RELATED BIT 500 LAKE SHORE OWNER LLC

350 West Hubbard, Suite 300
Chicago, Illinois 60654
Phone: (312) 595-7400
Fax: (312) 595-1898

March 18, 2014

[Via UPS Overnight]
Cathleen R. Martwick
Associate Regional Counsel
Unite States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Environmental Covenant
515 N. Peshtigo Ct., Chicago, IL

Dear Ms. Martwick:

Please find enclosed a recorded copy of the Environmental Covenant with all exhibits for the 515 N. Peshtigo project.

Thank you in advance for your attention to this matter. If you have any questions, please do not hesitate to contact me at (312) 595-7400.

Very truly yours,

Jacalyn M. Guon
Vice President

Enclosure

cc: Donald Biernacki (via email)
Frank Monterisi (via email)
Michael Elch (via email)
Larry Koch (via email)

US EPA RECORDS CENTER REGION 5
473656

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Doc#: 1407622096 Fee: $782.00
RHSP Fee:$9.00 RPRF Fee: $1.00
Karen A.Yarbrough
Cook County Recorder of Deeds
Date: 03/17/2014 08:32 PM Pg: 1 of 373

This instrument was prepared by:

Name: Leo P. Dombrowski
Address: Sanchez Daniels & Hoffman LLP
333 W. Wacker Drive, Suite 500
Chicago, IL 60606

Please return this instrument to:

Name: Leo P. Dombrowski
Address: Sanchez Daniels & Hoffman LLP
333 W. Wacker Drive, Suite 500
Chicago, IL 60606

ENVIRONMENTAL COVENANT

1. This Environmental Covenant is made this 25th day of February, 2014, by and among Related BIT 500 Lake Shore Owner LLC (Grantor) and the Holder/Grantee further identified in paragraph 3 below pursuant to the Uniform Environmental Covenants Act, 765 ILCS Ch. 122 ("UECA") for the purpose of subjecting the Property to the activity and use limitations described herein.

2. **Property and Grantor.**

A. **Property:** The real property subject to this Environmental Covenant is located at 515 North Peshtigo Court, in Chicago, Cook County, Illinois, and is legally described in Exhibit A, hereinafter referred to as the "Property." The county parcel numbers for this Property are 17-10-218-007 & 17-10-218-008.

B. **Grantor:** Related BIT 500 Lake Shore Owner LLC is the current fee owner of the Property and is the "Grantor" of this Environmental Covenant. The mailing address of the Grantor is:

Related BIT 500 Lake Shore Owner LLC
c/o Related Midwest
350 W. Hubbard Street, Suite 300
Chicago, IL 60654
Attn: Don Biernacki

3. **Holders (and Grantees for purposes of indexing).**

A. Illinois EPA is a Holder (and Grantee for purposes of indexing) of this Environmental Covenant pursuant to its authority under Section 3(b) of UECA. The mailing address of the Illinois EPA is 1021 N. Grand Avenue East, P.O. Box 19276, Springfield, IL 62794-9276.

B. Related BIT 500 Lake Shore Owner LLC is a Holder (and Grantee for purposes of indexing) of this Environmental Covenant pursuant to UECA. The mailing address of Related BIT 500 Lake Shore Owner LLC is the same as in paragraph 2.B. above. Regardless of any future transfer of the Property, Related BIT 500 Lake Shore Owner LLC shall remain a Holder of this Environmental Covenant. Related BIT 500 Lake Shore Owner LLC is to be identified as both Grantee and Grantor for purposes of indexing.

4. **Agencies**. The Illinois EPA and the U.S. EPA are "Agencies" within the meaning of Section 2(2) of UECA. The Agencies have approved the environmental response project described in paragraph 5 below and may enforce this Environmental Covenant pursuant to Section 11 of UECA.

5. **Environmental Response Project and Administrative Record.**

A. This Environmental Covenant arises under an environmental response project as defined in Sections 2(5)(B) and (D) of UECA.

B. The Property has been designated the Lindsay Light II Operable Unit 18 Site (OU 18) and is part of the Lindsay Light II Site. The Lindsay Light II Site currently has 20 operable units. The Property, OU 18, has undergone environmental remediation pursuant to an Administrative Settlement Agreement and Order on Consent for Removal Action in *In the Matter of Lindsay Light II Operable Unit 18, 515 North Peshtigo Court, Chicago, IL*, Docket No. V-W-11-C-976 ("Consent Order"), issued under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601 *et. seq.* ("CERCLA") Sections 104, 106(a), 107, and 122. A copy of the Consent Order is attached as Exhibit B.

