHOLD:	Not applicable
OXIDIZING PROPERTIES:	Oxidizer
PERCENT VOLATILE:	Not applicable
pH:	1 @ 25 °C slurry (1% solution)
SOLUBILITY IN WATER:	Insoluble
SPECIFIC GRAVITY:	Approximately 2.92 (H_2O=1)
VAPOR DENSITY:	Air=1: Not available
VAPOR PRESSURE:	Not applicable

---

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Heat (decomposes at 275ºC), moisture, reducing agents. Grinding with organics.
STABILITY:	Stable (decomposition could occur when exposed to heat or moisture)
POLYMERIZATION:	Will not occur

FLAMMABLE LIMITS: Non-Combustible

SENSITIVITY TO IMPACT: Oxidizable materials can be ignited by grinding and may become explosive.

SENSITIVITY TO STATIC DISCHARGE: Not available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Confine spill and place into container; dilute with a large quantity of water for disposal. Do not return product to the original container. Runoff to sewer may create fire or explosion hazard (do not flush powdered material to sewer).

7. HANDLING AND STORAGE

HANDLING: Avoid contact by using personal protective equipment. Use respiratory protective equipment when release of airborne dust is expected. If compounded with organics or combustible materials be sure to exclude moisture.

STORAGE: Keep material dry. Store in a clean cool place. Do not store near or expose to heat sources i.e., steam pipes, radiant heaters, hot air vents or welding sparks. Avoid contact with reducing agents. Reacts with moisture. Keep container tightly closed when not in use.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of dust into work environment. If ventilation is inadequate or not available, use dust respirator and eye protection.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Calcium Hydroxide	5 mg/m^3 (TWA)	5 mg/m^3 (PEL) (respirable fraction) 15 mg/m^3 (PEL) (total dust)	5 mg/m^3 (TWA)

ENGINEERING CONTROLS: Provide mechanical local exhaust ventilation to prevent the release of vapors or mist into the work area. If release is expected use respiratory protection.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Calcium Peroxide	1305-79-9	75	215-139-4	Xi-O; R8-R41
Calcium Hydroxide	1305-62-0	25	215-137-3	Xi; R41

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, obtain medical attention.

NOTES TO MEDICAL DOCTOR: This product is expected to have low oral, dermal and inhalation toxicity. It may be severely irritating to the eyes. It is expected to be irritating to the skin, mucous membranes and upper respiratory tract. Treatment is symptomatic and supportive. Direct contact with the eyes may have serious consequences; therefore, direct contact with eyes should be avoided. Contaminated external surfaces should be flooded with water, and direct eye contact deserves ophthalmologic evaluation. If ingested, gastrointestinal irritation but not caustic burns are to be expected; dilution with water indicated as may be gastric evacuation via emesis or lavage if large doses or severe irritation is evident. Demulcents should be helpful. No systemic effects are expected though human toxicity data is sparse.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Water

FIRE / EXPLOSION HAZARDS: Under fire conditions, may decompose and release oxygen gas. Mixtures with polysulfide polymers may ignite.

FIRE FIGHTING PROCEDURES: Use flooding quantities of water. Use water spray to keep fire exposed containers cool.

MATERIAL SAFETY DATA SHEET

Calcium Peroxide

MSDS Ref. No.: 1305-79-9-1
Date Approved: 06/10/2009
Revision No.: 10

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200 and Canada's Workplace Hazardous Materials Information System (WHMIS) requirements.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	Calcium Peroxide
SYNONYMS:	Calcium Peroxide, Food Grade (75% Min. Assay); Calcium Superoxide
GENERAL USE:	Used as a curing agent in certain rubber compounds. Other uses included starch modification, dough conditioner, and as an ingredient in deodorants, cosmetics and dentrifices.

MANUFACTURER

FMC CORPORATION
FMC Peroxygens
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)
msdsinfo@fmc.com (Email - General Information)

EMERGENCY TELEPHONE NUMBERS

(303) 595-9048 (Medical - U.S. - Call Collect)

For leak, fire, spill, or accident emergencies, call:
(800) 424-9300 (CHEMTREC - U.S.A. & Canada)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- White to yellowish, almost odorless, powder.
- Oxidizer.
- Contact with combustibles may cause fire.
- Under fire conditions product may decompose releasing oxygen that intensifies fire.
- Deluge container with water at safe distance or in protected area.
- Severely irritating to the eyes.

POTENTIAL HEALTH EFFECTS: Airborne dust may be irritating to eyes, nose, throat and lungs. No significant long term inhalation hazard; irritation usually subsides after exposure ceases.

Section 12 – Disposal Considerations

Waste Disposal Method:	Consult current federal, state and local regulations regarding the proper disposal of this material and its emptied containers.

Section 13 – Shipping/Transport Information

D.O.T Shipping Name:	Oxidizing Solid, N.O.S [A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
UN Number:	1479
Hazard Class:	5.1
Label(s):	5.1 (Oxidizer)
Packaging Group:	II
STCC Number:	4918717

Section 14 – Other Information

HMIS® Rating	Health – 2 Flammability – 0	Reactivity – 1 PPE - Required

HMIS® is a registered trademark of the National Painting and Coating Association.

NFPA® Rating	Health – 2 Flammability – 0	Reactivity – 1 OX

NFPA® is a registered trademark of the National Fire Protection Association.

Reason for Issue: Update toxicological and ecological data

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.

Sensitization:	No data
Chronic Toxicity:	In vitro, no mutagenic effect (Powder 50%)
Target Organ Effects:	Eyes and respiratory passages.

Section 11 – Information on Ecology

Ecology Data	
	10 mg $Ca(OH)_2$/L: pH = 9.0
	100 mg $Ca(OH)_2$/L: pH = 10.6
Acute Exotoxicity:	Fishes, Cyprinus carpio, LC_{50}, 48 hrs, 160 mg/L
	Crustaceans, Daphnia sp., EC_{50}, 24 hours, 25.6 mg/L
	(Powder 16%)
Mobility:	Low Solubility and Mobility
	Water – Slow Hydrolysis.
	Degradation Products: Calcium Hydroxide
Abiotic Degradation:	Water/soil – complexation/precipitation. Carbonates/sulfates present at environmental concentrations.
	Degradation products: carbonates/sulfates sparingly soluble
Biotic Degradation:	NA (inorganic compound)
Potential for Bioaccumulation:	NA (ionizable inorganic compound)

Section 11 – Information on Ecology (cont)

Comments:	Observed effects are related to alkaline properties of the product. Hazard for the environment is limited due to the product properties of: • No bioaccumulation • Weak solubility and precipatation as carbonate or sulfate in an aquatic environment. Diluted product is rapidly neutralized at environmental pH.
Further Information:	NA

Ingestion:	If the victim is conscious, rinse mouth and admnister fresh water. DO NOT induce vomiting. Consult a physician in all cases.
Skin Contact:	Wash affected skin with running water. Remove and clean clothing. Consult with a physician in case of persistent pain or redness.
Special Precautions:	Evacuate all non-essential personnel. Intervention should only be done by capable personnel that are trained and aware of the hazards associated with this product. When it is safe, unaffected product should be moved to safe area.
Specific Hazards:	Oxidizing substance. Oxygen released on exothermic decomposition may support combustion. Confined spaces and/or containers may be subject to increased pressure. If product comes into contact with flammables, fire or explosion may occur.

Section 9 – Accidental Release Measures

Precautions:	Observe the protection methods cited in Section 3. Avoid materials and products that are incompatible with product. Immediately notify the appropriate authorities in case of reportable discharge (> 100 lbs).
Cleanup Methods:	Collect the product with a suitable means of avoiding dust formation. All receiving equipment should be clean, vented, dry, labeled and made of material that this product is compatible with. Because of the contamination risk, the collected material should be kept in a safe isolated place. Use large quantities of water to clean the impacted area. See Section 12 for disposal methods.

Section 10 – Information on Toxicology

Toxicity Data

Acute Toxicity:	Oral Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Dermal Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Inhalation, LD_{50}, rat, > 5,000 mg/m^3 (powder 35%)
Irritation:	Rabbit (eyes), severe irritant

	clothing that has been contaminated with this product should be submerged in water prior to drying.
Inhalation:	High concentrations may cause slight nose and throat irritation with a cough. There is risk of sore throat and nose bleeds if one is exposed to this material for an extended period of time.
Eye Contact:	Severe eye irritation with watering and redness. There is also the risk of serious and/or permanent eye lesions.
Skin Contact:	Irritation may occur if one is exposed to this material for extended periods.
Ingestion:	Irritation of the mouth and throat with nausea and vomiting.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage/Gas Leakage:	Collect in suitable containers. Wash remainder with copious quantities of water.
Extinguishing Media:	See next.
Suitable:	Large quantities of water or water spray. In case of fire in close proximity, all means of extinguishing are acceptable.
Further Information:	Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire. Apply cooling water to sides of transport or storage vessels that are exposed to flames until the fire is extinguished. Do not approach hot vessels that contain this product.
First Aid:	After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention. Consult an opthalmologist in all cases.

Section 8 – Measures in Case of Accidents and Fire

Eye Contact:	Flush eyes with running water for 15 minutes, while keeping the eyelids wide open. Consult with an ophthalmologist in all cases.
Inhalation:	Remove subject from dusty environment. Consult with a physician in case of respiratory symptoms.

Section 6 – Protective Measures, Storage and Handling (cont)

Personal Protective Equipment (PPE)

Engineering Controls:	Calcium Hydroxide ACGIH® TLV® (2000) 5 mg/m^3 TWA OSHA PEL Total dust–15 mg/m^3 TWA Respirable fraction– 5 mg/m^3 TWA NIOSH REL (1994) 5 mg/m^3
Respiratory Protection:	For many conditions, no respiratory protection may be needed; however, in dusty or unknown atmospheres use a NIOSH approved dust respirator.
Hand Protection:	Impervious protective gloves made of nitrile, natural rubbber or neoprene.
Eye Protection:	Use chemical safety goggles (dust proof).
Skin Protection:	For brief contact, few precautions other than clean clothing are needed. Full body clothing impervious to this material should be used during prolonged exposure.
Other:	Safety shower and eyewash stations should be present. Consultation with an industrial hygienist or safety manager for the selection of PPE suitable for working conditions is suggested.
Industrial Hygiene:	Avoid contact with skin and eyes.
Protection Against Fire & Explosion:	NA

Section 7 – Hazards Identification

Emergency Overview:	Oxidizer – Contact with combustibles may cause a fire. This material decomposes and releases oxygen in a fire. The additional oxygen may intensify the fire.
Potential Health Effects:	Irritating to the mucous membrane and eyes. If the product splashes in ones face and eyes, treat the eyes first. Do not dry soiled clothing close to an open flame or heat source. Any

Section 5 – Regulations (cont)

SARA, Title III, Section 313 (40 CFR Part 372 – Toxic Chemical Release Reporting: Community Right-To-Know

Extremely Hazardous Substance:	No	
WHMIS Classification:	C	Oxidizing Material Poisonous and Infectious Material
	D	Material Causing Other Toxic Effects – Eye and Skin Irritant
Canadian Domestic Substance List:	Not Listed	

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in tightly closed container. Store in dry area, protected from heat sources and direct sunlight.
Handling:	Clean and dry processing pipes and equipment before operation. Never return unused product to the storage container. Keep away from incompatible products. Containers and equipment used to handle this product should be used exclusively for this material. Avoid contact with water or humidity.

Section 4 – Reactivity Data

Stability:	Stable under certain conditions (see below).
Conditions to Avoid:	Heat and moisture.
Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances.
Hazardous Polymerization:	Does not occur.

Section 5 – Regulations

TSCA Inventory List:	Listed

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance:	No
Unlisted Substance:	Yes
Reportable Quantity (RQ):	100 pounds
Characteristic(s):	Ignitibility
RCRA Waste Number:	D001

SARA, Title III, Sections 302/303 (40 CFR Part 355 – Emergency Planning and Notification)

Extremely Hazardous Substance:	No

SARA, Title III, Sections 311/312 (40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-To-Know

Hazard Category:	Immediate Health Hazard Fire Hazard
Threshold Planning Quantity:	10,000 pounds

Section 3 – Physical Data

Form:	Powder
Color:	White to Pale Yellow
Odor:	Odorless
Melting Point:	527 °F (275 °C) – Decomposes
Boiling Point:	Not Applicable (NA)
Flammability/Flash Point:	NA
Auto- Flammability:	NA
Vapor Pressure:	NA
Self-Ignition Temperature:	NA
Thermal Decomposition:	527 °F (275 °C) – Decomposes
Bulk Density:	0.5 – 0.65 g/ml (Loose Method)
Solubility:	1.65 g/L @ 68° F (20° C) for calcium hydroxide.
Viscosity:	NA
pH:	11-13 (saturated solution)
Explosion Limits % by Volume:	Non-explosive
Hazardous Decomposition Products:	Oxygen, Hydrogen Peroxide, Steam, and Heat
Hazardous Reactions:	None

Oxygen Release Compound – Advanced (ORC *Advanced*™)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: March 13, 2007

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone:	**949.366.8000**
Fax:	**949.366.8090**
E-mail:	**info@regenesis.com**

Chemical Description:	A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
Chemical Family:	Inorganic Chemical
Trade Name:	Advanced Formula Oxygen Release Compound (ORC *Advanced*™)
Chemical Synonyms	Calcium Hydroxide Oxide; Calcium Oxide Peroxide
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Composition

CAS No.	Chemical
682334-66-3	**Calcium Hydroxide Oxide [$CaO(OH)_2$]**
1305-62-0	**Calcium Hydroxide [$Ca(OH)_2$]**
7758-11-4	**Dipotassium Phosphate (HK_2O_4P)**
7778-77-0	**Monopotassium Phosphate (H_2KO_4P)**

Air Monitoring Documentation Form

Appendix J

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Ambient Air Monitoring Form

Project Name: Project Number: Date:

Document Routing	
FSO	Retain copy in site health & safety file.

1. Work Information

ERM Representative:	
Work Crew Members & Employers:	

2. Monitoring Details

Time	Ambient Air Monitoring Location	Results	
		VOC (PPM)	Particulate (mg/ cu.M)

3. Completion

Name: _____

Signature: _____

Emergency Drill Evaluation Form

Appendix K

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

RCM
ERM Remediation & Construction Management

Emergency Drill Evaluation Form

Project Name: Project Number:

Document Routing	
SSO	Retain copy in site health & safety file.

1. Basic Information

Date of the Drill: _____

Drill Facilitator: _____

Name *Signature*

2. Describe the Drill Scenario below

3. Post-drill Review

Evaluation Date: _____

a. List the Positive Attributes of the Drill below

b. List the Opportunities for Improvement below

c. List the corrective actions taken and their completion date below

Corrective Action	Assigned to…	Completion Date

Daily Safety Meeting Documentation Form

Appendix L

September 11, 2012
Project No. 0168812
Borinquen Court
Bronx, NY

ERM
Melville, New York
(631) 756-8900

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Document Routing	
FSO	Retain copy in site health & safety file.

What work will be conducted on site today and by whom?

Work Task	Conducted By

What overlapping operations/simultaneous operations will occur today?

Any follow-up from previous Major Incidents, Near Misses, Unsafe Acts or Unsafe Conditions discussed today?

List any new / short-service personnel on site today?

Safety Meeting Core Topics – All Site Workers *and* Visitors

- ☐ What PPE is required in order to enter the work zone?
- ☐ What are the potential hazards associated with today's work. How will they be managed?
- ☐ What are the potential impacts of planned activities to: Visitors? Nearby workers? Public?
- ☐ Is everyone aware that they are empowered to stop work if something is questionable or unsafe?
- ☐ What happens and who do you contact if there is an injury or emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?
- ☐ Who do you contact if you have questions, or before deviating from written procedures?
- ☐ Where is fire extinguisher, first aid kit, eyewash, safety shower located?
- ☐ Are any work permits required? Are permits completed and posted in plain view of workers?
- ☐ Have all excavation / borehole locations been cleared of underground utilities/structures, in accordance with ERM and client-specific subsurface clearance procedures?
- ☐ Have all tools / equipment / vehicles been inspected today to ensure safe operating condition?
- ☐ Will a follow-up safety meeting be conducted after lunch?
- ☐ Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?
- ☐ What is the worst that could happen if something goes wrong today?

APPENDIX E

COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN
Borinquen Court, Bronx, NY
January 2012

INTRODUCTION

The objective of the Community Air Monitoring Plan (CAMP) is to focus on potential community exposures related to migration of chemicals beyond the boundary of the Site where investigative work will be undertaken (e.g., nearby residences, public).

COMMUNITY AIR MONITORING PLAN

This CAMP has been developed in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP) as well as the National Ambient Air Quality Standards (NAAQS) developed by the Environmental Protection Agency (EPA). The intent of the CAMP is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne releases of COPCs as a direct result of investigative and remedial work activities. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

Based on the NYSDOH guidance document, the CAMP includes requirements for continuous real-time air monitoring for total volatile organic compounds (VOCs), and particulates (PM-10) for select remedial activities. Real-time monitoring will be conducted at the perimeter of the work area, which may also be defined as the exclusion zone, and will include one upwind and one downwind monitoring location. Real-time monitoring will occur during activities that disrupt impacted media from the Site or adjacent sidewalk areas. The definition of activities that disrupt such impacted media is as follows:

- Ground intrusive activities include the installation of soil borings or monitoring wells and the soil/groundwater sampling.

The objective of the monitoring is to confirm that work area activities do not result in a sustained (i.e., 15 minute average) release of volatile organic compounds (VOCs) and particulates beyond the work area boundary above levels established herein. Upwind and downwind locations of the work area boundary will be determined using a wind sock. Depending on the remedial activity, perimeter monitoring will involve real-time total particulate and VOC measurements. Additional monitoring may also be conducted under any of the following circumstances:

- Change in ambient levels of hazardous constituents as indicated by the sense of smell and PID readings;
- Changes in the physical appearance of the soil or groundwater; and/or
- When new hazardous substances are encountered.

The remainder of this CAMP discusses the associated actions related to this monitoring plan as well as monitoring frequency and data reporting.

VOC Monitoring, Response Levels, Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should also be measured at the start of each workday and periodically thereafter to establish background conditions.