In 2011-2013, Grantor completed all Work at OU 18 as defined in Section III of the Consent Order and required by Section VIII of the Consent Order including radiologically screening portions of the Site in 18-inch lifts to identify soil in excess of the clean-up criteria of 7.1 picocuries per gram (pCi/g) total radium. Grantor performed this Work pursuant to the U.S. EPA-approved Work Plan attached as Exhibit C. Grantor did not radiologically screen the entire OU 18 Site because it did not undertake construction excavation at all portions of the OU 18

Site. U.S. EPA issued a Completion Letter dated September 30, 2013, which is attached as Exhibit D. Activity and use limitations (Institutional Controls in the form of a Deed Restriction) are required under Section X of the Consent Order if, upon completion of the Work required under the Consent Order, any portion of the OU 18 Site is not radiologically surveyed in 18-inch lifts.

All known soil contamination identified in excess of the clean-up criteria has been excavated and transported off-site for disposal. While there may not remain any radiologically contaminated soil at the Property, this Environmental Covenant shall operate to fulfill the requirements of Section X of the Consent Order which requires a Deed Restriction/Institutional Contract Document to apply to any portion of the Site that is not radiologically surveyed in 18-inch lifts. The Activity and Use Limitations described in paragraph 7 below are required to protect construction laborers, utility workers and the public that may be exposed to elevated levels of thorium if any portion of the OU 18 Site that was not radiologically surveyed in 18-inch lifts is ever excavated without the proper radiation monitoring and management and disposal of radioactively contaminated materials.

C. Grantor wishes to cooperate fully with the Agencies in the implementation, operation, and maintenance of the terms of this Environmental Covenant at the OU 18 Site.

D. The Administrative Record for the response actions at the OU 18 Site (including the environmental response project at the Property) is maintained at the U.S. EPA Superfund Record Center, 7th Floor, 77 West Jackson Boulevard, Chicago, Illinois 60604. Persons may also contact FOIA Officer, 1021 N. Grand Avenue East, P.O. Box 19276, Springfield, IL 62794-9276 for the Administrative Record or other information concerning the Property.

6. **Grant of Covenant. Covenant Runs With The Land**. Grantor creates this Environmental Covenant pursuant to UECA so that the Activity and Use Limitations, and associated terms and conditions set forth herein shall "run with the land" in accordance with Section 5(a) of UECA and shall be binding on Grantor, its heirs, successors and assigns, and on all present and subsequent fee owners (hereafter each an "Owner"), or other persons acquiring an interest in the real estate underlying the Site.

7. **Activity and Use Limitations**. The following Activity and Use Limitations apply to the use of the Property:

A. The Consent Order defines "Uninvestigated Site Area" as any portion of the Site which is not radiologically surveyed in 18-inch lifts to native sand in accordance with the Work Plan or any portion of the site where any known contamination will remain after completion of the Work.

B. Grantor has attached hereto and submitted to U.S. EPA the legal description (Exhibit A) and elevation information on a map of the Uninvestigated Site Area (Exhibit E) documenting and demonstrating those areas of the Property which were not investigated in 18-inch lifts. All known soil contamination identified in excess of the clean-up criteria has been excavated and transported off-site for disposal.

C. Except as provided in a work plan approved in writing by U.S. EPA, disturbing, exposing and intruding upon soils in the Uninvestigated Site Area is prohibited.

D. Prior to disturbing, exposing or intruding upon the soils in the Uninvestigated Site Area, the Owner at the time of the proposed soil disturbance, exposure or intrusion shall notify U.S. EPA both by telephone and in writing of plans to work in the Uninvestigated Site Area at least 72 hours prior to (but no more than 21 calendar days in advance of) commencing such activities. When material containing total radium (Ra-226 +Ra-228) exceeding 7.1 pCi/g is identified, the Owner at that time shall provide a letter report to U.S. EPA explaining how work was conducted in accordance with an approved work plan within 60 days of completion of the work.

8. **Right of Access**. Grantor consents to officers, employees, contractors, and authorized representatives of the Holder and U.S. EPA entering and having continued access at reasonable times to the Property for the purpose of conducting any activity related to the Consent Order.

Nothing in this document shall limit or otherwise affect U.S. EPA's rights of entry and access or U.S. EPA's and Illinois EPA's authority to take response actions under CERCLA, RCRA or other applicable federal and state laws.

9. **Reserved rights of Grantor**. Grantor hereby reserves unto itself, its successors, and assigns, including heirs, lessees and occupants, all rights and privileges in and to the use of the Property which are not incompatible with the Activity and Use Limitations identified herein.

10. **No Public Access and Use**. No right of access or use by the general public to any portion of the Property is conveyed by this instrument.

11. **Future Conveyances, Notice and Reservation**.

A. Grantor or transferee, if applicable, shall include in any future instrument conveying any interest in any portion of the real estate underlying the Site, including but not limited to deeds and mortgages but excluding (i) tenant leases, and (ii) with respect to any condominium unit or units created on the Site, any deed conveying title to a condominium unit or mortgage creating a lien on such condominium unit, a notice and reservation which is in substantially the following form:

THE INTEREST CONVEYED HEREBY IS SUBJECT TO AND GRANTOR SPECIFICALLY RESERVES THE ENVIRONMENTAL COVENANT EXECUTED UNDER THE UNIFORM ENVIRONMENTAL COVENANTS ACT (UECA) AT 765 ILCS CH. 122 RECORDED IN THE OFFICIAL PROPERTY RECORDS OF COOK COUNTY, ILLINOIS ON _____ AS DOCUMENT NO. _____, IN FAVOR OF AND ENFORCEABLE BY GRANTOR AS A UECA HOLDER, THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY AS A UECA HOLDER AND THE U.S. ENVIRONMENTAL PROTECTION AGENCY AS A UECA AGENCY.

B. Grantor or transferee, if applicable, shall notify Illinois EPA and U.S. EPA in writing within ten days after each conveyance of an interest in the real estate underlying the Site or any portion thereof, excluding tenant leases or conveyance or mortgage of any condominium unit or units created on the Site. The notice shall include the name, address, and telephone number of the transferee, a copy of the deed or other documentation evidencing the conveyance, and a survey map that shows the boundaries of the property being transferred.

12. Enforcement and Compliance.

A. Civil Action for Injunction or Equitable Relief. This Environmental Covenant may be enforced through a civil action for injunctive or other equitable relief for any violation of any term or condition of this Environmental Covenant, including violation of the Activity and Use Limitations under Paragraph 7 and denial of Right of Access under Paragraph 8. Such an action may be brought individually or jointly by:

i. the Illinois Environmental Protection Agency
ii. the Holders of the Environmental Covenant; and
iii. U.S. Environmental Protection Agency.

B. Other Authorities Not Affected. No Waiver of Enforcement. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA. Nothing in this Environmental Covenant affects Illinois EPA's or U.S. EPA's authority to take or require performance of response actions to address releases or threatened releases of hazardous substances or pollutants or contaminants at or from the Property, or to enforce the Consent Order. Enforcement of the terms of this instrument shall be at the discretion of the Holders, the U.S. EPA and Illinois EPA, and any forbearance, delay or omission to exercise its rights under this instrument in the event of a breach of any term of this instrument shall not be deemed to be a waiver by the Holders, U.S. EPA, or Illinois EPA of such term or of any subsequent breach of the same or any other term, or of any of the rights of the Holders, U.S. EPA, or Illinois EPA.

C. Former Owners And Interest Holders Subject to Enforcement. An Owner, or other person that holds any right, title or interest in or to the Property, remains subject to enforcement with respect to any violation of this Environmental Covenant by the Owner or other person which occurred during the time when the Owner or other person was bound by this Environmental Covenant regardless of whether the Owner or other person has subsequently conveyed the fee title, or other right, title or interest, to another person.

13. Waiver of Certain Defenses. This Environmental Covenant may not be extinguished, limited, or impaired through issuance of a tax deed, foreclosure of a tax lien, or application of the doctrine of adverse possession, prescription, abandonment, waiver, lack of enforcement, or acquiescence, or similar doctrine as set forth in Section 9 of UECA.

14. Representations and Warranties. Grantor hereby represents and warrants to the Illinois EPA, U.S. EPA and any other signatories to this Environmental Covenant that, at the time of

execution of this Environmental Covenant, that the Grantor is lawfully seized in fee simple of the Property, that the Grantor has a good and lawful right and power to sell and convey it or any interest therein, that the Property is free and clear of encumbrances, other than those interests and encumbrances as reflected in the Title Policy attached as Exhibit F, and that the Grantor will forever warrant and defend the title thereto and the quiet possession thereof. After recording this instrument, Grantor will provide a copy of this Environmental Covenant to all holders of record of the encumbrances including those entities noted in Exhibit F.