Ambient air monitoring will be conducted using direct-reading real-time instruments. The continuous total VOC perimeter monitoring will be performed using a portable, direct-reading photoionization detector (e.g., RAE MiniRAE 2000 PID) or a flame ionization detector (FID). The instrumentation used for perimeter monitoring will be used to calculate a running 15-minute average concentration. The PID lamp voltage of to be used for this Site is 11.7 eV.

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas (e.g., isobutylene) will be required for fieldwork lasting longer than one day. The monitoring location, date, time, weather conditions, activities performed and the 15 minute interval readings in ppm shall be recorded.

The VOC response levels and actions are as follows:

- 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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level (e.g., Thermo Anderson PM-10 DataRAM). The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m3) 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 ug/m3 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 ug/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m3 of the upwind level and in preventing visible dust migration.

MITIGATIVE MEASURES

Potential mitigative measures to control airborne levels may include, but are not limited to, the following:

- Water spraying and/or other dust suppression techniques
- Soil gas control techniques

- Ventilation techniques to provide dilution and/or isolation of VOCs
- Personal protective equipment (worker exposures)
- Administrative controls

DOCUMENTATION AND RECORDKEEPING

All 15-minute readings will be recorded and available for personnel and management to review. Instantaneous readings, if any, used for decision purposes will also be recorded. Sampling data will be evaluated daily and a summary report will be generated weekly. The summary report shall include equipment type, serial number, calibration results, flow rates, sampling locations, sampling dates, sampling times, sampling results in the required units, and corrective actions implemented based on any threshold level exceedances.

A copy of any laboratory analytical results will be kept on-site along with any datalogged results as well as by the Project Manager at ERM.

APPENDIX F

SITE-WIDE INSPECTION FORM

Appendix F - Site-Wide Inspection Form
Borinquen Court; Bronx, New York
NYSDEC BCP Site No. C203056

Item #	Inspection Item	Yes	No	Inspector Comments	Notes
1	Has a change of ownership occurred				NYSDEC must be informed 60 days in advance
2	Has there been any change in Site Use?				Current Site Use is Restricted-Residential. NYSDEC must be informed 60 days in advance per 6 NYCRR Part 375-1.11(d)
3	Are there any plans to construct a new building?				Per Section 2.3.2 of the SMP, a soil vapor intrusion monitoring plan must be prepared and submitted to NYSDEC prior to any construction.
4	Have any soil disturbances occurred in the past?				Documentation must be provided as required by the Excavation Work Plan (Appendix C)
5	Are any soil disturbances planned at this time?				NYSDEC must be informed 15 days in advance
6	Have there been any disturbances to the elements of the cover system (soil cover, asphalt areas, building concrete slab)?				
7	Soil Cover - Are there any signs of erosion, settlement, or bare spots?				
8	Asphalt Cover - Are there any significant cracks, settlement, or erosion?				
9	Concrete cover (including building slab)and pavers - Are there any significant cracks, settlement, or erosion?				
10	Is ground water underlying the Site being used?				Use of Site ground water is prohibited without treatment rendering it for safe use.
11	Are there any vegetable gardens or farming at the Site?				These activities are prohibited
12	Is there any activity that may tend to interfere with the completed remedy or the continued ability to implement institutional controls?				

Corrective Measures:
Specify any corrective measures needed (e.g., seal asphalt cracks, re-seed bare spot, etc.):

Monitoring Well Inspection:
Provide the following information for each monitoring well on a scaled site map:
Location & identification of well
Well cover in place
Overall well integrity
Presence of a functioning padlock & plug

Photographs:
Attach photos showing status of the cover elements

Name of Inspector:

Signature of Inspector:

Date of Inspection:

Date of Last Inspection:

Required Date of Next Inspection:

Identify expected inspector for next inspection:

Additional comments or drawings:

APPENDIX G

STANDARD OPERATING PROCEDURES

APPENDIX G
STANDARD OPERATING PROCEDURES (SOPs)

Section	Standard Operating Procedure
G.1	SOP 1: Utility Survey/Geophysical Investigation
G.2	SOP 2: Field Screening
G.3	SOP 3: Water Level Measurement Procedure
G.4	SOP 4: Groundwater Sampling (Low-Flow)
G.5	SOP 5: Groundwater pH and Temperature
G.6	SOP 6: Measurement of Groundwater Specific Conductance
G.7	SOP 7: Measurement of Groundwater Turbidity
G.8	SOP 8: Measurement of Groundwater Dissolved Oxygen
G.9	SOP 9: Geoprobe Soil and Groundwater Vertical Profiling
G.10	SOP 10: Monitoring Well Construction
G.11	SOP 11: Monitoring Well Development
G.12	SOP 11: Indoor Air Sampling using Summa Canister

TABLE OF CONTENTS

G.0 STANDARD OPERATING PROCEDURES

G.1 SOP 1: Utility Survey/Geophysical Investigation

The exact locations of subsurface features which may be potential sources of contamination or impede drilling have not completely been identified. Electromagnetic and ground penetrating radar (GPR) geophysical methods will be used to identify any sub-surface features. In addition, the geophysical surveys will be used to confirm the locations of utility lines in areas where drilling will take place.

The geophysical surveys will be conducted using a grid system based upon north-south and east-west coordinates that can be related to permanent and recoverable landmarks for future location of any identified anomalies. Anomaly, locations will also be established using a portable Global Positioning System (GPS) unit. The grid coordinates will be designated as the number of feet north by the number of feet east from the established grid datum (e.g. 00N/00E). The corners of the grid will be marked with wooden or metal stakes.

G.2 SOP 2: Field Screening

Field screening for organic compounds in soil samples shall be performed during soil sampling activities performed during the Site RI. Soil samples will be visually characterized for the presence of staining and screened for volatile organics using an instrument equipped with a portable photo-ionization detector (PID).

During soil boring installation, total volatile organic compound (VOC) headspace readings will be collected from every boring at two-foot intervals. As described below, the headspace readings will be performed in a consistent manner to yield comparable qualitative results. The headspace screening results will compliment the analytical data and allow for a three dimensional profile to help vertically define any encountered impacted soil.

As of the part of the Health and Safety monitoring program, a PID will also be utilized to continuously monitor the breathing zone of all work areas where intrusive activities are taking place. This shall serve as an immediate indication as to volatile organic hazards at the work location and shall determine if personnel health and safety protection is adequate. Screening with a hand-held PID meter shall also be performed during ground water sampling immediately upon opening the well and during purging activities. The following standard operating procedures will apply to field screening activities:

- Calibrate the PID daily in accordance with the particular manufacturer's procedures.

- For soil samples, a separate container will be used, other than the one that is going to the analytical laboratory to screen the headspace for total VOCs. Generally, the sample aliquot retained for geologic description and archive is used for organic vapor screening and is placed in a dedicated jar or sealable baggie (e.g. Ziplock) immediately upon sample collection or retrieval.

- The headspace sample container will be filled approximately 2/3 full with soil to allow for the headspace screening.

- Following collection, aluminum foil will be placed over the sample jar mouth, tightly sealing the opening.

- Once sealed, the sample container will be allowed to stand for a standardized period of time in a location where the sample temperature change will be minimal. A minimum of 5 minutes is recommended.

- After 5 minutes, or the end of the selected standardized time interval, the sample container will be shaken to aid the desegregation of VOCs from the soil matrix.

- The container will then be allowed to stand for an additional standardized time interval (minimum 5 minutes) in a location where the sample temperature change will be minimal.

- To perform the headspace screening, the probe of a PID will be inserted through the foil seal while attempting to minimize the hole that will be created. The instrument will then be observed for the maximum organic vapor reading.

- The sample number and depth interval and maximum headspace organic vapor concentration will then be recorded.

G.3 SOP 3: Water Level Measurement Procedure

Groundwater elevation measurements will be obtained from all newly-installed and existing wells. The measurements will be collected following installation concurrent with the groundwater sampling event and the water levels will be obtained prior to well evacuation and sample collection. The static water level will be measured to the nearest 0.01 foot. Groundwater level data will be used to construct groundwater table contour maps.

- Clean all water-level measuring equipment using appropriate decontamination procedures.

- Remove locking well cap, note weather, time of day, and date, etc. in field notebook, or on an appropriate form.

- Remove well casing cap.

- Lower water level measuring device into well until the water surface is encountered.

- Measure distance from water surface to reference measuring point on well casing, and record in field notebook.

Notes:

If water level measurement is from either the top of protective steel casing, top of PVC riser pipe, from ground surface, or some other position on the well head.

- Measure total depth of well and record in field notebook or on log form.

- Remove all downhole equipment, replace well casing cap and locking steel caps.

- Calculate elevation of water:

Ew = E - D

where

Ew = Elevation of Water
E = Elevation at point of measurement
D = Depth to Water

G.4 SOP 4: Groundwater Sampling (Low-Flow)

The low-flow sampling procedure will be performed on existing monitoring wells and is intended to facilitate the collection of minimum-turbidity groundwater monitoring well samples.

Sample Equipment

- Adjustable-rate, positive displacement pumps (e.g., centrifugal or bladder pumps constructed of stainless-steel or Teflon®). Peristaltic pumps may be used only for inorganic sample collection. The selected

pump must be specifically designed for low-flow rates (i.e., use of a high volume pump that is adjusted down to a low-flow setting is not permitted).

- Tubing: Tubing used in purging and sampling each well must be dedicated to that well. Once properly located, moving the pump in the well should be avoided. Consequently, the same tubing should be used for purging and sampling. Teflon® and Teflon®-lined polyethylene tubing must be used to collect samples for organic analysis. For samples collected for inorganic analysis, Teflon® or Teflon®-lined polyethylene, PVC, Tygon, or polyethylene or silicon tubing may be used.
- Electronic water level measuring device, 0.01-foot accuracy.
- Flow measurement supplies (e.g., graduated cylinder and stop watch).
- Interface probe.
- Power or air source (generator, compressed air tank, etc.).
- In-line purge criteria parameter monitoring instruments - pH, turbidity, specific conductance, temperature, ORP, and dissolved oxygen.
- Decontamination supplies.
- Logbook and field forms.
- Sample bottles.
- Sample preservation supplies (as specified by the analytical methods).
- Sample tags or labels, chain of custody forms.
- Well construction data, location map, field data from last sampling event.

Sample Procedure

1) Lower pump, safety cable, tubing, and electrical lines very slowly into the well to a depth corresponding to the center of the saturated screen section of the well. The pump intake must be kept at least two feet above the bottom of the well to prevent mobilization of any sediment. Lowering the pump quickly, or even at a moderate rate, will result in disturbing sediment in the well. This is one of the most important steps in low-flow sampling.
2) Measure the water level again with the pump in well before starting the pump. Start pumping the well at 100 to 500 milliliters per minute. Ideally, the pump rate should cause little or no water level drawdown in the well (less than 0.3 foot and the water level should stabilize).

- Measure and record the depth to water and pumping rate every 3 to 5 minutes (or as appropriate) during pumping. If purging continues for more than 30 minutes, readings will be recorded at approximately 10-minute intervals. However, once stabilization is indicated, a minimum of 3 consecutive readings at 3 to 5 minute intervals will be recorded prior to sample collection.
- Care should be taken not to cause pump suction to be broken or entrainment of air in the sample. Do not allow the groundwater level to go below the pump intake.
- Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to minimize drawdown and/or to ensure stabilization of indicator parameters.

3) During purging, measure and record the field indicator parameters using the in-line meter (turbidity, temperature, specific conductance, pH, Eh, and dissolved oxygen) every 3 to 5 minutes (or as appropriate). If purging continues for more than 30 minutes, readings will be recorded at approximately 10-minute intervals. However, once stabilization is indicated, a minimum of 3 consecutive readings at 3 to 5 minute intervals will be recorded prior to sample collection.
   - The well is considered stabilized and ready for sample collection once all the field indicator parameter values remain within 10 percent for 3 consecutive readings.
   - If drawdown in the well is measured at 1 foot or more, continue to low-flow purge until a minimum of the equivalent volume of 1 well casing volume is removed. Using the flow equation to calculate the volume of purge water. Then collect the groundwater sample.
4) The groundwater discharge should achieve a turbidity of 50 NTUs or less prior to sampling for metals. If this is not achievable, a filtered sample will be collected for metals in addition to an unfiltered sample.
5) Before sampling, either disconnect the in-line cell or use a by-pass assembly to collect groundwater samples before the in-line cell. All sample containers should be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.
6) Label the samples using waterproof labels, or apply clear tape over the paper labels. Place all samples in a cooler as described in the Quality Assurance Project Plan (QAPP) with bagged ice or frozen cold packs and maintain at 4°C for delivery to the laboratory.
7) Do not use ice for packing material; melting will cause bottle contact and possible breakage.

8) Measure and record well depth. Take final water quality reading using low-flow cell.

9) Secure the well.

G.5 SOP 5: Groundwater pH and Temperature

- Immerse the tip of the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode tip in water for at least an hour before use.

- Rinse the electrode with demineralized water.

- Immerse the electrode in pH 7 buffer solution.

- Adjust the temperature compensator to the proper temperature.

- Adjust the pH meter to read 7.0.

- Remove the electrode from the buffer and rinse with demineralized water.

- Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the vertical profile wells) and pour a small amount of this sample into an extra sample jar which shall not be used to store chemically analyzed samples.

- Immerse the electrode into the extra sample jar. Do not immerse the electrode into a sample that shall be chemically analyzed.

- Read and record the pH of the solution, after adjusting the temperature compensator to the sample temperature (obtained during measurement of specific conductance or from a standard scientific thermometer).

- Rinse the electrodes with demineralized water.

- Keep the electrode immersed in demineralized water when not in use.

- All results are to be recorded in the Field Notebook.

G.6 SOP 6: Measurement of Groundwater Specific Conductance

- Immerse the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode for at least an hour before use.

- Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the well purging activities) and pour a small amount of this sample into an extra sample jar which shall not be used to store chemically analyzed samples.

- Rinse the cell with one or more portions of the sample to be tested.

- Immerse the electrode in the sample and measure the temperature. Do not immerse the electrode into a sample that is to be chemically analyzed.

- Adjust the temperature setting to the sample temperature.

- Immerse the electrode in the sample and measure the conductivity. Do not immerse the electrode into a sample that is to be chemically analyzed.

- Record the results in the Field Notebook.

G.7 SOP 7: Measurement of Groundwater Turbidity

- Ensure that the sample cell (sample vials) are clean, with no dust and lint on the inside or outside surface.

- Ensure that instrument has been standardized recently and span control has not been changed.

- Range calibration of instrument is performed at the factory, but it should be checked from time to time against fresh formalin turbidity standard dilutions.

- Check the mechanical zero setting while instrument is off.

- Turn on the power and press the battery check switch and verify the battery check range. The needle should be in the battery check area. If battery was not recharged before use, switch to a charged instrument. The battery pack should be charged on a daily basis.

- Select the range that shall exceed the expected turbidity of the sample under test and press the appropriate range switch.

- Place the focusing template into the cell holder and adjust the zero control for a reading of zero NTU. Remove the focusing template.

Notes:

If the instrument shall be used in the 100 range, place the cell riser into the cell holder before inserting the test sample. When using the 1 and 10 ranges, the cell riser must not be used.

- Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the vertical profile wells) and pour a small amount of this sample into an extra sample jar which shall not be used to store chemically analyzed samples.

- Fill a clean sample cell to the marked line with the sample to be measured and place it into the cell holder. Use the white dot on the sample cell to orient the cell in the same position each time. Cover the sample cell with the light shield and allow the meter to stabilize. Read the turbidity of the sample.

Notes:

The sample size for all turbidity measurements should be 18 ml. Use the line on the sample cell as a level indicator. Variation in sample volume can affect the accuracy of the determinations.

When measuring the lower range (0 - 10 and 0 - 1 NTU), air bubbles in the sample will cause false high readings - before covering the cell with the light shield, observe the sample in its cell. A five-minute wait period can eliminate air bubbles from the sample and thereafter a valid reading can be taken.

- Record the results in the Field Notebook.

G.8 SOP 8: Measurement of Groundwater Dissolved Oxygen

The dissolved oxygen (DO) meter shall be properly calibrated prior to each sampling event.

Calibration Procedure

- Prepare the DO meter with a thin Teflon membrane stretched over the sensor.

- Perform a battery check.

- Set mode switch to operate and the operation switch to zero, and zero the instrument.

- Take a temperature measurement and determine the calibration value from the manufacturer's table for the appropriate atmospheric pressure.

- Select the desired range and adjust the instrument to an appropriate calibration value (determined in the preceding step).

- Place the probe in a water sample with a known dissolved oxygen level and read mg/L-dissolved oxygen.

- Record temperature and dissolved oxygen calibration information on the equipment calibration and maintenance log for that instrument.

Operating Procedure

- Calibrate the dissolved oxygen meter.

- Perform the battery check.

- Immerse the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode for at least an hour before use.

- Collect a groundwater sample using a bailer and pour a small amount of this sample into an extra sample jar which shall not be used to store chemically analyzed samples.

- Rinse the cell with one or more portions of the sample to be tested.

- Set mode switch to operate and the operation switch to the desired range.

- Immerse the probe in the water sample.

- Take a temperature and adjust the temperature compensator to the sample temperature (obtained during measurement of specific conductance or from a standard scientific thermometer).

- Switch the dissolved oxygen content measurement and allow reading to stabilize.

- Record the results in the Field Notebook.

- Repeat procedure and record a second reading. Average the results and record the average.

- Rinse the probe with distilled water and replace protective cover on probe with a small amount of distilled water to keep the probe membrane wet.

G.9 SOP 9: Geoprobe Groundwater and Soil Vertical Profiling

To evaluate the presence and extent of contamination at the Site, a soil boring and groundwater sampling program will be implemented to allow collection of subsurface soil and groundwater samples.

To collect soil samples, either a Macro Core (MC) sampler or a Large Bore (LB) drive point sampler will be used. The MC samplers are an open tube design and measure approximately 2" in diameter by 46" long. The samplers are fitted with a removable cutting shoe and clear acetate liner. Samples will be collected in four foot intervals to the determined completion depth. If probe hole "cave-in" is significant at the deeper depths, it may be necessary to use the closed piston assembly that fits into the MC cutting shoe or to switch to the LB drive point sampler. LB drive point samplers can be used to collect soil samples at points where subsurface conditions prevent the use of MC samplers or where continuous sampling is not necessary. The LB samplers use twenty-two inch by one inch acetate liners and can be driven closed to a desired sampling depth. In order to collect samples with the Large Bore (LB) drive point sampler, it is first driven to the desired sampling depth and then opened and driven two feet further.

The LB sampler remains completely closed while it is being driven to depth and is opened by releasing a stop pin from the surface. Releasing the stop pin allows a piston to retract inside of the sample tube as it is being displaced by the soil core. Each of the samplers used will be fitted with a new acetate Liner prior to use. The acetate liner assists in the removal of the soil sample from the tube and helps insure sample integrity.

G.10 SOP 10: Monitoring Well Construction

Materials

All monitoring wells shall be constructed of a minimum of 1-inch inside diameter to a maximum of 4-inch inside diameter, threaded flush joint, schedule 40 polyvinylchloride (PVC) casing and ten (15) feet length PVC screen having slot openings of 0.010-inches. Well screen sand packs shall be a Type #1 well sand. Type #00 fine sand shall be used to separate well screen sand pack from the overlying bentonite slurry seal. Only pure Wyoming bentonite shall be used for bentonite pellet seals and in cement/bentonite grout. Cement bentonite grout shall be prepared consisting of 5.0 pounds of high grade bentonite for each 94 pounds of

Type I or Type II Portland cement mixed with 8.3 gallons of water for a target density of 13.9 pounds/gallon with an acceptable range of 13.4 to 14.5 pounds/gallon.

All well materials shall be inspected by the ERM's representative for dents, cracks, grease, etc. and to ensure that the materials are in accordance with the specifications.

Well Assembly and Screen Placement

Once the well string is assembled in each borehole, the well shall be suspended in a manner such that the screen is set approximately two foot above the bottom of the borehole allowing for a sump at the bottom of the well. When the well screen is properly positioned, Type #1 sand pack shall be placed in the annulus by a tremie pipe to extend four (4) to five (5) feet (minimum 20% of the screen length) above the top of the screened interval to allow for settlement during development. Additionally, a 12-inch Type #00 sand pack shall be placed above the well screen sand pack to separate the bentonite seal from the well screen sand pack. During this time, the drill rods will be slowly removed. The well pipe will also be pulled up no more than ½ foot intervals to allow sand material to fill the borehole beneath the well screen. In addition, during the installation of the sand pack, the sand will be tamped down using a weighted tape measure to minimize the potential for bridging, and to ensure the proper placement and thickness of the sand.

Annular Seal

Upon completing the placement of the sand packs, a minimum 2-foot thick bentonite pellet seal will be placed in the annular space. During the installation of the pellet seal, the pellets will be tamped down using a weighted tape measure to minimize the potential for bridging, and to ensure the proper placement and thickness of the pellet seal.

Once the bentonite seal is in place, the remaining annular space shall be backfilled by pressure injection of cement/bentonite grout using a tremie pipe. The end of the tremie pipe shall be positioned approximately five (5) feet above the top of the bentonite seal prior to injection of the cement/bentonite grout to prevent disturbance of the bentonite seal. Injection shall continue until there is a return of grout from the annulus of the borehole at grade. The tremie pipe shall then be retracted from the well. Additional grout shall be added as required so the top of the grout shall settle at a maximum of two (2) feet below grade.

Well Completions at Grade

For each of the wells, a minimum of 1-inch to a maximum of 4-inch diameter PVC riser will extend from the top of the screen to approximately 4-inches below ground surface. A permanent mark will be made at the top of the well casing to provide a datum for water level measurements.

Each well will be fitted with a flush-mounted steel well vault which is a minimum of two (2) inches larger in diameter than the well casing, and secured in a surface seal to adequately protect the casing. A locking cap will be provided for each well with one (1) or two (2) inches clearance between the top of the well cap and the bottom of the locking cap of the protective casing when in the locked position. The ERM representative will provide keyed-alike padlocks for the wells.

Each well will have concrete surface seal that will secure the protective casing in place. The surface seal will extend below the frost depth (a minimum of 24 inches) to prevent potential well damage. The top of the seal will be constructed by pouring concrete into a pre-built form with a minimum of 2-foot long sides. The seal will be finished with a sloping surface to prevent surface runoff from ponding and entering the well vault.

G.11 SOP 11: Monitoring Well Development

Drilling and well installation typically result in disturbance of natural bedding and hydraulic permeability of the surrounding formation. Prior to use for collection of liquid level measurements or groundwater

samples, it is imperative that sufficient hydraulic connection between the well and the surrounding soil be established. Each of the wells will be developed in an effort to meet this goal. A development goal will be achieving discharge turbidity of 50 Nephelometric Turbidity Units (NTUs) or less. Stabilization (+/- 20% in four successive measurements) of well discharge turbidity, temperature and specific conductance measurements will be used as the completion criteria for this task.

G.12 SOP 12: Indoor Air Sampling using Summa Canister

In order to assess the potential for migration of VOCs vapors emanating from residual on-site sources or impacted groundwater, soil gas samples will be collected at twenty two (22) locations. The soil gas samples will be collected from two depths, 10 feet below grade at on-site locations and 3 feet below grade at off-site locations. The soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators. Each sample will be analyzed by a NYSDOH ELAP-certified laboratory for TCL VOCs using USEPA Method TO-15. Specific details are presented below.

Sample locations will be chosen where samples will not be disrupted and at least 5 feet away from doors. An inventory of possible sources of VOC's will be recorded and the sources are removed if possible. A PID reading of indoor air will be taken and recorded on sample sheet.

A regulator will be attached to canister and ¼" O.D. tubing will be attached to regulator in same fashion as sub-slab samples. Intake will be placed at or around breathing height. A picture will be taken documenting the sample and surrounding area.

When all samples are set, the valve on the regulator will opened and time, date and pressure reading of canister will be recorded on sample sheet and chain of custody. Sample will be checked on periodically to check if pressure has dropped and has not reached 0"hg. Valve will be closed when 24 hours has elapsed or when pressure of canister reaches less then 5"hg, whichever occurs sooner. Ending pressure, time, and date will be recorded on sample sheet and chain of custody.

Tubing will be disconnected from regulator, and regulator will be removed from canister. Brass cap is replaced on SUMMA canister.

The following information will be recorded in the field notebook and/or data collection forms. This information should include the following for each soil vapor sample:

- Sampler's name;
- Date, time and initial PID reading;
- Date and time of Teflon tubing insertion and pilot hole sealing;

- Date, time and sustained PID reading;
- Summa canister serial number;
- Survey location number, and descriptive location of the sampling area;
- Weather conditions; and
- All calibrations performed.

APPENDIX H

MONITORING WELL

CONSTRUCTION LOGS

ERM Inc.

WELL : MW-11S

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/20/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		11.0	
			<-- BENTONITE SEAL
		13.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40

			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40

			<------ ---- SAND PACK
			TYPE: Morie #2

			<------ ---- BOTTOM CAP
		18.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-11D

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/20/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		17.0	
			<-- BENTONITE SEAL
		19.0	
			<------- ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------- ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------- ---- SAND PACK
			TYPE: Morie #2
			<------- ---- BOTTOM CAP
		24.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-12S

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		11.0	
			<-- BENTONITE SEAL
		13.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40

			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40

			<------ ---- SAND PACK
			TYPE: Morie #2

			<------ ---- BOTTOM CAP
		18.0	
			BOTTOM OF BOREHOLE

REMARKS _____

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-12D

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		16.0	
			<-- BENTONITE SEAL
		18.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- SAND PACK
			TYPE: Morie #2
			<------ ---- BOTTOM CAP
		23.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-13S

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		13.0	
			<-- BENTONITE SEAL
		15.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- SAND PACK
			TYPE: Morie #2
			<------ ---- BOTTOM CAP
		20.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-13D

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		13.0	
			<-- BENTONITE SEAL
		15.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- SAND PACK
			TYPE: Morie #2
			<------ ---- BOTTOM CAP
		20.0	
			BOTTOM OF BOREHOLE

REMARKS Note: MW-13D is deeper than MW-13S due to the difference in elevation even though the bottom of the wells are at the same depth.

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-14S

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		13.0	
			<-- BENTONITE SEAL
		15.0	
			<------ ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------ ---- SAND PACK
			TYPE: Morie #2
			<------ ---- BOTTOM CAP
		20.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

ERM Inc.

WELL : MW-14D

105 Maxess Road, Suite 316, Melville NY 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Borinquen Court	**168812**				
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Ephase II, LLC	Steve				
Surveyor		9/24/2013			*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*
	Brice Lynch				

Generalized Soil Description	*Elevation	**Depth	CONSTRUCTION DETAILS
			PROTECTIVE STEEL CAP FLUSH WITH GROUND
	0.00	0.0	*GROUND SURFACE*
	0.00	0.5	<--- WATER TIGHT CAP WITH LOCK
			< ---- PROTECTIVE STEEL CASING
		1.0	CEMENDED IN PLACE
			<-- BENTONITE-CEMENT GROUT
		17.0	
			<-- BENTONITE SEAL
		19.0	
			<------- ---- RISER
			DIAMETER: 1"
			MATERIAL: Sched 40
			<------- ---- WELL SCREEN
			SLOT SIZE: 0.01"
			DIAMETER: 1"
			MATERIAL: Sched 40
			<---------- SAND PACK
			TYPE: Morie #2
			<------- ---- BOTTOM CAP
		24.0	
			BOTTOM OF BOREHOLE

REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

APPENDIX I

GROUNDWATER MONITORING WELL

SAMPLING LOG FORM

GROUND WATER SAMPLING RECORD

Low Flow Sampling Technique

SITE: _____ DATE _____

SAMPLE ID : _____

WELL ID : _____

NJDEP WELL PERMIT NO. : _____ Time Onsite: _____ Time Offsite: _____

SAMPLERS : _____ _____ _____

_____ _____ _____

_____ _____ _____

PID reading (ppm)..... _____ Time: _____ (hrs)

Depth of well (from top of casing)..... _____ Time: _____ (hrs)

DNAPL Level (from top of casing)..... _____ Time: _____ (hrs)

Static water level (from top of casing)..... _____ Time: _____ (hrs)

Static water level (after pump installation)..... _____ Time: _____ (hrs)

Water level after purging (from top of casing)..... _____ Time: _____ (hrs)

Water level before sampling (from top of casing)..... _____ Time: _____ (hrs)

Depth of screened interval (from top of casing)..... _____

Purging Method:

_____ Peristaltic _____ Centrifugal

_____ Bailer _____ Pos. Displ.

_____ Submersible _____ Ded. Pump

Well Volume Calculation:

1 volume 3 volumes

4 in. well: _____ ft. of water x 0.65 = _____ gal. x 3 = _____ gal.

6 in. well: _____ ft. of water x 1.47 = _____ gal. x 3 = _____ gal.

Depth of Pump: _____ (ft)

Purge Start Time: _____ (hrs) Purge Duration: _____ (min)

Purge End Time: _____ (hrs) Purge Flow Rate: _____ (lpm)

Volume of water removed:

_____ ltr. >3 volumes: yes ___ no ___ purged dry? yes ___ no ___

Field Tests:

Time/Duration		pH	Cond.	Turbidity	D.O.	Temp.	ORP	DTW	Drawdown	Flow Rate
units	(min)	(m S/	(S/cm)	U-22 (ntu Hach	(mg/L)	(deg C)	(mV)	(ft. toc)	(feet)	(lpm)
Range		*0.1*	*3%*	*10%*	*10%*		*10%*		*0.3*	*0.2 - 0.5*
After Sample										

Sampling:

Time readings stabilized: _____ (hrs) Chain of Custody sample time: _____ (min)

Sample Start Time: _____ (hrs) Sample Flow Rate: _____ (lpm)

Sample End Time: _____ (hrs) Duration of sample time: _____ (min)

Collection Method:

_____ Stainless steel bailer

_____ Teflon bailer

_____ Pos. Disp. Pump

_____ Disposable bailer

_____ Dedicated pump

_____ Other: Submersible Pump

Analyses:

_____ VOCs - 602 _____ 503 _____ Other 601 _____

_____ SVOCs

_____ PP Metals

_____ PCB/Pest

_____ Physical

_____ Other

Analytical Method:

Observations

Weather/Temperature: _____

Sample Description: Turbidity: (circle one) HIGH MODERATE LOW

Free Product? yes ___ no ___ describe _____

Sheen? yes ___ no ___ describe _____

Odor? yes ___ no ___ describe _____

Comments:

APPENDIX J

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN (QAPP)

285 East 138th Street
Bronx, NY

January, 2012

Prepared for:

EAST ONE THIRTY EIGHTH HOUSING DEVELOPMENT FUND COMPANY, INC.
2345 Broadway
New York, NY 10024

Prepared by:

Environmental Resources Management
40 Marcus Drive, Suite 200
Melville, NY 11747

LIST OF TABLES

FIGURES

1.0 PURPOSE AND OBJECTIVES

1.1 Purpose

This Quality Assurance Project Plan (QAPP) was prepared for the Remedial Action (RA) Work Plan (WP) for the site located at 285 East 138th Street in Bronx, NY (the Site). It is intended to set forth guidelines for the generation of reliable data by measurement activities, such that data generated are scientifically valid, defensible, comparable and of known precision and accuracy.

This QAPP contains a detailed discussion of the quality assurance and quality control (QA/QC) protocols to be utilized by Environmental Resources Management (ERM) and laboratory personnel. The RA sampling program and relevant field/laboratory QA/QC requirements are summarized in Tables J-1 through J-14.

1.2 Definitions

The parameters that will be used to specify data quality objectives, and to evaluate the analytical system performance for all analytical samples are precision, accuracy, representativeness, completeness, and comparability (PARCC). Definitions of these and other key terms used in this QAPP are provided below.

- ***Accuracy*** - the degree of agreement of a measurement with an accepted reference value. Accuracy is generally reported as a percent recovery, and calculated as:

$$\frac{\text{Measured Value}}{\text{Accepted Value}} \times 100$$

- ***Analyte*** - the chemical or property for which a sample is analyzed.
- ***Comparability*** - the expression of information in units and terms consistent with reporting conventions; the collection of data by equivalent means; or the generation of data by the same analytical method. Aqueous samples will be reported as µg/l, solid samples will be reported in units of ug/kg or mg/kg, dry weight.
- ***Completeness*** - the percentage of valid data obtained relative to that which would be expected under normal conditions. Data are judged valid if they meet the stated precision and accuracy goals.

- ***Duplicate*** - two separate samples taken from the same source by the same person at essentially the same time and under the same conditions that are placed into separate containers for independent analysis. Duplicate samples are intended to assess the effectiveness of equipment decontamination, the precision of sampling efforts, the impacts of ambient environmental conditions on sensitive analyses (e.g., volatile organics analysis (VOA)), and the potential for contaminants attributable to reagents or decontamination fluids. Identifying such potential sources of error is essential to the success of the sampling program and the validity of the environmental data. Each QC sample is described below. As a minimum, each set of ten or fewer field samples will include a trip blank, a duplicate, and one sample collected in a sufficient volume to allow the laboratory to perform a matrix spike.

- ***Field Blanks*** - field blanks (sometimes referred to as "equipment blanks" or "sampler blanks") are the final analyte-free water rinse from equipment decontamination in the field and are collected at least one during a sampling episode. If analytes pertinent to the project are found in the field blank, the results from the blanks will be used to qualify the levels of analytes in the samples. This qualification is made during data validation. The field blank is analyzed for the same analytes as the sample that has been collected with that equipment.

- ***Precision*** - a measure of the agreement among individual measurements of the sample property under prescribed similar conditions. Precision is generally reported as Relative Standard Deviation (RSD) or Relative Percent Difference (RPD). Relative standard deviation is used when three or more measurements are available and is calculated as:

$$\text{RSD} = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} \times 100$$

  Relative percent difference is used for duplicate measurements and is calculated as:

$$\text{RPD} = \frac{\text{Value 1 - Value 2}}{\text{Arithmetic Mean}} \times 100$$

- ***Quality Assurance (QA)*** - all means taken in the field and inside the laboratory to make certain that all procedures and protocols use the same calibration and standardization procedures for reporting results; also, a program which integrates the quality planning, quality assessment, and quality improvements activities within an organization.

- ***Quality Control (QC)*** - all the means taken by an analyst to ensure that the total measurement system is calibrated correctly. It is

achieved by using reference standards, duplicates, replicates, and sample spikes. In addition, the routine application of procedures designed to ensure that the data produced achieve known limits of precision and accuracy.

- ***Replicate*** - two aliquots taken from the same sample container and analyzed separately. Where replicates are impossible, as with volatile organics, duplicates must be taken.
- ***Representativeness*** - degree to which data represent a characteristic of a set of samples. The representativeness of the data is a function of the procedures and caution utilized in collecting and analyzing the samples. The representativeness can be documented by the relative percent difference between separately collected, but otherwise identical sample volumes.
- ***Trip Blanks*** - trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic samples. One trip blank should accompany each cooler containing volatile organics; it will be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOCs.

1.3 Data Quality Objectives

1.3.1 Overall Data Quality Objectives

Data Quality Objectives (DQO) are quantitative and qualitative statements specifying the quality of the environmental data necessary to support the decision-making process to guide the RA and any subsequent corrective actions. DQO define the total uncertainty in the data that is acceptable for each specific activity during the RA. This uncertainty includes both sampling error and analytical error. Ideally, the prospect of zero uncertainty is the objective; however, the very processes by which data are collected in the field and analyzed in the laboratory contribute to the uncertainty of the data. It is the overall objective to keep the total uncertainty to a minimal level such that it will not hinder the intended use of the data.

To achieve the project DQO, specific data quality parameters such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability and data completeness must be specified. The overall objectives are established such that there is a high degree of confidence in the measurements.

The parameters that will be used to specify data quality objectives and to evaluate the analytical system performance for soil and groundwater

samples are PARCC: precision, accuracy, representativeness, completeness, and comparability.

1.3.2 Field Investigation Data Quality Objectives

To permit calculation of precision and accuracy for the samples, blind field duplicate, field blanks, trip blanks, and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected, analyzed, and evaluated.

Through the submission of field QC samples, the distinction can be made between laboratory problems, sampling technique considerations, sample matrix effects, and laboratory artifacts. To assure sample representativeness, all sample collection will be performed in strict accordance with the procedures set forth in this QAPP.