15. **Amendment or Termination**. Except the Illinois EPA and U.S. EPA, all Holders and other signers waive the right to consent to termination of the Environmental Covenant. This Environmental Covenant may be amended by consent only if the amendment is signed by the Illinois EPA, U.S. EPA and the then current fee simple Owner of the Property. If Grantor no longer owns the Property at the time of proposed amendment or termination, Grantor waives the right to consent to an amendment or termination of the Environmental Covenant, provided that in no event shall an amendment agreed to by a subsequent Owner be binding on Grantor to the extent that it alters, changes or expands upon Grantor's obligations or liability. U.S. EPA together with Illinois EPA may terminate this Environmental Covenant, in whole or in part, in writing, as authorized by law. If requested by the U.S. EPA and Illinois EPA, such writing will be executed by the then current Owner in recordable form and recorded with the Recorder of Deeds, Cook County, Illinois. The then current Owner of the Property may only modify or terminate the requirements of the Environmental Covenant and the above restrictions in whole or in part, in writing, with the prior written approval of U.S. EPA and Illinois EPA. The then current Owner of the Property may seek to modify or terminate, in whole or in part, the restrictions by submitting to U.S. EPA and Illinois EPA, for approval, a written application that identifies each such term and restriction to be terminated or modified, describes the terms of each proposed modification and includes proposed revision(s) to the Environmental Covenant. Each application for termination or modification of any restriction shall include a demonstration that the requested termination or modification will not interfere with, impair or reduce protection of human health and the environment. If U.S. EPA together with the Illinois EPA makes a determination that an application satisfies the requirements of this Paragraph, including the criteria specified above, U.S. EPA will notify the then current Property Owner in writing. If U.S. EPA does not respond in writing to a request to change land use within 90 days of its receipt of that request, unless Grantor agrees to extend this period beyond 90 days, U.S. EPA and Illinois EPA may be deemed to have denied the request. If a modification to or termination of restriction is approved, the then current Property Owner shall record the revised Environmental Covenant as approved by U.S. EPA and Illinois EPA, with the Recorder of Deeds, Cook County, Illinois and shall send copies to all parties in accordance with Paragraph 17.C.

16. **Notices**. Except for the annual electronic compliance reporting required in Paragraph 18.A. below, any notice, demand, request, consent, approval, or communication that either party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantor:

Related BIT 500 Lake Shore Owner LLC
c/o Related Midwest
350 W. Hubbard Street, Suite 300
Chicago, IL 60654
Attn: Don Biernacki

To Holder:

Related BIT 500 Lake Shore Owner LLC
c/o Related Midwest
350 W. Hubbard Street, Suite 300
Chicago, IL 60654
Attn: Don Biernacki

To Agencies:

Illinois Environmental Protection Agency
Chief, Bureau of Land
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

U.S. Environmental Protection Agency
Superfund Division Director
77 West Jackson Boulevard
Chicago, IL 60604

17. **Recording and Notice of Environmental Covenant, Amendments and Termination**.

A. **The Original Environmental Covenant.** An Environmental Covenant must be recorded in the Office of the Recorder or Registrar of Titles of the county in which the property that is the subject of the Environmental Covenant is located. Within 30 days after the Illinois EPA and U.S. EPA (whichever is later) sign and deliver to Grantor this Environmental Covenant, the Grantor shall record this Environmental Covenant in the office of the County Recorder or Registrar of Titles for the County in which the Property is located.

B. **Termination, Amendment or Modification.** Within 30 days after Illinois EPA and U.S. EPA (whichever is later) sign and deliver to Owner any termination, amendment or modification of this Environmental Covenant, the Owner shall record the amendment, modification, or notice of termination of this Environmental Covenant in the office of the County Recorder or Registrar of Titles in which the Property is located.

C. Providing Notice of Covenant, Termination, Amendment or Modification. Within 30 days after recording this Environmental Covenant, the Grantor shall transmit a copy of the Environmental Covenant in recorded form to:

i. the Illinois EPA;
ii. the U.S. EPA;
iii. each person holding a recorded interest in the Property, including those interests reflected in the Title Policy attached in Exhibit F;
iv. each person in possession of the Property, excepting any lessees; and
v. the City of Chicago, Law Department.