Precision will be calculated as RPD if there are only two analytical points and percent relative standard deviation (% RSD) if there are more than two analytical points. Blind field duplicate and MS/MSD sample analyses will provide the means to assess precision. The submission of field and trip blanks will provide a check with respect to accuracy and will monitor chemicals that may be introduced during sampling, preservation, handling, shipping, and/or the analytical process. In the event that the blanks are contaminated and/or poor precision is obtained, the associated data will be appropriately qualified.

Representativeness will be assured through the implementation of the structured and coherent RAWP of which this QAPP is a part. This RAWP has been designed so that the appropriate numbers of samples of each matrix and of each location of interest are obtained for analysis.

Ideally, 100% completeness is the goal. However, it must be recognized that unforeseen issues may result in the generation of some data that may not be acceptable for use. Therefore, a completeness target of 90%, as determined by the total number of usable data points versus the total number of data points measured, will be the realistic goal of this program.

Comparability is defined as the extent to which data from one data set can be compared to similar data sets. Comparability between data sets is often questionable due to issues such as different analytical methods used or inter-laboratory differences. In order that the data generated as part of this project remain comparable to any previously generated data or data to be generated in the future, currently published analytical methods have been identified for the analysis of the collected samples. These methods will be performed by an analytical laboratory with a demonstrated proficiency in the analysis of similar samples by the referenced methods. In addition, samples will be collected using documented procedures to ensure consistency of effort and reproducibility if necessary.

1.3.3 Laboratory Data Quality Objectives

The analytical laboratory will demonstrate analytical precision and accuracy by the analysis of various QC samples (i.e., laboratory duplicates, spike samples, matrix spike duplicates and laboratory control samples). Tables J-5 through J-14 present the relevant precision and accuracy criteria for the analytical parameters related to this RAWP. Precision, as well as instrument stability, will also be demonstrated by comparison of calibration response factors from the initial calibration to that of the continuing calibrations. Laboratory accuracy will be evaluated by the addition of surrogate and matrix spike compounds, and will be presented as percent recovery (%R). Precision will be presented as RPD, % RSD, or percent difference (%D), whichever is appropriate for the number and type of QC samples analyzed. Laboratory blanks can also be used to demonstrate the accuracy of the analyses and possible effects from laboratory artifact contamination.

2.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

2.1 Equipment Maintenance

In addition to the laboratory analyses conducted during the course of this RA, field measurements will be collected for total volatile organics (air monitoring and soil sample screening), pH, conductivity, oxidation/reduction potential (ORP), dissolved oxygen (DO) and turbidity in groundwater. A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. ERM's equipment manager, the Quality Assurance Officer (QAO), and the field team members will administer the program. ERM's equipment manager will perform the scheduled monthly and annual calibration and maintenance. Monthly and annual maintenance, calibration, and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments.

2.2 Equipment Calibration

Trained field team members will be familiar with the field calibration, operation, and maintenance of the equipment. They will perform field calibrations, checks, and instrument maintenance daily. The photoionization detector (PID) and AREA Rae will be calibrated on a periodic basis with isobutylene. A Dust Trak will be calibrated daily using provided calibration air. A trained team member will perform daily field checks and instrument maintenance prior to use. A trained team member using standard calibration solutions will calibrate the pH, conductivity, ORP, DO, turbidity and colorimetry meters. Field maintenance, calibration, and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments. All maintenance and calibration will be documented on an instrument-specific master calibration/maintenance form.

The Field Team Leader (FTL) will be responsible for keeping a master instrument calibration/maintenance form for each measuring device. Each form will include at least the following relevant information:

- Name of device and/or instrument calibrated;
- Device/instrument serial and/or identification (I.D.) number;
- Frequency of calibration;
- Date of calibration;
- Results of calibration;

- Name of person performing the calibration;
- Identification of the calibration standards; and
- Buffer solutions (pH meter only).

2.3 Equipment Decontamination

To minimize the potential for cross-contamination, all drilling and sampling equipment will be properly decontaminated prior to and after each use.

2.3.1 General Procedures

All heavy equipment will be decontaminated in a designated clean area. Sampling equipment and probes will be decontaminated in an area covered by plastic near the sampling location. All solvents and wash water used in the decontamination process will be collected and drummed for off-site disposal. All disposable sampling equipment will be properly disposed of in dry containers.

All well casing and screen will be steam cleaned, wrapped in clean polyethylene sheeting, and stored until the time of well construction.

Extraneous contamination and cross-contamination will be controlled by wrapping the sampling equipment with aluminum foil when not in use and changing and disposing of the sampler's gloves between samples. Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated sampling equipment will be used. Personnel directly involved in equipment decontamination will wear appropriate protective equipment.

2.3.2 Heavy Equipment (drill rigs, etc.)

All drilling equipment and the back of the drilling rig will be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This will include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment will be capable of generating live steam with a minimum temperature of 212° F.

All water used during drilling and/or steam-cleaning operations will be from a potable source and so designated in writing. The drilling contractor is responsible for obtaining all permits from the local potable water purveyor and any other concerned authorities, and provision of any

requested back-flow prevention devices. The equipment will be cleaned to the satisfaction of the ERM Hydrogeologist or FTL.

2.3.4 Aqueous Sampling Equipment

Factory pre-cleaned disposable bailers will be used during the RA. In the event that field decontamination of reusable sampling equipment is necessary, decontamination procedures will be as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse; and
- Distilled and deionized (ASTM Type II) water rinse;
- 10% nitric acid rinse, followed by a distilled and deionized water rinse (metals only), or
- Methanol (pesticide grade) rinse (volatiles only);
- Total air dry; and
- Distilled and deionized water rinse.

The submersible sampling pumps that are placed in the borehole will be decontaminated with an Alconox detergent rinse and by pumping approximately 5 gallons of potable water through the pump. Since dedicated new lengths of polyethylene tubing will be used for sampling each well, the tubing will not be decontaminated. Unless otherwise specified, the submersible pumps will be decontaminated prior to the sampling the first well and between each subsequent well as follows:

- Potable water rinse.
- Alconox detergent and potable water scrub.
- Potable water rinse.
- Distilled/deionized water rinse.
- Wrap in aluminum foil, shiny side facing out.

2.3.5 Meters and Probes

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., oxygen meters, explosimeters, etc.) will be decontaminated between uses as follows:

- Phosphate-free laboratory detergent solution;
- tap water;

- methanol rinse (at the FTL's discretion);
- deionized water (triple rinse).

A methanol rinse will be used if deemed necessary by the FTL.

2.4 Quality Assurance/Quality Control Sampling

The field sampling quality assurance-sampling program is summarized in Table J-1. Specific guidance regarding the collection of field and laboratory QA/QC samples is presented separately below.

2.4.1 Field QA/QC Samples

Trip Blanks

The trip blank will be used to determine if any cross-contamination occurs between aqueous samples during shipment. The analytical laboratory will supply trip blanks as aliquots of distilled, deionized water that will be sealed in a sample bottle prior to initiation of each day of fieldwork. Glass vials (40 ml) with Teflon®-lined lids will be used for trip blanks. The sealed trip blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank. Trip blanks are analyzed for VOCs only.

Field Blanks

Field blanks will be collected to evaluate the cleanliness of soil and aqueous sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment, sample bottles and contaminants present in the air. Field blanks will be collected at a frequency of one per decontamination event for each type of sampling equipment, and each media being sampled (e.g., a groundwater bailer for groundwater, and a hand auger for soil sampling), at a minimum of one per equipment type and/or media per day.

Field blanks will be collected prior to the occurrence of any analytical field-sampling event by pouring deionized or potable water over a particular piece of sampling equipment and into a sample container. The analytical laboratory will provide field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars will be used for organic blanks. The field blanks as well as the trip blanks will accompany field personnel to the sampling location. The field blanks will be analyzed for the same analytes as the environmental samples being collected that day and will be shipped with the samples taken.

Field blanks will be taken in accordance with the procedure described below:

- Decontaminate sampler using the procedures specified in the QAPP;
- Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate sample bottles;
- The sample will be immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory; and
- Fill out sample log, labels, and COC forms, and record in field notebook.

Temperature Blanks

The temperature blank will be used to determine the temperature of the samples within the cooler upon arrival at the analytical laboratory. A laboratory-supplied temperature blank will be an aliquot of distilled, deionized water that will be sealed in a sample bottle. The sealed temperature blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport samples, then each cooler must contain an individual temperature blank.

2.4.2 Laboratory QA/QC

Blind Field Duplicate Samples

Aqueous blind field duplicate samples will be collected analyzed to check laboratory reproducibility of analytical data. Blind field duplicates will be collected from the soil borings.

Blind field duplicate samples will be collected at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. All blind field duplicate samples will be submitted to the analytical laboratory as a normal sample, however, will have a fictitious sample identification and fictitious time of sample collection. Each blind field duplicate will be cross-referenced to document which actual sample it is a blind field duplicate of in the field notes and on the master sample log.

Matrix Spike/Matrix Spike Duplicate

Additional environmental sample volume will be collected for use as MS/MSD samples at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected per matrix to evaluate the precision and reproducibility of the analytical methods. To ensure the

laboratory has sufficient volume for MS/MSD analysis, triple sample volume must be submitted for aqueous organic extractable and volatile samples once per every 20 samples in a sample delivery group (SDG).

2.5 Field Records

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the RAWP and QAPP in an efficient and high quality manner. Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Field management forms and field logbook will be used to document all field activities, as this documentation will support that the samples were collected and handled properly, making the resultant data complete, comparable and defensible. Field logbook procedures and field management forms are identified in the following sections.

2.5.1 Field Logbook

The sample team or individual performing a particular sampling activity will keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use this notebook, which will be kept as a permanent record. The field notebook will be filled out at the location of sample collection immediately after sampling. It will contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook will contain any deviations from protocol and why, visitor's names, or community contacts made during sampling, geologic and other site-specific information which may be noteworthy.

2.5.2 Field Management Forms

In addition to maintenance of a field logbook, the use of field management forms will supplement field logbook entries for all field activities associated with this project. Field management forms provide a regular format to record the relevant information for a particular field activity.

Use of these forms will ensure that the field team consistently and completely records all pertinent data relative to a particular field activity on a regular basis. All forms, sample labels, custody seals and other sample documents will be filled out completely.

A list of forms and the associated activities for which each form could be potentially be completed is presented below.

Form	***Activity***
Groundwater Sampling Record	All permanent well sampling
Soil Boring Logs	All borings
Air Sampling Checklist	All air samples
Monitoring Well Construction Logs	All permanent well installations
Well Development Data Sheet	All well development efforts
Chain of Custody (COC) Form	All field sampling efforts
Laboratory Sample Bottle Request	All field sampling efforts
Sampling Equipment Checklist	All field sampling efforts
Daily Instrument Calibration Log	Every day a field instrument is used
Well Inspection Log	All permanent well sampling

Copies of each of these forms are provided at the end of this attachment.

2.6 Sample Preparation And Custody

2.6.1 Sample Identification

To provide for proper identification in the field, and proper tracking in the laboratory, all samples must be labeled in a clear and consistent fashion using the procedures and protocols described below and within the following subsections.

- Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.
- Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities will be sequentially recorded in the notebook.
- The notebook, along with the COC form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.
- Each sample will have a corresponding notebook entry which includes:

- Sample ID number;
- Well or other sample location and number;
- Date and time;
- Analysis for which sample was collected;
- Additional comments as necessary; and
- Samplers' name.

- Each sample must have a corresponding entry on a COC manifest.
- The manifest entry for sampling at any one well is to be completed before sampling is initiated at any other well by the same sampling team.
- In cases where the samples leave the immediate control of the sampling team (i.e., shipment via common carrier) the shipping container must be sealed.

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location and a specific sample designation (identifier). Location types will be identified by a two-letter code. Groundwater samples collected from the monitoring wells will begin with "MW". Sub-slab air samples will begin with "SS", indoor air samples from the basement will begin with "B", samples from other floors although not anticipated would begin with "FF" for first floor, etc, and ambient air samples will begin with "AA". Soil samples collected from the soil borings will begin with "SB". The depth will also be added to soil samples if applicable. The specific sampling designation (identifier) will be identified using a two-digit number. Samples collected for waste characterization will begin with "WC". For example, the first sample collected from the first soil boring at 5 feet will be identified as SB-01 (5).

In the case of QC samples such as field blanks, trip blanks and blind field duplicate samples, six digits will follow FB, TB and DUP respectively to represent the date (e.g., FB040112 would represent a field blank collected on 01 April 2012). For matrix spike/matrix spike duplicate samples, MS/MSD will be added following the applicable sample identification.

2.6.2 Sample Containers

- The analytical laboratory will provide all sample containers.
  - If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur.
  - If sample preservation is specified, the necessary preservatives will be placed in the sample bottles by the laboratory.

- The sample bottles will be handled carefully so that any preservatives are not inadvertently spilled.

A more detailed description of the sample containers to be utilized for this RI can be found in Tables J-2 through J-4.

2.6.3 Sample Preservation

Sample Preservation

Soil samples collected during the RA will be preserved by cooling to 4°C and maintained at this temperature until time of analysis. Groundwater samples for VOC analysis during the RA will be preserved by acidification to a pH of <2 using hydrochloric acid (HCl), cooled to 4°C, and maintained at this temperature until time of analysis. A more detailed description of the sample preservation to be utilized for this RA can be found in Tables J-2 through J-4.

- Immediately following collection of the samples, they will be placed in a cooler with "freezer-pacs" to maintain sample integrity. All volatile sample bottles to be filled to capacity with no headspace for volatilization. If necessary to meet a maximum recommended holding time, the samples are to be shipped by overnight courier to the laboratory.
- The shipping container used will be designed to prevent breakage, spills, and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the "freezer-pacs". The container is to be securely sealed, clearly labeled, and accompanied by a COC record. Separate shipping containers should be used for "clean" samples and samples suspected of being heavily contaminated. During winter months, care should be taken to prevent samples from freezing. Sample bottles will not be placed directly on "freezer-pacs".

Sample Holding Time

- All samples will be shipped the same day they are obtained to the analytical laboratory.
- The samples must be stored at or near 4°C and analyzed within specified holding times.
- The analytical laboratory will be a NYSDOH ELAP-certified laboratory, and conform to meeting specifications for documentation, data reduction, and reporting. The laboratory will follow all method specifications pertaining to sample holding times contained in the NYSDEC ASP (revised 2005) and/or as prescribed by the specific analytical method.

A more detailed description of the sample holding times to be utilized for this RA can be found in Tables J-2 through J-4. These holding times are consistent with NYSDEC ASP Exhibit I although technical holding times vary. The holding times for the air samples will be consistent with the method requirements and not the EPA Region 2 validation criteria.

Sample Custody

Chain of Custody *- T*he primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. All field-sampling personnel will adhere to proper sample custody procedures because samples collected during an investigation could be used as evidence in litigation. Therefore, possession of the samples must be traceable from the time each sample is collected until it is analyzed at the laboratory.

Custody Transfer to Field Personnel - The on-site hydrogeologist or the field personnel will maintain custody of samples collected during this investigation. All field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory. COC records will be completed at the time of sample collection and will accompany the samples inside the cooler for shipment to the selected laboratory.

Each individual who has the samples in their possession will sign the COC record. Preparation of the COC record is as follows:

- For every sample, the person collecting the sample will initiate the COC record in the field. Every sample will be assigned a unique identification number that is entered on the COC Record.
- The record will be completed in the field to indicate project, sampling team, etc.
- If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for Relinquished By _____, Received By _____ will be completed in the field.
- The person transporting the samples to the laboratory or delivering them for shipment will sign the record form as Relinquished By _____.
- If commercial carrier ships the samples to the laboratory, the original COC record will be sealed in a watertight container and placed in the shipping container, which will be sealed prior to being given to the

carrier. The carbonless copy of the COC record will be maintained in the field file.

- If the samples are directly transported to the laboratory, the COC will be kept in possession of the person delivering the samples.
- For samples shipped by commercial carrier, the waybill will serve as an extension of the COC record between the final field custodian and the laboratory.
- Upon receipt in the laboratory, the Sample Custodian or designated representative, will open the shipping containers, compare the contents with the COC record, and sign and date the record. Any discrepancies will be noted on the COC record.
- If discrepancies occur, the samples in question will be segregated from normal sample storage and the field personnel immediately notified.
- COC records will be maintained with the records for a specific project, becoming part of the data package.

Custody Transfer to Laboratory - All samples collected during the RA will be submitted to a NYSDOH ELAP-certified laboratory meeting specifications for documentation, sample login, internal chain of custody procedures, sample/analysis tracking, data reduction, and reporting. The laboratory will follow all specifications pertaining to laboratory sample custody procedures contained in the NYSDEC ASP (revised 2005).

In general, the following procedures will be followed upon sample receipt. The laboratory will not accept samples collected by project personnel for analysis without a correctly prepared COC record.

The first steps in the laboratory receipt of samples are completing the COC records and project sample login form. The laboratory Sample Custodian, or designee, will note that the shipment is accepted and notify the Laboratory Manager or the designated representative of the incoming samples.

Upon sample receipt, the laboratory Sample Custodian, or designee, will:

- Examine all samples and determine if proper temperature has been maintained during shipment. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected will also be considered damaged. It will be noted on the COC record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed, and provide an explanation of the cause of damage.

- Compare samples received against those listed on the COC record.
- Verify that sample holding times have not been exceeded.
- Sign and date the COC record and attach the waybill to the COC record.
- Denote the samples in the laboratory sample log-in book which contains the following information:
  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory
  - Record of the verified time of sample receipt (VTSR)
  - Date put into storage after analysis is completed
  - Date of disposal.

The last two items will be added to the log when the action is taken.

- Notify the Laboratory Manager of sample arrival.
- Place the completed COC records in the project file.

The VTSR is the time of sample receipt at the laboratory. The date and time the samples are logged in by the Sample Custodian or designee, will agree with the date and time recorded by the person relinquishing the samples.

A typical COC can be found as Figure J-1.

2.6.4 Sampling Packaging and Shipping

Sample bottles and samples will either be delivered/picked up at the site daily by the analytical laboratory, or delivered/shipped via overnight courier. Once the samples have been collected, proper procedures for packaging and shipping will be followed as described below.

Packaging

Prior to shipment, samples must be packaged in accordance with current United States Department of Transportation (USDOT) regulations. All necessary government and commercial carrier shipping papers must be filled out. The procedure below should be followed regardless of transport method:

- Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or Styrofoam containers are unacceptable).

- Remove previously used labels, tape, and postage from cooler.
- Ship filled sample bottles in same cooler in which empty bottles were received.
- Affix a return address label to the cooler.
- Check that all sample bottles are tightly capped.
- Check that all bottle labels are complete.
- Be sure COC forms are complete.
- Wrap sample bottles in bubble pack and place in cooler.
- Pack bottles with extra bubble pack, vermiculite, or Styrofoam "peanuts". Be sure to pack the trip blank, if one is being submitted with the samples.
- Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.
- Separate and retain the sampler's copy of COC and keep with field notes.
- Tape paperwork (COC, manifest, return address) in zipper bag to inside cooler lid.
- Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.
- Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

Shipping

Samples should arrive at the laboratory as soon as possible following sample collection to ensure that holding times are not exceeded. All samples must be hand delivered on the same day as sampling or sent via overnight courier. When using a commercial carrier, follow the steps below.

- Securely package samples and complete paperwork.
- Weigh coolers for air transport.
- Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.
- Keep customer copy of air bill with field notes and COC form.
- When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of arrival.

- Call the lab on day following shipment to be sure all samples arrived intact. If bottles are broken, locations can be determined from COC and resampled.

2.7 Analytical Laboratory

The data collected during the course of the RA activities will be used to determine the presence and concentration of certain analytes in soil, and groundwater.

All groundwater samples collected from the permanent monitoring wells as well as the soil samples collected during the RA will be submitted to Spectrum Analytical Laboratories located at 175 Metro Center Boulevard, Warwick, Rhode Island 02886. Spectrum Warwick is a NYSDOH ELAP-certified laboratory (Lab I.D. # 11522) meeting specifications for documentation, data reduction, and reporting. Air samples will be sent to Spectrum Analytical Laboratories located at 830 Silver Street, Agawam, Massachusetts 01001. Spectrum Agawam is a NSDOH ELAP-certified laboratory (Lab I.D. # 11840) meeting specifications for documentation, data reduction, and reporting.

2.8 Analytical Test Parameters

The RA will require the analysis of (not including quality assurance/quality control [QA/QC] samples) approximately 90 groundwater samples for VOCs by USEPA SW-846 Method 8260B, 40 groundwater samples for Permanganate via USEPA SW-846 Method 3665A, 18 soil samples for VOCs by USEPA SW-846 Method 8260B, 8 soil samples for SVOCs by USEPA SW-846 Method 8270C and 6 soil samples for Natural Oxidant Demand (NOD) by ASTM Method D-7262-10.

These analyses will be performed in accordance with United States Environmental Protection Agency (USEPA) "*Test Methods for the Evaluation of Solid Waste, USEPA SW-846, Third Edition, September 1986, with revisions*".

Thirty-six air samples will be collected and analyzed for volatile compounds following "*Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition 1997, EPA/625/R-96/010B*", Compendium Method TO-15, "*Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)*".

2.9 Instrument Calibration

The frequency of laboratory instrument calibration and associated procedures for the specific analytical methods to be followed by the selected laboratory are specified in the individual USEPA analytical method procedures. The selected laboratory's calibration schedule will adhere to all analytical method specifications.

2.10 Data Management and Reporting Plan

2.10.1 Data Use and Management Objectives

Data Use Objectives

The typical data use objectives for this RA are:

- Ascertaining if there is a threat to public health or the environment.
- Locating and identifying potential sources of impacts to soil or groundwater.
- Delineation of horizontal and vertical constituent concentrations, identifying clean areas, estimating the extent and/or volume of impacted soil and groundwater.
- Determining treatment and disposal options.
- Characterizing soil for on-site or off-site treatment.
- Formulating remediation strategies, and estimating remediation costs.

Data Management Objectives

The primary objective of proper data management is to ensure and document that all necessary work is conducted in accordance with the RAWP and QAPP in an efficient and high quality manner thereby maximizing the confidence in the data in terms of PARCC. Data management procedures not only include field and laboratory documentation, but also include how the information is handled after the conclusion of field investigation and laboratory analyses area completed. Data handling procedures include project file management, reporting, usability analysis (review and validation) and use of consistent formats for the final presentation of the data.

Project File Specifications

The ERM Project Manager in ERM's Melville, New York, office location will keep all project information in a central Project File maintained. The Project File will be assigned a unique project number that will be clearly

displayed on all project file folders (including electronic files). Electronic files will be maintained in a similarly organized Project File located on the ERM Central Network system that is backed up on a weekly basis. Both hard copy and electronic Project Files will contain, at a minimum copies or originals of the following key project information:

- All correspondence including letters, transmittals, telephone logs, memoranda, and emails;
- Meeting notes;
- Technical information such as analytical data; field survey results, field notes, field logbooks and field management forms;
- Project calculations;
- Subcontractor agreements/contracts, and insurance certificates;
- Project-specific health and safety information/records;
- Access agreements;
- Project document output review/approval documentation; and
- Reports: Monthly Progress, Interim Technical, and Draft/Final Technical.

2.10.2 Reporting

Field Data

Field data will be recorded and reported by field personnel using appropriate field data documentation materials such as the field logbook, field management forms, and COC forms.

Good field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Proper completion of these forms and the field logbook are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly making the resultant data complete, comparable, and defensible.

Laboratory Data

The analytical results of all samples collected, as part of the RA will be reported following NYSDEC ASP 2005 specifications. All laboratory analytical data will be reported as NYSDEC Category B deliverables. The Category B data deliverables include all backup QA/QC documentation necessary to facilitate a complete validation of the data.

In addition, NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms will be completed and included with each data package. The sample tracking forms are specified and supplied by the 2005 NYSDEC ASP.

The laboratory will also transmit the analytical data in an electronic format to minimize the chances of transposition errors in summarizing the data. The data will be transmitted in an electronic data deliverable (EDD) in GISKEY (most recent version) format and a PDF copy of each ASP deliverable.

2.10.3 Data Validation

All field and laboratory data will be reviewed, validated and qualified as necessary to assess data usability by direct comparison to the specified data quality objectives and/or procedures set forth in this QAPP. The data associated with the groundwater samples, the soil samples, and the waste characterization samples will not be validated or qualified unless a major issue is observed after the initial review of the results. The ERM QAO will determine this. Information that can be obtained includes comparison of results obtained from samples taken at the same location, and the identification of missing data points. Examination of the data at the end of the process allows for the assessment of data quality with respect to PARCC.

Field Data Validation Protocol

Field data generated in accordance with the project-specific RAWP will primarily consist of field temperature, pH, ORP, specific conductance data, data associated with soil boring advancement, monitoring well installation and development, and soil classification. This data will be validated by review of the project documentation to check that all forms specified in the Work Plan and this QAPP have been completely and correctly filled out and that documentation exists for the specified instrument calibrations. This documentation will be considered sufficient to provide that proper procedures have been followed during the field investigation.

Laboratory Data Validation Protocol

Data validation is the assessment of data quality with respect to method specifications and technical performance of the analytical laboratory. Analytical data packages will be examined to ensure that all specified lab components are included, all QA/QC specifications were performed or met, and the data use restrictions are well defined.

Summary documentation regarding QA/QC results will be completed by the laboratory using NYSDEC ASP forms and will be submitted with the raw analytical data packages (NYSDEC ASP Category B deliverables). Data validation will be performed to assess and document analytical data quality in accordance with the project data quality objectives. The data review will evaluate data for its quality and usability. This process will qualify results so that the end user of the analytical results can make decisions with consideration of the potential accuracy and precision of the data. For example, the results are acceptable as presented, considered estimated and qualified with a "J", or rejected and not useable and therefore qualified with an "R".

The validation of the organic analytical data will be performed according to the protocols and QC requirements of the analytical methods, the NYSDEC ASP, the National Functional Guidelines for Organic Data Review (October 1999), the USEPA Region II Data Review Standard Operating Procedure (SOP) HW-24, Revision 1, June 1999: Validating Volatile Organic Compounds by SW-846 Method 8260B, the USEPA Region II Data Review SOP Number HW-22, Revision 3, October 2006: Validating Semivolatile Organic Compounds by SW-846 Method 8270C, the USEPA Region II Data Review SOP Number HW-18, Revision 0, August 1994: Validating Canisters of Volatile Organics in Ambient Air, and the reviewer's professional judgment.

The order in which the aforementioned guidance documents and/or criteria are listed does not imply a hierarchy of reliance on a particular document for validation. ERM will utilize all guidance documents and/or criteria relying on the most comprehensive reference sources to perform the most complete validation possible.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results.

During the validation process, it will be determined whether sufficient back-up data and QA/QC results are available so the reviewer may conclusively determine the quality of data support laboratory submittals for sample results. Each data package will be checked for completeness and technical adequacy of the data. Upon completion of the review, the reviewers will develop a QA/QC data validation report for each SDG.

For the organic parameter analyses, the following items or criteria will be reviewed:

- Case narrative and deliverable compliance

- Holding times both technical and procedural and sample preservation (including pH and temperature)
- Surrogate Compound recoveries, summary and data
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) results, recoveries, summary and data
- Blank Spike Sample (BSS) recoveries
- Method blank summary and data
- Gas Chromatography (GC)/Mass Spectroscopy (MS) tuning and performance
- Initial and continuing calibration summaries and data
- Internal standard areas, retention times, summary and data
- Blind Field Duplicate sample results
- Field Blank results
- Trip Blank results
- Organic analysis data sheets (Form I)
- GC/MS chromatograms, mass spectra and quantitation reports
- Quantitation and detection limits
- Qualitative and quantitative compound identification

After the Summary Reports are prepared for each SDG, the validator will prepare a Data Usability Report (DUSR). The DUSR will be prepared according to the guidelines established by Division of Environmental Remediation Quality Assurance Group and will review the following:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?
- Have all holding times been met?
- Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
- Have all of the data been generated using established and agreed upon analytical protocols?
- Does an evaluation of the raw data confirm the results provided in the data summary sheets and qualify control verification forms?
- Have the correct data qualifiers been used?

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the

analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems are identified and their effect-on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP 2005 Rev. Guidelines.

2.10.4 Data Presentation Formats

Project data will be presented in consistent formats for all letters, Progress Reports, Interim Technical Reports, and Draft/Final Technical Reports. All data will be submitted to the NYSDEC in EQuIS Electronic Data Deliverable (EDD) format consistent with the requirements outlined by the NYSDEC. General specifications are described below.

Data Records

The data record will generally include one or more of the following:

- Unique sample or field measurement code;
- Sampling or field measurement location and sample or measurement type;
- Sampling or field measurement raw data;
- Laboratory analysis ID number;
- Property or component measured; and
- Result of analysis (e.g., concentration).

Tabular Displays

The following data will generally be presented in tabular displays:

- Unsorted (raw) data;
- Results for each medium or for each constituent monitored;
- Data reduction for statistical analysis;
- Sorting of data by potential stratification factors (e.g., location, soil layer/depth, topography, etc.); and
- Summary data.

Graphical Displays

The following data will be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

- Sample locations and sampling grid;
- Boundaries of sampling area;
- Areas where additional data are necessary;
- Constituent concentrations at each sample location;
- Geographical extent of impacts;
- Constituent concentration levels, averages, minima and maxima;
- Changes in concentration in relation to distance from the source, time, depth or other parameters;
- Features affecting intramedia transport; and
- Potential receptors.

2.11 Performance Audits

2.11.1 Field Audits

During field activities, the ERM QAO may accompany sampling personnel into the field to verify that the sampling program is being properly implemented and to detect and define problems so that corrective action can be taken. All findings will be documented and provided to the ERM Project Manager and FTL.

2.11.2 Laboratory Audits

The NYSDOH ELAP certified laboratory that has satisfactorily completed performance audits and performance evaluation samples will be used for all sample analysis. The results of the most recent performance audits and performance evaluations will be made available upon request. ERM may perform a laboratory audit if warranted.

2.11.3 Corrective Actions

The laboratory utilized for this project will meet the specifications for corrective action protocols typical for performing contract laboratory services. Laboratory corrective action may include instrumentation maintenance, methods modification, cross contamination/carry over issues, sample tracking practices, laboratory information management (LIMs), etc.

Prior to mobilization for the field investigation, a meeting may be scheduled among representatives of ERM and the laboratory to discuss general corrective action approach and establish procedures to ensure good and timely communications among all parties during the investigation. New procedures will be put into effect as appropriate.

TABLES

TABLE J-1
SAMPLE TOTAL SUMMARY

Media	*AOC*	*Analytical Parameters*	*Number of Samples*	*Blind Field Duplicates [1]*	*MS/MSD Pairs [2]*	*Trip Blanks [3]*
Soil	MW-02	VOCs	5	0	1	1
		NOD	3	0	0	0
	MW-05	VOCs	5	0	1	1
		NOD	3	0	0	0
	UST	VOCs and SVOCs	8	1	1	1
Air	Indoor Air	TO-15	16	0	0	0
	Sub-Slab Soil Vapor	TO-15	16	0	0	0
	Ambient Air	TO-15	4	0	0	0
Groundwater	Groundwater	VOCs	90	1	1	1
	Groundwater	Permangenate	10	1	1	0

Notes:

1. Duplicates are generally collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
2. MS/MSD Pairs (two samples) will be collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
3. Trip Blanks will be collected at the rate of one per aqueous sample shipment when VOCs are collected where applicable.

TABLE J-2
DETAILED SUMMARY OF SOIL SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES, AND CONTAINERS

Analytical Parameters	*Analytical Method Reference*	*Sample Preservation*	*Holding Time [1]*	*Container [2]*
TCL VOCs	SW-846 8260 + 10 TICs	Cool 4°C	10 days	1 – 4 oz. glass jar
TCL SVOCs	SW-846 8270 + 20 TICs	Cool 4°C	5 days/ 40 days	2 – 8 oz. glass jar
NOD[3]	ASTM Method D-7262-10	Cool 4°C	14 days	2 – 8 oz. glass jar

Notes:

1. Holding times are from Validated Time of Sample Receipt (VTSR). Technical holding times vary. VOC and TAL Inorganic holding times are days after VTSR until analysis; SVOC, Pesticide, and PCB holding times are days after VTSR until extraction / days from extraction to analysis; Inorganics holding times are days after VTSR until analysis. TCLP holding times are days after VTSR until leaching / days from leaching until extraction (if required)/days from extraction until analysis.
2. As specified by Spectrum Analytical Inc., Warwick RI and Alpha Woods Hole Laboratories, Westborough, MA.
3. To be analyzed by Alpha Woods Hole Laboratories, Westborough, MA.

TABLE J-3
DETAILED SUMMARY OF AQUEOUS SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES, AND CONTAINERS

Analytical Parameters	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [1]	*Container* [2]
TCL VOCs	SW-846 8260 + 10 TICs	Cool 4°C, pH<2 (HCl)	10 days	2 – 40 mL glass Teflon-lined cap vials

Notes:

1. Holding times are from Validated Time of Sample Receipt (VTSR). Technical holding times vary. VOC and TAL Inorganic holding times are days after VTSR until analysis; SVOC, Pesticide, and PCB holding times are days after VTSR until extraction / days from extraction to analysis; Inorganics holding times are days after VTSR until analysis. TCLP holding times are days after VTSR until leaching / days from leaching until extraction (if required)/days from extraction until analysis.
2. As specified by Spectrum Analytical Inc., Warwick RI.

TABLE J-4
DETAILED SUMMARY OF AIR SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES, AND CONTAINERS

Analytical Parameters	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [1]	*Container*
VOCs in Air	TO-15	none	30 days	1 – 6 liter Summa Canister

Notes:
1. VOCs in Air holding times are days after the date of sample collection until analysis.

TABLE J-5
VOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS

Target Compound List	*CAS Number* [1]	*Soil Reporting Limits (ug/kg)* [2]	*Aqueous Reporting Limits (ug/l)* [2]
Dichlorodifluoromethane	75-71-8	5	5
Chloromethane	74-87-3	5	5
Vinyl chloride	75-01-4	5	5
Bromomethane	74-83-9	5	5
Chloroethane	75-00-3	5	5
Trichlorofluoromethane	75-69-4	5	5
1,1-Dichloroethene	75-35-4	5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5	5
Acetone	67-64-1	5	5
Carbon disulfide	75-15-0	5	5
Methyl acetate	79-20-9	5	5
Methylene chloride	75-09-2	2	2
trans-1,2-Dichloroethene	156-60-5	5	5
Methyl tert-butyl ether	1634-04-4	5	5
1,1-Dichloroethane	75-34-3	5	5
cis-1,2-Dichloroethene	156-59-2	5	5
2-Butanone	78-93-3	5	5
Bromochloromethane	74-97-5	5	5
Chloroform	67-66-3	5	5
1,1,1-Trichloroethane	71-55-6	5	5
Cyclohexane	110-82-7	5	5
Carbon tetrachloride	56-23-5	5	5
Benzene	71-43-2	5	5
1,2-Dichloroethane	107-06-2	5	5
1,4-Dioxane	123-91-1	100	100
Trichloroethene	79-01-6	5	5
Methylcyclohexane	108-87-2	5	5
1,2-Dichloropropane	78-87-5	5	5
Bromodichloromethane	75-27-4	5	5
cis-1,3-Dichloropropene	10061-01-5	5	5
4-Methyl-2-pentanone	108-10-1	5	5
Toluene	108-88-3	5	5
trans-1,3-Dichloropropene	10061-02-6	5	5
1,1,2-Trichloroethane	79-00-5	5	5
Tetrachloroethene	127-18-4	5	5
2-Hexanone	591-78-6	5	5
Dibromochloromethane	124-48-1	5	5
1,2-Dibromoethane	106-93-4	5	5

TABLE J-5 (continued)
VOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS

Target Compound List	*CAS Number* [1]	*Soil Reporting Limits (ug/kg)* [2]	*Aqueous Reporting Limits (ug/l)* [2]
Chlorobenzene	108-90-7	5	5
Ethylbenzene	100-41-4	5	5
o-Xylene	95-47-6	5	5
m,p-Xylene	179601-23-1	5	5
Styrene	100-42-5	5	5
Bromoform	75-25-2	5	5
Isopropylbenzene	98-82-8	5	5
1,1,2,2-Tetrachloroethane	79-34-5	5	5
1,3-Dichlorobenzene	541-73-1	5	5
1,4-Dichlorobenzene	106-46-7	5	5
1,2-Dichlorobenzene	95-50-1	5	5
1,2-Dibromo-3-chloropropane	96-12-8	5	5
1,2,4-Trichlorobenzene	120-82-1	5	5
1,2,3-Trichlorobenzene	87-61-6	5	5

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. As specified by Spectrum Analytical Inc., Warwick RI.