Within 30 days after recording a termination, amendment or modification of this Environmental Covenant, the Owner shall transmit a copy of the document in recorded form to the persons listed in items i to v above.

18. Compliance Reporting:

A. The Owner shall submit to U.S. EPA on an annual basis an electronic mail notice confirming compliance with the Activity and Use Limitations provided in Paragraph 7. The electronic mail notice shall be submitted to both r5_sfrecords@epa.gov and r5webmaster@epa.gov or other subsequent electronic mail address as instructed by U.S. EPA. The electronic mail subject line shall include "Lindsay Light Site." The electronic mail shall be submitted on the first July 1 that occurs at least six months after the effective date of this Environmental Covenant, and on each succeeding July 1 thereafter whether or not Grantor, its contractors, representatives or agents have disturbed, exposed or intruded upon soils in the Uninvestigated Site Area. Because Illinois EPA has not had involvement at the Site, the Owner need not submit the annual compliance reporting to Illinois EPA.

B. Owner also shall notify the Illinois EPA and U.S. EPA in writing as soon as possible of any actions or conditions that would constitute a breach of the Activity and Use Limitations in Paragraph 7.

19. General Provisions.

A. Controlling law: This Environmental Covenant shall be construed according to and governed by the laws of the State of Illinois and the United States of America.

B. Liberal construction: Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed in favor of the grant to effect the purpose of this instrument and the policy and purpose of the environmental response project and its authorizing legislation. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

C. **No Forfeiture**: Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

D. **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.

E. **Captions**: The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

20. **Effective Date**. This Environmental Covenant is effective on the date of acknowledgement of the signature of the Illinois EPA and U.S. EPA, whichever is later.

21. **List of Exhibits.**

Exhibit A – Legal Description of the Property
Exhibit B – Consent Order
Exhibit C – USEPA Approved Work Plan
Exhibit D – Completion Letter
Exhibit E – Map of Uninvestigated Site Area
Exhibit F – Title Policy

[Signature Pages to follow]

THE UNDERSIGNED REPRESENTATIVE OF THE GRANTOR REPRESENTS AND CERTIFIES THAT HE/SHE IS AUTHORIZED TO EXECUTE THIS ENVIRONMENTAL COVENANT.

IN WITNESS WHEREOF, THIS INSTRUMENT HAS BEEN EXECUTED ON THE DATES INDICATED BELOW:

FOR THE GRANTOR:

RELATED BIT 500 LAKE SHORE OWNER LLC

By: Related BIT 500 Lake Shore Company LLC, sole member

By: Related 500 Lake Shore LLC, member

By _____
Its: AUTHORIZED SIGNATORY

State of Illinois)
) SS.
County of Cook)

On December 10, 2013, this instrument was acknowledged before me by Frank Montecinsi of Related BIT 500 Lake Shore Owner LLC.

_____ (signature)
Notary Public
My Commissioner Expires: 3/6/14

OFFICIAL SEAL
KIMBERLY E COLEMAN
NOTARY PUBLIC - STATE OF ILL
MY COMMISSION EXPIRES:03/

FOR THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

By Lisa Bonnett (signature)

_____, Director
Illinois Environmental Protection Agency

State of Illinois)
)SS.
County of Sangamon)

This instrument was acknowledged before me on Feb. 11TH, 2014, by LISA BONNETT, the Director of the Illinois Environmental Protection Agency, a state agency, on behalf of the State of Illinois.

Sherrie A. Elzinga (signature)
Notary Public
My Commission Expires 12/23/2015

OFFICIAL SEAL
SHERRIE A. ELZINGA
NOTARY PUBLIC STATE OF ILLINOIS
MY COMMISSION EXPIRES 12-23-2015

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

On behalf of the Administrator of the
United States Environmental Protection Agency

By: _____
Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency, Region 5

BERTANNA M. LOUIE
OFFICIAL SEAL
Notary Public, State of Illinois
My Commission Expires
March 15, 2014

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

The foregoing instrument was acknowledged before me this 25th day of FEBRUARY, 2014, by Richard C. Karl, Director, Superfund Division, Region 5 of the United States Environmental Protection Agency.