TABLE J-6
SEMIVOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS

Target Compound List	*CAS Number* [1]	*Soil Reporting Limits (ug/kg)* [2]	*Aqueous Reporting Limits (ug/l)* [2]
Benzaldehyde	100-52-7	330	10
Phenol	108-95-2	330	10
Bis(2-chloroethyl) ether	111-44-4	330	10
2-Chlorophenol	95-57-8	330	10
2-Methylphenol	95-48-7	330	10
2,2'-Oxybis(1-choloropropane)	108-60-1	330	10
Acetophenone	98-86-2	330	10
4-Methylphenol	106-44-5	330	10
N-Nitroso-di-n propylamine	621-64-7	330	10
Hexachloroethane	67-72-1	330	10
Nitrobenzene	98-95-3	330	10
Isophorone	78-59-1	330	10
2-Nitrophenol	88-75-5	330	10
2,4-Dimethylphenol	105-67-9	330	10
Bis(2-chloroethoxy) methane	111-91-1	330	10
2,4-Dichlorophenol	120-83-2	330	10
Naphthalene	91-20-3	330	10
4-Chloroaniline	106-47-8	330	10
Hexachlorobutadiene	87-68-3	330	10
Caprolactam	105-60-2	330	10
4-Chloro-3-methylphenol	59-50-7	330	10
2-Methylnaphthalene	91-57-6	330	10
Hexachlorocyclopentadiene	77-47-4	330	10
2,4,6-Trichlorophenol	88-06-2	330	10
2,4,5-Trichlorophenol	95-95-4	330	10
1,1'-Biphenyl	92-52-4	330	10
2-Chloronaphthalene	91-58-7	330	10
2-Nitroaniline	88-74-4	670	20
Dimethylphthalate	131-11-3	330	10
2,6-Dinitrotoluene	606-20-2	330	10
Acenaphthylene	208-96-8	330	10
3-Nitroaniline	99-09-2	670	20
Acenaphthene	83-32-9	330	10
2,4-Dinitrophenol	51-28-5	670	20
4-Nitrophenol	100-02-7	670	20
Dibenzofuran	132-64-9	330	10
2,4-Dinitrotoluene	121-14-2	330	10
Diethylphthalate	84-66-2	330	10

TABLE J-6 (continued)
SEMIVOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS

Target Compound List	*CAS Number* [1]	*Soil Reporting Limits (ug/kg)* [2]	*Aqueous Reporting Limits (ug/l)* [2]
Fluorene	86-73-7	330	10
4-Chlorophenyl-phenyl ether	7005-72-3	330	10
4-Nitroaniline	100-01-6	670	20
4,6-Dinitro-2-methylphenol	534-52-1	670	20
N-Nitrosodiphenylamine	86-30-6	330	10
1,2,4,5-Tetrachlorobenzene	95-94-3	330	10
4-Bromophenyl-phenylether	101-55-3	330	10
Hexachlorobenzene	118-74-1	330	10
Atrazine	1912-24-9	330	10
Pentachlorophenol	87-86-5	670	20
Phenanthrene	85-01-8	330	10
Anthracene	120-12-7	330	10
Carbazole	86-74-8	330	10
Di-n-butylphthalate	84-74-2	330	10
Fluoranthene	206-44-0	330	10
Pyrene	129-00-0	330	10
Butylbenzylphthalate	85-68-7	330	10
3,3'-dicholorobenzidine	91-94-1	330	10
Benzo(a)anthracene	56-55-3	330	10
Chrysene	218-01-9	330	10
Bis(2-ethylhexyl) phthalate	117-81-7	330	10
Di-n-octylphthalate	117-84-0	330	10
Benzo(b) fluoranthene	205-99-2	330	10
Benzo(k) fluoranthene	207-08-9	330	10
Benzo(a) pyrene	50-32-8	330	10
Indeno(1,2,3,-cd) pyrene	193-39-5	330	10
Dibenzo(a,h) anthracene	53-70-3	330	10
Benzo(g,h,i) perylene	191-24-2	330	10
2,3,4,6-Tetrachlorophenol	58-90-2	330	10

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. As specified by Spectrum Analytical Inc., Warwick RI.

TABLE J-7
VOLATILES IN AIR COMPOUND LIST AND REPORTING LIMITS

Compound List	*CAS Number* [1]	*Reporting Limits (ppbv)* [2]	*Reporting Limits (ug/m³)* [2]
Acetone	67-64-1	0.5	1.19
1,3-Butadiene	106-99-0	0.5	1.10
Benzene	71-43-2	0.5	1.60
Bromodichloromethane	75-27-4	0.5	3.35
Bromoform	75-25-2	0.5	5.17
Bromomethane	74-83-9	0.5	1.94
Benzyl Chloride	100-44-7	0.5	2.58
Carbon disulfide	75-15-0	0.5	1.56
Chlorobenzene	108-90-7	0.5	2.30
Chloroethane	75-00-3	0.5	1.32
Chloroform	67-66-3	0.5	2.43
Chloromethane	74-87-3	0.5	1.03
Carbon tetrachloride	56-23-5	0.5	3.15
Cyclohexane	110-82-7	0.5	1.72
1,1-Dichloroethane	75-34-3	0.5	2.02
1,1-Dichloroethylene	75-35-4	0.5	1.98
1,2-Dibromoethane	106-93-4	0.5	3.84
1,2-Dichloroethane	107-06-2	0.5	2.02
1,2-Dichloropropane	78-87-5	0.5	2.31
1,4-Dioxane	123-91-1	0.5	1.80
Dibromochloromethane	124-48-1	0.5	4.26
trans-1,2-Dichloroethylene	156-60-5	0.5	1.98
cis-1,2-Dichloroethylene	156-59-2	0.5	1.98
cis-1,3-Dichloropropene	10061-01-5	0.5	3.27
m-Dichlorobenzene	541-73-1	0.5	3.01
o-Dichlorobenzene	95-50-1	0.5	3.01
p-Dichlorobenzene	106-46-7	0.5	3.01
trans-1,3-Dichloropropene	10061-02-6	0.5	2.27
Ethanol	64-17-5	0.5	0.94
Ethylbenzene	100-41-4	0.5	2.17
4-Ethyltoluene	622-96-8	0.5	2.46
Heptane	142-82-5	0.5	2.05
Hexachlorobutadiene	87-68-3	0.5	5.33
Hexane	110-54-3	0.5	1.76

TABLE J-7 (continued)
VOLATILES IN AIR COMPOUND LIST AND REPORTING LIMITS

Compound List	*CAS Number* [1]	*Reporting Limits (ppbv)* [2]	*Reporting Limits (ug/m³)* [2]
2-Hexanone	591-78-6	0.5	2.05
Isopropylbenzene	98-82-8	0.5	2.46
Isopropyl Alcohol	67-63-0	0.5	1.23
Methylene chloride	75-09-2	0.5	1.74
Methyl ethyl ketone	78-93-3	0.5	1.47
Methyl Isobutyl Ketone	108-10-1	0.5	2.05
Methyl Tert Butyl Ether	1634-04-4	0.5	1.80
Styrene	100-42-5	0.5	2.13
1,1,1-Trichloroethane	71-55-6	0.5	2.73
1,1,2,2-Tetrachloroethane	79-34-5	0.5	3.43
1,1,2-Trichloroethane	79-00-5	0.5	2.73
1,2,4-Trichlorobenzene	120-82-1	0.5	3.71
1,2,4-Trimethylbenzene	95-63-6	0.5	2.46
1,3,5-Trimethylbenzene	108-67-8	0.5	2.46
Tetrachloroethylene	127-18-4	0.5	3.39
Tetrahydrofuran	109-99-9	0.5	1.47
Toluene	108-88-3	0.5	1.88
Trichloroethylene	79-01-6	0.5	2.69
Vinyl chloride	75-01-4	0.5	1.28
m+p-Xylene	179601-23-1	0.5	4.34
o-Xylene	95-47-6	0.5	2.17

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. As specified by Spectrum Analytical Inc., Agawam, MA.

TABLE J-8
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)1*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Aqueous	all compounds		< 100	≤10 x RL for acetone,				
	Dichlorodifluoromethane			methylene chloride,	30-155	40	70 – 130	20
	Chloromethane			and 2-butanone	40-125	40	70 – 130	20
	Vinyl chloride				50-145	40	70 – 130	20
	Bromomethane			≤ RL for all other	30-145	40	70 – 130	20
	Chloroethane			compounds.	60-135	40	70 – 130	20
	Trichlorofluoromethane				60-145	40	70 – 130	20
	1,1-Dichloroethene				70-130	40	70 – 130	20
	1,1,2-Trichloro-1,2,2-trifluoroethane				70-130	40	70 – 130	20
	Acetone				40-140	40	70 – 130	20
	Carbon disulfide				35-160	40	70 – 130	20
	Methyl acetate				70-130	40	70 – 130	20
	Methylene chloride				55-140	40	70 – 130	20
	trans-1,2-Dichloroethene				60-140	40	70 – 130	20
	Methyl tert-butyl ether				65-125	40	70 – 130	20
	1,1-Dichloroethane				70-135	40	70 – 130	20
	cis-1,2-Dichloroethene				70-125	40	70 – 130	20
	2-Butanone				30-150	40	70 – 130	20
	Bromochloromethane				65-130	40	70 – 130	20
	Chloroform				65-135	40	70 – 130	20
	1,1,1-Trichloroethane				65-130	40	70 – 130	20
	Cyclohexane				70-130	40	70 – 130	20
	Carbon tetrachloride				65-140	40	70 – 130	20
	Benzene				80-120	40	70 – 130	20

TABLE J-8 (continued)
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)1*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
	1,2-Dichloroethane				70-130	40	70 – 130	20
Aqueous (continued)	Trichloroethene				70-125	40	70 – 130	20
	Methylcyclohexane				70-130	40	70 – 130	20
	1,2-Dichloropropane				75-125	40	70 – 130	20
	Bromodichloromethane				75-120	40	70 – 130	20
	cis-1,3-Dichloropropene				70-130	40	70 – 130	20
	4-Methyl-2-pentanone				60-135	40	70 – 130	20
	Toluene				75-120	40	70 – 130	20
	trans-1,3-Dichloropropene				55-140	40	70 – 130	20
	1,1,2-Trichloroethane				75-125	40	70 – 130	20
	Tetrachloroethene				45-150	40	70 – 130	20
	2-Hexanone				55-130	40	70 – 130	20
	Dibromochloromethane				60-135	40	70 – 130	20
	1,2-Dibromoethane				80-120	40	70 – 130	20
	Chlorobenzene				80-120	40	70 – 130	20
	Ethylbenzene				75-125	40	70 – 130	20
	o-Xylene				80-120	40	70 – 130	20
	m,p-Xylene				75-130	40	70 – 130	20
	Styrene				65-135	40	70 – 130	20
	Bromoform				70-130	40	70 – 130	20
	Isopropylbenzene				75-125	40	70 – 130	20
	1,1,2,2-Tetrachloroethane				65-130	40	70 – 130	20
	1,3-Dichlorobenzene				75-125	40	70 – 130	20
	1,4-Dichlorobenzene				75-125	40	70 – 130	20
	1,2-Dichlorobenzene				70-120	40	70 – 130	20
	1,2-Dibromo-3-chloropropane				50-130	40	70 – 130	20
	1,2,4-Trichlorobenzene				65-135	40	70 – 130	20
	1,2,3-Trichlorobenzene				55-140	40	70 – 130	20
	Toluene-d8	85-120						
	Bromofluorobenzene	75-120						

TABLE J-8 (continued)
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)1*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Aqueous (continued)	1,2-Dichloroethane-d4	70-120						
Soil	all compounds		< 100	≤10 x RL for acetone,				
	Dichlorodifluoromethane			methylene chloride,	35-135	40	70 – 130	20
	Chloromethane			and 2-butanone	50-130	40	70 – 130	20
	Vinyl chloride				60-125	40	70 – 130	20
	Bromomethane			≤ RL for all other	30-160	40	70 – 130	20
	Chloroethane			compounds.	40-155	40	70 – 130	20
	Trichlorofluoromethane				25-185	40	70 – 130	20
	1,1-Dichloroethene				65-135	40	70 – 130	20
	1,1,2-Trichloro-1,2,2-trifluoroethane				70-130	40	70 – 130	20
	Acetone				20-160	40	70 – 130	20
	Carbon disulfide				45-160	40	70 – 130	20
	Methyl acetate				70-130	40	70 – 130	20
	Methylene chloride				55-140	40	70 – 130	20
	trans-1,2-Dichloroethene				65-135	40	70 – 130	20
	Methyl tert-butyl ether				75-126	40	70 – 130	20
	1,1-Dichloroethane				75-125	40	70 – 130	20
	cis-1,2-Dichloroethene				65-125	40	70 – 130	20
	2-Butanone				30-160	40	70 – 130	20
	Bromochloromethane				70-125	40	70 – 130	20
	Chloroform				70-125	40	70 – 130	20
	1,1,1-Trichloroethane				70-135	40	70 – 130	20
	Cyclohexane				70-130	40	70 – 130	20
	Carbon tetrachloride				65-135	40	70 – 130	20
	Benzene				75-125	40	70 – 130	20
	1,2-Dichloroethane				70-135	40	70 – 130	20
	1,4-Dioxane				70-130	40	70 – 130	20
	Trichloroethene				75-125	40	70 – 130	20
Soil	Methylcyclohexane				70-130	40	70 – 130	20

TABLE J-8 (continued)
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)1*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
(continued)	1,2-Dichloropropane				70-120	40	70 – 130	20
	Bromodichloromethane				70-130	40	70 – 130	20
	cis-1,3-Dichloropropene				70-125	40	70 – 130	20
	4-Methyl-2-pentanone				45-145	40	70 – 130	20
	Toluene				70-125	40	70 – 130	20
	trans-1,3-Dichloropropene				65-125	40	70 – 130	20
	1,1,2-Trichloroethane				60-125	40	70 – 130	20
	Tetrachloroethene				65-140	40	70 – 130	20
	2-Hexanone				45-145	40	70 – 130	20
	Dibromochloromethane				65-130	40	70 – 130	20
	1,2-Dibromoethane				70-125	40	70 – 130	20
	Chlorobenzene				75-125	40	70 – 130	20
	Ethylbenzene				75-125	40	70 – 130	20
	o-Xylene				75-125	40	70 – 130	20
	m,p-Xylene				80-125	40	70 – 130	20
	Styrene				75-125	40	70 – 130	20
	Bromoform				55-135	40	70 – 130	20
	Isopropylbenzene				75-130	40	70 – 130	20
	1,1,2,2-Tetrachloroethane				55-130	40	70 – 130	20
	1,3-Dichlorobenzene				70-125	40	70 – 130	20
	1,4-Dichlorobenzene				70-125	40	70 – 130	20
	1,2-Dichlorobenzene				75-120	40	70 – 130	20
	1,2-Dibromo-3-chloropropane				40-135	40	70 – 130	20
	1,2,4-Trichlorobenzene				65-130	40	70 – 130	20
	1,2,3-Trichlorobenzene				60-135	40	70 – 130	20
	toluene-d8	85-115						
	bromofluorobenzene	77-111						
	1,2-dichloroethane-d4	65-128						

Notes:

TABLE J-8 (continued)
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

1. As specified by Spectrum Analytical Inc., Warwick RI.

QC = Quality Control; % R = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit

TABLE J-9
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
SEMIVOLATILE ANALYSES

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)[1]*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Aqueous	all compounds		< 100	≤ 10 x RL for				
	Benzaldehyde			any phthalate	10-118	40	70 – 130	20
	Phenol			ester.	40-100	40	70 – 130	20
	Bis(2-chloroethyl) ether				40-105	40	70 – 130	20
	2-Chlorophenol			≤ RL for all	45-105	40	70 – 130	20
	2-Methylphenol			other compounds.	40-105	40	70 – 130	20
	2,2'-Oxybis(1-choloropropane)				20-115	40	70 – 130	20
	Acetophenone				50-150	40	70 – 130	20
	4-Methylphenol				40-105	40	70 – 130	20
	N-Nitroso-di-n propylamine				40-115	40	70 – 130	20
	Hexachloroethane				35-110	40	70 – 130	20
	Nitrobenzene				40-115	40	70 – 130	20
	Isophorone				45-110	40	70 – 130	20
	2-Nitrophenol				40-110	40	70 – 130	20
	2,4-Dimethylphenol				30-105	40	70 – 130	20
	Bis(2-chloroethoxy) methane				45-110	40	70 – 130	20
	2,4-Dichlorophenol				45-110	40	70 – 130	20
	Naphthalene				40-105	40	70 – 130	20
	4-Chloroaniline				10-100	40	70 – 130	20
	Hexachlorobutadiene				40-115	40	70 – 130	20
	Caprolactam				40-115	40	70 – 130	20
	4-Chloro-3-methylphenol				45-115	40	70 – 130	20
	2-Methylnaphthalene				45-105	40	70 – 130	20
	Hexachlorocyclopentadiene				8-148	40	70 – 130	20
	2,4,6-Trichlorophenol				45-110	40	70 – 130	20

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)[1]*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Aqueous (continued)	2,4,5-Trichlorophenol				50-110	40	70 – 130	20
	1,1'-Biphenyl				50-121	40	70 – 130	20
	2-Chloronaphthalene				45-105	40	70 – 130	20
	2-Nitroaniline				45-120	40	70 – 130	20
	Dimethylphthalate				50-110	40	70 – 130	20
	2,6-Dinitrotoluene				50-110	40	70 – 130	20
	Acenaphthylene				45-105	40	70 – 130	20
	3-Nitroaniline				25-110	40	70 – 130	20
	Acenaphthene				45-110	40	70 – 130	20
	2,4-Dinitrophenol				15-130	40	70 – 130	20
	4-Nitrophenol				15-140	40	70 – 130	20
	Dibenzofuran				50-105	40	70 – 130	20
	2,4-Dinitrotoluene				50-115	40	70 – 130	20
	Diethylphthalate				50-115	40	70 – 130	20
	Fluorene				50-110	40	70 – 130	20
	4-Chlorophenyl-phenyl ether				45-110	40	70 – 130	20
	4-Nitroaniline				35-115	40	70 – 130	20
	4,6-Dinitro-2-methylphenol				30-135	40	70 – 130	20
	N-Nitrosodiphenylamine				50-115	40	70 – 130	20
	1,2,4,5-Tetrachlorobenzene				50-126	40	70 – 130	20
	4-Bromophenyl-phenylether				45-115	40	70 – 130	20
	Hexachlorobenzene				45-120	40	70 – 130	20
	Atrazine				50-150	40	70 – 130	20
	Pentachlorophenol				25-120	40	70 – 130	20
	Phenanthrene				50-110	40	70 – 130	20
	Anthracene				55-105	40	70 – 130	20
	Carbazole				45-115	40	70 – 130	20
	Di-n-butylphthalate				55-110	40	70 – 130	20
	Fluoranthene				55-115	40	70 – 130	20
	Pyrene				45-125	40	70 – 130	20
	Butylbenzylphthalate				50-125	40	70 – 130	20

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)[1]*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Aqueous (continued)	3,3'-dicholorobenzidine				10-130	40	70 – 130	20
	Benzo(a)anthracene				50-110	40	70 – 130	20
	Chrysene				55-110	40	70 – 130	20
	Bis(2-ethylhexyl) phthalate				45-125	40	70 – 130	20
	Di-n-octylphthalate				40-130	40	70 – 130	20
	Benzo(b) fluoranthene				45-115	40	70 – 130	20
	Benzo(k) fluoranthene				45-125	40	70 – 130	20
	Benzo(a) pyrene				50-110	40	70 – 130	20
	Indeno(1,2,3,-cd) pyrene				40-120	40	70 – 130	20
	Dibenzo(a,h) anthracene				40-125	40	70 – 130	20
	Benzo(g,h,i) perylene				40-125	40	70 – 130	20
	2,3,4,6-Tetrachlorophenol				41-139	40	70 – 130	20
	nitrobenzene-d5	35-100						
	2-fluorobiphenyl	45-105						
	terphenyl-d14	30-125						
	phenol-d5	40-100						
	2-fluorophenol	35-105						
	2,4,6-tribromophenol	35-125						
Soil	all compounds		< 100	≤ 10 x RL for				
	Benzaldehyde			any phthalate	50-150	40	70 – 130	20
	Phenol			ester.	0-115	40	70 – 130	20
	Bis(2-chloroethyl) ether				35-110	40	70 – 130	20
	2-Chlorophenol			≤ RL for all	35-105	40	70 – 130	20
	2-Methylphenol			other compounds.	40-110	40	70 – 130	20
	2,2'-Oxybis(1-choloropropane)				30-123	40	70 – 130	20
	Acetophenone				50-150	40	70 – 130	20
	4-Methylphenol				30-110	40	70 – 130	20
	N-Nitroso-di-n propylamine				35-130	40	70 – 130	20
	Hexachloroethane				30-95	40	70 – 130	20
	Nitrobenzene				45-110	40	70 – 130	20

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)[1]*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
	Isophorone				50-110	40	70 – 130	20
	2-Nitrophenol				40-115	40	70 – 130	20
	2,4-Dimethylphenol				30-110	40	70 – 130	20
	Bis(2-chloroethoxy) methane				45-105	40	70 – 130	20
	2,4-Dichlorophenol				50-105	40	70 – 130	20
	Naphthalene				40-100	40	70 – 130	20
	4-Chloroaniline				15-110	40	70 – 130	20
	Hexachlorobutadiene				25-105	40	70 – 130	20
	Caprolactam				50-150	40	70 – 130	20
	4-Chloro-3-methylphenol				45-110	40	70 – 130	20
	2-Methylnaphthalene				45-105	40	70 – 130	20
	Hexachlorocyclopentadiene				27-147	40	70 – 130	20
	2,4,6-Trichlorophenol				50-115	40	70 – 130	20
	2,4,5-Trichlorophenol				50-110	40	70 – 130	20
	1,1'-Biphenyl				55-108	40	70 – 130	20
	2-Chloronaphthalene				50-105	40	70 – 130	20
	2-Nitroaniline				50-115	40	70 – 130	20
	Dimethylphthalate				25-125	40	70 – 130	20
	2,6-Dinitrotoluene				50-115	40	70 – 130	20
	Acenaphthylene				50-105	40	70 – 130	20
	3-Nitroaniline				20-125	40	70 – 130	20
	Acenaphthene				45-110	40	70 – 130	20
	2,4-Dinitrophenol				15-140	40	70 – 130	20
	4-Nitrophenol				0-125	40	70 – 130	20
	Dibenzofuran				55-105	40	70 – 130	20
	2,4-Dinitrotoluene				50-120	40	70 – 130	20
	Diethylphthalate				40-120	40	70 – 130	20
	Fluorene				50-110	40	70 – 130	20
	4-Chlorophenyl-phenyl ether				50-110	40	70 – 130	20
	4-Nitroaniline				35-120	40	70 – 130	20
	4,6-Dinitro-2-methylphenol				40-130	40	70 – 130	20

Matrix	*QC Compounds*	*Surrogate Accuracy (% R)[1]*	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% R)[1]*	*MS/MSD Precision (RPD)[1]*	*BS/BSD Accuracy (% R)[1]*	*BS/BSD Precision (RPD)[1]*
Soil (continued)	N-Nitrosodiphenylamine				50-110	40	70 – 130	20
	1,2,4,5-Tetrachlorobenzene				50-150	40	70 – 130	20
	4-Bromophenyl-phenylether				50-115	40	70 – 130	20
	Hexachlorobenzene				50-110	40	70 – 130	20
	Atrazine				52-175	40	70 – 130	20
	Pentachlorophenol				40-115	40	70 – 130	20
	Phenanthrene				40-115	40	70 – 130	20
	Anthracene				55-110	40	70 – 130	20
	Carbazole				50-115	40	70 – 130	20
	Di-n-butylphthalate				55-115	40	70 – 130	20
	Fluoranthene				53-115	40	70 – 130	20
	Pyrene				50-130	40	70 – 130	20
	Butylbenzylphthalate				45-115	40	70 – 130	20
	3,3'-dicholorobenzidine				20-110	40	70 – 130	20
	Benzo(a)anthracene				55-110	40	70 – 130	20
	Chrysene				55-110	40	70 – 130	20
	Bis(2-ethylhexyl) phthalate				40-125	40	70 – 130	20
	Di-n-octylphthalate				35-135	40	70 – 130	20
	Benzo(b) fluoranthene				45-120	40	70 – 130	20
	Benzo(k) fluoranthene				45-125	40	70 – 130	20
	Benzo(a) pyrene				55-110	40	70 – 130	20
	Indeno(1,2,3,-cd) pyrene				45-125	40	70 – 130	20
	Dibenzo(a,h) anthracene				40-125	40	70 – 130	20
	Benzo(g,h,i) perylene				40-125	40	70 – 130	20
	2,3,4,6-Tetrachlorophenol				50-150	40	70 – 130	20
	nitrobenzene-d5	40-110						
	2-fluorobiphenyl	50-110						
	terphenyl-d14	50-135						
	phenol-d5	10-115						
	2-fluorophenol	20-110						
	2,4,6-tribromophenol	40-125						

Notes:

1. As specified by Spectrum Analytical Inc., Warwick RI.

QC = Quality Control; % R = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit

FIGURES

MITKEM LABORATORIES

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page _____ of _____

Special Handling:

☐ Standard TAT - 7 to 10 business days

☐ Rush TAT - Date Needed:_____

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: _____

Project Mgr.: _____

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: _____

Site Name: _____

Location: _____ State: _____

Sampler(s): _____

1=Na_2S2O_3 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid
7=CH_3OH 8= $NaHSO_4$ 9=_____ 10=_____

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	Containers: # of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Analyses:								QA Reporting Notes: (check if needed)

☐ Provide MA DEP MCP CAM Report
☐ Provide CT DEP RCP Report

QA/QC Reporting Level
☐ Standard ☐ No QC
☐ Other_____

State specific reporting standards:

☐ Fax results when available to (____) _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C _____

Relinquished by:	Received by:	Date:	Time:

FIGURE J-1
EXAMPLE CHAIN-OF-CUSTODY

FIGURE J-2
EXAMPLE CUSTODY SEAL

APPENDIX K

STORMWATER POLLUTION PREVENTION PLAN

New York State Department of Environmental Conservation
Division of Water
Bureau of Water Permits, 4th Floor
625 Broadway, Albany, New York 12233-3505
Phone: (518) 402-8111 ▪ **Fax:** (518) 402-9029
Website: www.dec.state.ny.us

Joe Martens
Commissioner

9/6/2012

BORINQUEN COURT ASSOCIATES, LP
STEPHANIE GREEN
2345 BROADWAY
NEW YORK NY 10024-

Re: ACKNOWLEDGMENT of NOTICE of INTENT for Coverage Under SPDES General Permit for Storm Water Discharges from CONSTRUCTION ACTIVITY General Permit No. GP-0-10-001

Dear Prospective Permittee:

This is to acknowledge that the New York State Department of Environmental Conservation (Department) has received a complete Notice of Intent (NOI) for coverage under General Permit No. GP-0-10-001 for the construction activities located at:

BORINQUEN COURT APARTMENTS
285 EAST 138TH STREET
BRONX NY 10454- **County: BRONX**

Pursuant to Environmental Conservation Law (ECL) Article 17, Titles 7 and 8, ECL Article 70, discharges in accordance with GP-0-10-001 from the above construction site will be authorized **5** business days from **8/27/2012** which is the date we received your final NOI, unless notified differently by the Department.

The permit identification number for this site is: NYR **10V867** . Be sure to include this permit identification number on any forms or correspondence you send us. When coverage under the permit is no longer needed, you must submit a Notice of Termination to the Department.

This authorization is conditioned upon the following:

1. The information submitted in the NOI received by the Department on **8/27/2012** is accurate and complete.

2. You have developed a Storm Water Pollution Prevention Plan (SWPPP) that complies with GP-0-10-001 which must be implemented as the first element of construction at the above-noted construction site.

3. Activities related to the above construction site comply with all other requirements of GP-0-10-001.

4. Payment of the annual $100 regulatory fee, which is billed separately by the Department in the late fall. The regulatory fee covers a period of one calendar year. In addition, since September 1, 2004, construction stormwater permittees have been assessed an initial authorization fee which is now $100 per acre of land disturbed and $600 per acre of future impervious area. The initial authorization fee covers the duration of the authorized disturbance.

5. When applicable, project review pursuant to the State Environmental Quality Review Act (SEQRA) has been satisifed.

6. You have obtained all necessary Department permits subject to the Uniform Procedures Act (UPA). You should check with your Regional Permit Administrator for further information.

*Note: Construction activities cannot commence until project review pursuant to SEQRA has been satisfied, when SEQRA is applicable; and, where required, all necessary Department permits subject to the UPA have been obtained.

Please be advised that the Department may request a copy of your SWPPP for review.

Should you have any questions regarding any aspect of the requirements specified in GP-0-10-001, please contact Dave Gasper at (518) 402-8114 or the undersigned at (518) 402-8109.

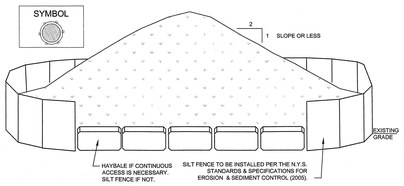
Sincerely,

Toni Cioffi

Toni Cioffi
Environmental Program Specialist 1

cc: RWE - 2
SWPPP Preparer

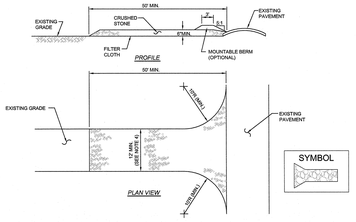
MORRIS ASSOCIATES, PLLC
SETARO PETER
9 ELKS LANE
POUGHKEEPSIE NY 12601-



GENERAL SOIL STOCKPILE NOTES

1. AREA CHOSEN FOR STOCKPILING SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 2:1.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH SILT FENCING AND STABILIZED SEED AND MULCH OR JUTE MESH. HAYBALES SHALL NOT BE USED IN PLACE OF SILT FENCE.
4. SEE SPECIFICATIONS FOR INSTALLATION OF SILT FENCE.
5. SIZE OF STOCKPILE SHALL NOT EXCEED THE LIMITATIONS OF DRAINAGE AREA PER SILT FENCE SPECIFICATIONS.
6. INSTALL SILT FENCE AND OR HAY BALES A MINIMUM OF 2' FROM THE TOE OF THE STOCKPILE.
7. THE STOCKPILED SOIL WILL BE DIKED UNDER 6 MIL POLYSHEETING.

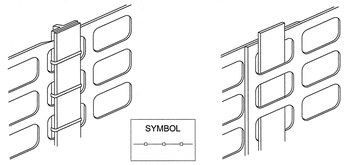
TYPICAL SOIL STOCKPILE DETAIL
1 / EC1 — N.T.S.



GENERAL CONSTRUCTION ENTRANCE SPECIFICATIONS

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50' (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30' MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN 6".
4. WIDTH - 12' MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT MINIMUM IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO THE PLACING OF STONE. FILTER WILL NOT BE REQUIRED ON A SINGLE FAMILY RESIDENCE LOT.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES SHALL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/ OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

TYPICAL STABILIZED CONSTRUCTION ENTRANCE DETAIL
2 / EC1 — N.T.S.



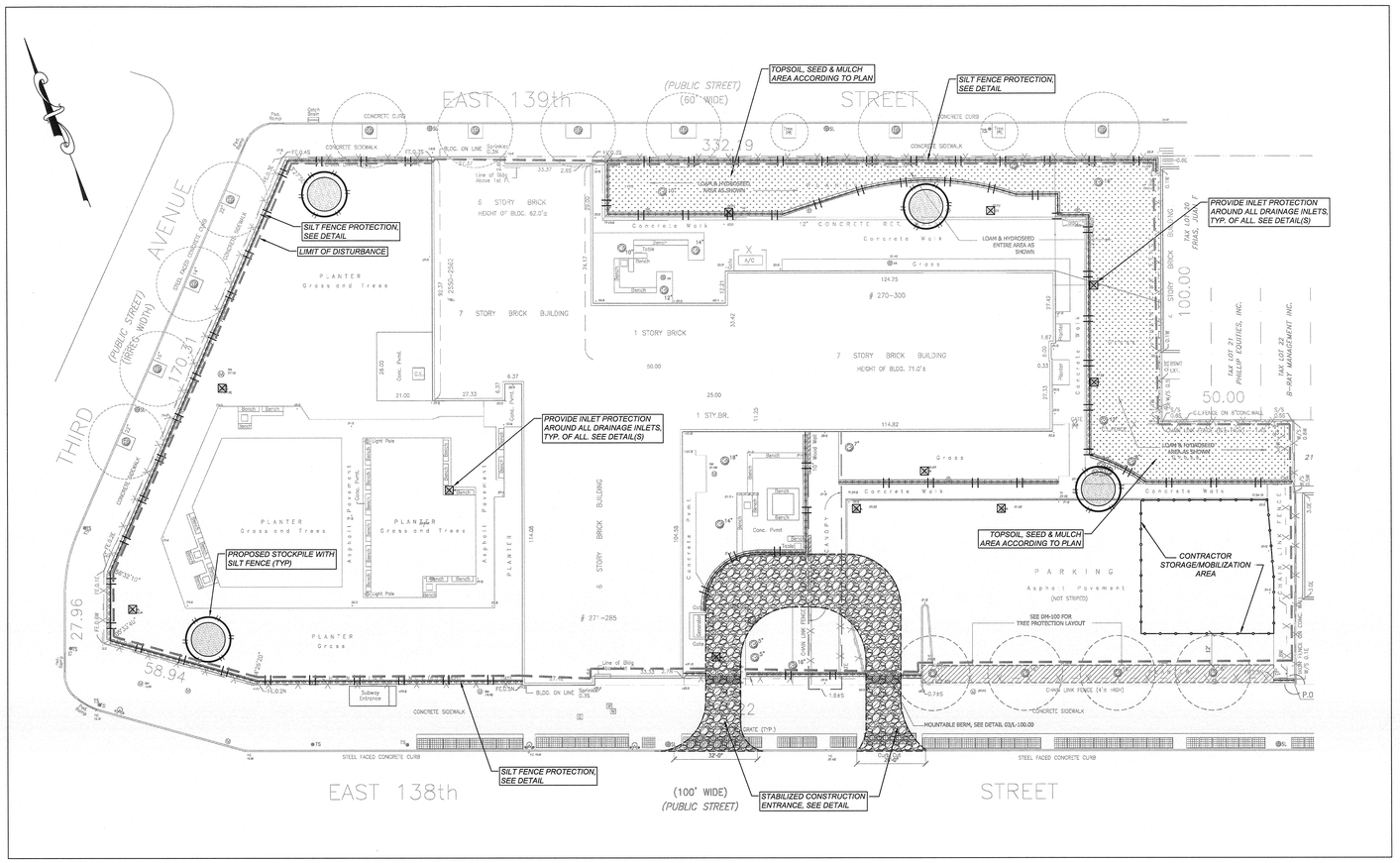
INSTALLATION INSTRUCTIONS:

1. T-POST SHOULD BE PLACED A MAXIMUM OF 10 FT APART.
2. VERTICAL STRAND OF FENCE SHOULD BE SANDWICHED BETWEEN FLAT SIDE OF T-POST AND 1"x2" WOOD SLAT.
3. WIRE TIES OR PLASTIC CABLE TIES CAN THEN BE USED TO SECURE THE SLAT AND FENCE STRAND TO THE T-POST.

SLICING INSTRUCTIONS:

1. TO CONNECT FENCE SECTIONS, OVERLAP 2 STRAND SECTION FROM EACH END AND WEAVE A 1"x2" SLAT THROUGH THE OVERLAPPED STRANDS.
2. FENCE SHOULD BE TENSIONED BY HAND ONLY, DO NOT USE MECHANICAL TENSIONERS.

TYPICAL CONSTRUCTION FENCE DETAIL
3 / EC1 — N.T.S.



EROSION & SEDIMENT CONTROL PLAN
SCALE 1" = 20'

SILTSACK®
SPECIFICATIONS

NOTE: THE SILTSACK®WILL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS.

REGULAR FLOW SILTSACK ®
(FOR AREAS OF LOW TO MODERATE PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	120 LBS
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	120 LBS
APPARENT OPENING SIZE	ASTM D-4751	80 %
FLOW RATE	ASTM D-4491	40 US SIEVE
PERMITTIVITY	ASTM D-4491	40 GAL/MIN/SQ FT
		0.50 SEC -1

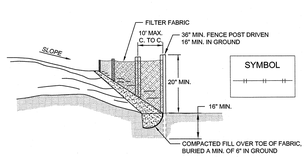
HI-FLOW SILTSACK ®
(FOR AREAS OF MODERATE TO HEAVY PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	265 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	135 LBS
TRAPEZOID TEAR	ASTM D-4533	135 LBS
UV RESISTANCE	ASTM D-4355	45 LBS
APPARENT OPENING SIZE	ASTM D-4751	90 %
FLOW RATE	ASTM D-4491	20 US SIEVE
PERMITTIVITY	ASTM D-4491	200 GAL/MIN/SQ FT
		1.0 SEC -1

OIL-ABSORBANT SILTSACK ®
(FOR AREAS WHERE THERE IS A CONCERN FOR OIL RUN-OFF OR SPILLS)

DEPENDING ON YOUR PARTICULAR APPLICATION, THE SILTSACK ® MAY BE MADE FROM EITHER ONE OF THE ABOVE FABRICS WITH AN OIL-ABSORBANT PILLOW INSERT OR, MADE COMPLETELY FROM AN OIL-ABSORBANT SILTSACK® WITH A WOVEN PILLOW INSERT.

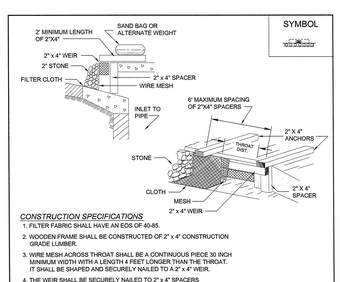
SILTSACK® INLET PROTECTION DETAIL
4 / EC1 — N.T.S.



GENERAL SILT FENCE NOTES

1. LOCATE POSTS DOWNSIDE OF FABRIC TO HELP SUPPORT FENCING.
2. BURY TOE OF FENCE A MIN. OF 6" DEEP TO PREVENT UNDEROUTTING.
3. WHEN JOINTS ARE NECESSARY, SECURELY FASTEN THE FABRIC AT A SUPPORT POST WITH A 6" OVERLAP AND FOLDED TO THE NEXT POST.
4. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABLINKA T140N, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN 'BULGES' DEVELOP IN THE SILT FENCE.

TYPICAL SILT FENCE DETAIL
5 / EC1 — N.T.S.



CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" x 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" x 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" x 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" x 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SANDBAGS OR ALTERNATE WEIGHTS.

MAXIMUM DRAINAGE AREA 1 ACRE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

CURB DROP INLET PROTECTION

TYPICAL INLET PROTECTION DETAIL
6 / EC1 — N.T.S.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (2005), AS PUBLISHED BY THE NEW YORK STATE SOIL AND WATER CONSERVATION SOCIETY AND RECOMMENDED BY THE U.S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE. (REFERRED TO IN REMAINING TEXT AS "THE NEW YORK GUIDELINES").
2. THE CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS WITH RESPECT TO EROSION CONTROL AND SWPPP IMPLEMENTATION IN ACCORDANCE WITH NYS SPDES GENERAL PERMIT #0-10-001, NYC DEP REQUIREMENTS AND ANY OTHER LOCAL OR FEDERAL LAWS ASSOCIATED WITH EROSION CONTROL AND STORMWATER MANAGEMENT.
3. ANY DISTURBED AREA THAT WILL BE LEFT UNDISTURBED FOR MORE THAN 21 DAYS, AND ARE NOT SUBJECT TO CONSTRUCTION TRAFFIC, SHALL BE SEEDED AND MULCHED WITHIN 14 DAYS OF THE LAST DISTURBANCE WITH TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS SHALL BE MULCHED WITH STRAW OR EQUIVALENT MATERIAL. THE SEEDING SHALL BE DONE IN ACCORDANCE WITH THE NEW YORK GUIDELINES, AS FOLLOWS:
   A) SEED: ANNUAL RYE GRASS APPLIED AT A RATE OF 30 LBS./ACRE OTHER SELECT MIXTURE AS DESCRIBED IN THE NEW YORK GUIDELINES.
      IF: SPRING, SUMMER OR EARLY FALL SEED WITH RYE GRASS (ANNUAL OR PERENNIAL) AT 30 LBS. PER ACRE.
      IF: LATE FALL OR EARLY WINTER SEED WITH CERTIFIED "ARIUSTOOK" WINTER RYE, AT 100 LBS. (CEREAL RYE) PER ACRE.
   B) MULCH: OLD HAY OR SMALL GRAIN STRAW APPLIED AT A RATE OF NINETY (90) POUNDS PER ONE THOUSAND SQUARE FT. OR TWO TONS PER ACRE. TO BE APPLIED AND ANCHORED ACCORDING TO THE NEW YORK GUIDELINES. WOODFIBER HYDROMULCH OR OTHER SPRAYABLE PRODUCTS APPROVED FOR EROSION CONTROL (NYLON WEB OR MESH) MAY BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
   C) IN AREAS OF SLOPES STEEPER THAN ONE ON TWO, JUTE MATTING SHALL BE USED TO STABILIZE SEEDED AND/OR PLANTED AREAS. JUTE MATTING SHALL BE INSTALLED AND ANCHORED IN ACCORDANCE WITH THE NEW YORK GUIDELINES.
4. ANY GRADED AREAS NOT SUBJECT TO FURTHER DISTURBANCE OR CONSTRUCTION TRAFFIC SHALL, WITHIN FIVE (5) DAYS AFTER FINAL GRADING, RECEIVE PERMANENT VEGETATIVE COVER IN COMBINATION WITH A SUITABLE MULCH AS FOLLOWS:
   A) STEEP OR EROSION SLOPES GREATER THAN 2:1 (H:V) REFER TO PERMANENT CRITICAL AREA PLANTING NOTES.
   B) RECREATIONAL AREAS AND LAWN REFER TO RECREATIONAL AREA IMPROVEMENT NOTES.
5. SLOPES STEEPER THAN ONE ON THREE SHALL BE STABILIZED IMMEDIATELY AFTER GRADING.
6. PAVED ROADWAYS SHALL BE KEPT CLEAR AT ALL TIMES.
7. THE SITE SHALL AT ALL TIMES BE GRADED AND MAINTAIN SUCH THAT ALL STORM WATER RUNOFF IS DIVERTED TO SOIL EROSION OR SEDIMENT CONTROL FACILITIES, EXCEPT FOR MINOR PERIMETER EMBANKMENT AREAS. ALL GRADE AREA SHALL BE DIRECTED THROUGH ONE OF THE SEDIMENTS BARRIERS. DIVERSION SWALES MAY BE USED TO DIRECT DRAINAGE RUNOFF UNTIL PERMANENT STORM DRAINAGE SYSTEM IS IN PLACE.
8. DUST SHALL BE CONTROLLED BY SPRINKLING OR OTHER APPROVED METHODS.
9. STOCKPILES SHALL NOT BE LOCATED WITHIN FIFTY FEET (50') OF ROADWAYS OR DRAINAGE FACILITIES. THE BASE OF ALL STOCKPILES SHALL BE PROTECTED BY SILT FENCE.
10. SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED BY THE CONTRACTOR ON A DAILY BASIS TO ENSURE THAT TEMPORARY AND PERMANENT DITCHES, PIPES AND STRUCTURES ARE CLEAR OF DEBRIS, THAT EMBANKMENTS AND BERMS ARE NOT BREACHED, AND THAT ALL BARRIERS ARE INTACT.
11. ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL FINAL ACCEPTANCE OF THE SITE WORK BY THE OWNER, QUALIFIED INSPECTOR AND/ OR NS4 STORMWATER MANAGEMENT OFFICER. UPON CERTIFICATION OF FINAL ACCEPTANCE, THE OWNER WILL ASSUME RESPONSIBILITY FOR THE CONTINUED MAINTENANCE OR PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.
12. ALL DRAINAGE OUTLETS AND INLETS SHALL BE LINED WITH STONE RIP-RAP AS SPECIFIED ON THE PLANS AND/ OR PER ENGINEER.
13. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES.

GENERAL MAP NOTES

1. ALL ELEVATIONS SHOWN REFER TO THE BOROUGH OF THE BRONX DATUM WHICH IS 2.608' ABOVE MEAN SEA LEVEL AT SANDY HOOK AS ESTABLISHED THE U.S. COAST AND GEODETIC SURVEY.
2. ALL EXISTING AND PROPOSED SITE FEATURES SHOWN BASED ON INFORMATION PROVIDED TO THIS FIRM. THIS FIRM SHALL NOT BE HELD LIABLE FOR THE ACCURACY OR LOCATION OF THE INFORMATION SHOWN HEREON. THE CONTRACTOR SHALL VERIFY ALL EXISTING SITE CONDITIONS AND UTILITIES PRIOR TO CONSTRUCTION.
3. THE INFORMATION PROVIDED IN THESE PLANS IS SOLELY TO ASSIST THE CONTRACTOR IN ASSESSING THE NATURE AND EXTENT OF THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE COURSE OF WORK. ALL CONTRACTORS ARE DIRECTED, PRIOR TO BIDDING, TO CONDUCT WHATEVER INVESTIGATIONS THEY MAY DEEM NECESSARY TO ARRIVE AT THEIR OWN CONCLUSIONS REGARDING THE ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED, AND UPON WHICH THEIR BIDS WILL BE BASED.
4. THE CONTRACTORS' ATTENTION IS CALLED TO THE FACT THAT THERE MAY BE SOME UTILITY CONFLICTS. IT SHALL BE THE CONTRACTORS' RESPONSIBILITY TO LOCATE AND PROTECT ANY AND ALL EXISTING UTILITIES ON THIS PROJECT.
5. THE CONTRACTOR SHALL PROTECT ALL PROPERTY LINE MONUMENTATION. ANY MONUMENT DISTURBED OR DESTROYED SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE BY A NEW YORK STATE LICENSED LAND SURVEYOR.
6. THE CONTRACTOR SHALL MAINTAIN, AT ALL TIMES, FULL ACCESS TO ALL ROADWAYS AND PARKING AREAS THROUGHOUT THE SITE AND ADJACENT TO THE SITE.
7. THE LOCATION OF THE TEMPORARY EROSION CONTROL PRACTICES ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND CONSTRUCTION OPERATIONS/ METHODOLOGY.
8. THE LIMIT OF DISTURBANCE LINE SHOWN MAY VARY BASED ON LOCATION OF PROPOSED UTILITIES AND/ OR FIELD CHANGES. THE CONTRACTOR SHALL REFERENCE THE APPROVED SITE/ UTILITY PLAN BY OTHERS.
9. WATER FROM THE TRENCHES AND EXCAVATIONS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO AVOID PUBLIC NUISANCE, INJURY TO PUBLIC HEALTH OR THE ENVIRONMENT, DAMAGE OR PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO THE WORK COMPLETED OR IN PROGRESS. DO NOT DISCHARGE WATER INTO ANY SANITARY SEWER SYSTEM. SILTATION BARRIERS SHALL BE UTILIZED AS NECESSARY.
10. WATER FROM TRENCHES AND EXCAVATIONS SHALL NOT BE DISCHARGED DIRECTLY TO STORM DRAIN SYSTEMS. PROPER TREATMENT TO A SEDIMENTATION AREA IS TO TAKE PLACE PRIOR TO DISCHARGE TO ANY DRAINAGE SYSTEMS.
11. THE CONTRACTOR SHALL REPAIR ANY DAMAGE RESULTING FROM THE FAILURE OF THE DEWATERING OPERATIONS OR FROM FAILURE TO MAINTAIN ALL THE AREAS OF WORK IN SUITABLE DRY CONDITION.

SPILL RESPONSE REPORTING & INITIAL NOTIFICATION NOTES

PETROLEUM SPILLS MUST REPORTED TO DEC UNLESS THEY MEET **ALL** OF THE FOLLOWING CRITERIA:

- THE SPILL IS KNOWN TO BE LESS THAN 5 GALLONS; AND
- THE SPILL IS CONTAINED AND UNDER THE CONTROL OF THE SPILLER; AND
- THE SPILL HAS NOT AND WILL NOT REACH THE STATE'S WATER OR ANY LAND; AND
- THE SPILL IS CLEANED UP WITHIN 2 HOURS OF DISCOVERY.

ALL REPORTABLE PETROLEUM SPILLS AND MOST HAZARDOUS MATERIALS SPILLS MUST BE REPORTED TO NYSDEC SPILL HOTLINE **(1-800-457-7362)** WITHIN NEW YORK STATE; AND **(1-518-457- 7362)** FROM OUTSIDE NEW YORK STATE. FOR SPILLS NOT DEEMED REPORTABLE, IT IS STRONGLY RECOMMENDED THAT THE FACTS CONCERNING THE INCIDENT BE DOCUMENTED BY THE SPILLER AND A RECORD MAINTAINED FOR ONE YEAR.

SUGGESTED CONSTRUCTION SEQUENCE

1. OBTAIN ALL REQUIRED PERMIT APPROVALS FROM LOCAL, STATE, CITY AND/ OR FEDERAL AGENCIES PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL COORDINATE TO HAVE ALL UTILITIES MARKED OUT PRIOR TO THE START OF SITE WORK/ DEMOLITION. CONTRACTOR SHALL CONTACT NYC & LI ONE CALL CENTER (1-800-272-4480).
3. CLEARLY MARK OR DELINEATE (SPRAY PAINT, ORANGE SNOW FENCE, SIGNS, ETC.) THE LIMIT OF DISTURBANCE AND LOCATION OF ANY SENSITIVE AREAS.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCE AS SHOWN AND/ OR DIRECTED BY SITE ENGINEER.
5. INSTALL SILT FENCE PROTECTION WHERE SHOWN ON PLAN.
6. CLEAR AND GRUB SITE WITHIN PROPOSED AREAS TO BE DEVELOPED.
7. INSTALL NECESSARY SITE UTILITIES (SEWER, WATER, GAS, ELECTRIC, CABLE, DRAINAGE, ETC.).
8. BEGIN FOOTING/ SLAB EXCAVATION AND BUILDING CONSTRUCTION.
9. FINISH MISCELLANEOUS GRADING AND COMPACTION MEASURES WHERE NEEDED.
10. FINISH MISCELLANEOUS SITE WORK AND BUILDING CONSTRUCTION WHERE NEEDED.
11. ONCE THE SITE IS DECLARED STABILIZED BY THE QUALIFIED INSPECTOR, ALL TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE REMOVED.

APWA UNIFORM COLOR CODE
FOR MARKING UNDERGROUND UTILITY LINES

WHITE	PROPOSED EXCAVATION
PINK	TEMPORARY SURVEY MARKINGS
RED	ELECTRICAL POWER LINES, CABLES CONDUIT AND LIGHTING CABLES
YELLOW	GAS, OIL STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES CABLES, OR CONDUIT
BLUE	POTABLE WATER
PURPLE	RECLAIMED WATER, IRRIGATION AND SLURRY LINES
GREEN	SEWER & DRAIN LINES

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Dig Safely NEW YORK
1-800-962-7962
www.digsafelynewyork.com

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- Wait The Required Time
- Confirm Utility Response
- Respect The Marks
- Dig With Care

800-962-7962
www.digsafelynewyork.com

I-notice
- Create your own stake out-request on the internet, 24 hours a day, 7 days a week, 365 days a year
- The I-notice will satisfy all the requirements of an excavation notification as mandated by Code Rule 753
- No waiting on the phone
- Electronic maps are available to help pin point accurate dig site locations
- The only requirement is access to the internet and Microsoft Internet Explorer 4.0 or newer.
- Verbal transcription errors are eliminated.
- Self-paced on line tutorials and site training is available.
- The I-notice services is FREE!

Simply send an e-mail to: register@digsafelynewyork.com expressing your interest in participating in this innovative time efficient and user friendly method to create your OWN stake-out notice.

NYSDEC SPDES GP-0-10-001 TRACKING No. 10V867
NYSDEC BCA INDEX No. C203056-05-11
NYSDEC SITE No. C203056
CSO SPDES No. NY0026131, OUTFALL 37
MS4: BRONX, NY

PROJECT SITE

BORINQUEN COURT
285 EAST 138TH STREET
BRONX, NEW YORK 10454

OWNER / OPERATOR

EAST ONE THIRTY EIGHTH HOUSING DEVELOPMENT FUND COMPANY, INC.
2345 BROADWAY
NEW YORK, NEW YORK 10024

TAX MAP ID No.

BRONX TAX MAP -
SECTION 9, BLOCK 2314, LOT 1

LEGEND

- EXISTING CATCH BASIN
- EXISTING CURB INLET
- EXISTING DRAINAGE MANHOLE
- *DRAINAGE FLOW PATH*
- *PROPOSED CATCH BASIN*
- *PROPOSED DRAINAGE MANHOLE*
- *PROPOSED SILT FENCE PROTECTION*
- *PROPOSED STOCKPILE W/SILT FENCE*
- *PROPOSED INLET PROTECTION*
- *LIMIT OF SITE DISTURBANCE*
- *PROPOSED FENCE LINE*

REV. No.	DESCRIPTION	DATE	BY

BORINQUEN COURT RENOVATION
285 EAST 138TH STREET
CITY OF BRONX — BRONX COUNTY, NY

STORMWATER POLLUTION PREVENTION EROSION & SEDIMENT CONTROL PLAN

MORRIS ASSOCIATES, ENGINEERING CONSULTANTS, P.L.L.C.
9 Elks Lane, Poughkeepsie, New York 12601
Phone No. (845) 454-3411
Fax No. (845) 473-1942
44 Green Street, Suite 1
Hudson, New York 12534
Phone No. (518) 828-2300
Fax No. (518) 828-3163

DATE	SCALE	DESIGNED BY: MA	FILE No.	DRAWING No.
08/06/11	AS NOTED	DRAWN BY: MA	212046.050	EC1
		CHECKED BY: JPD/ PDS		