_____ (signature)
Notary Public
My Commission Expires: March 15, 2014

EXHIBIT A

Legal Description of the Property

The Property is located in the City of Chicago, Cook County, State of Illinois and more particularly described as:

Common Address: 515 North Peshtigo Court, Chicago, Illinois

Legal Description: Block 4 in Cityfront Center, being a subdivision in the North Fraction of Section 10, Township 39 North, Range 14, East of the Third Principal Meridian, according to the plat thereof recorded February 24, 1987 as document 87106320, in Cook County, Illinois

Real Estate Tax Index or Parcel #s: 17-10-218-007 & 17-10-218-008

EXHIBIT B

Consent Order

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 02 2011

REPLY TO THE ATTENTION OF:

S-6J

VIA ELECTRONIC MAIL
AND OVERNIGHT MAIL

Related BIT 500, LLC
c/o Mr. Leo Dombrowski
Attorney at Law
Wildman, Harrold, Allen & Dixon LLP
225 West Wacker Drive, Suite 3000
Chicago, Illinois 60606

Re: Lindsay Light II Site, Operable Unit 18 (05YT)
515 North Peshtigo Court, Chicago, Illinois

Dear Mr. Dombrowski:

Enclosed is the fully executed Lindsay Light II Operable Unit 18 Administrative Settlement and Order on Consent for Removal Action (Settlement Agreement) for the property located at 515 North Peshtigo Court, Chicago, Illinois. This Settlement Agreement is issued pursuant to Sections 106 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended.

Thank you and your client for your cooperation in reaching this Settlement Agreement. We look forward to the cleanup as it will help ensure the protection of construction workers, utility workers and the public in Streeterville. If you have any questions, please call Mary Fulghum at (312) 886-4683 or Cathleen Martwick at (312) 886-7166.

Sincerely,

for Richard C. Karl
Director, Superfund Division

cc: Mr. Gary King, Illinois Environmental Protection Agency Superfund Program Manager

Enclosure

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (50% Postconsumer)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:

Lindsay Light II Operable Unit
515 North Peshtigo Court
Chicago, Illinois

Respondent:

Related BIT 500 Lakeshore Owner, LLC

ADMINISTRATIVE SETTLEMENT
AGREEMENT AND ORDER ON
CONSENT FOR REMOVAL ACTION

Docket No. V-W-11-C-976

Proceeding Under Sections 104, 106(a), 107
and 122 of the Comprehensive
Environmental Response, Compensation,
and Liability Act, as amended,
42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA") and Respondent. This Settlement Agreement provides for the performance of removal actions by Respondent including recording any Environmental Covenant on portions of the Site where radioactive contamination may be present and also the reimbursement of certain response costs incurred by the United States at or in connection with the property designated Lindsay Light Operable Unit ("OU") 18, located at 515 North Peshtigo Court, Chicago, Illinois and that was formerly a parking lot and known as the "Site."

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended ("CERCLA"). This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. U.S. EPA has notified the State of Illinois (the "State") of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. U.S. EPA and Respondent recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondent in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondent does not admit, and retains the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondent agrees to comply with and be bound by the terms of this Settlement Agreement and further agrees that it will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondent and its successors and assigns. Any change in ownership or corporate status of the Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter the Respondent's responsibilities under this Settlement Agreement.

6. Respondent is jointly and severally liable for carrying out all activities required by this Settlement Agreement.

7. Respondent shall ensure that its contractors, subcontractors, and representatives receive a copy of and comply with this Settlement Agreement. Respondent shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

8. Unless otherwise expressly provided herein, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the Exhibits attached hereto and incorporated hereunder, the following definitions shall apply:

a. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq*.

b. "Day" shall mean a calendar day. In computing any period of time under this Settlement Agreement, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

c. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXXI.

d. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

e. "Response Costs" shall mean all costs, including direct and indirect costs, that the United States incurred or incurs reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after April 6, 2011.

f. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

g. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

h. "Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all Exhibits attached hereto (listed in Section XXX). In the event of conflict between this Settlement Agreement and any Exhibit, this Settlement Agreement shall control.

i. "Parties" shall mean U.S. EPA and Respondent.

j. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).

k. "Respondent" shall mean Related BIT 500 Lakeshore Owner, LLC, a limited liability company, organized and existing under the laws of the State of Illinois].

l. "Site" shall mean the Lindsay Light II, Operable Unit 18, 515 North Peshtigo Court that was a parking lot in Chicago, Cook County, Illinois and depicted generally on the map attached as Exhibit A.

m. "State" shall mean the State of Illinois.

n. "Uninvestigated Site Area" shall mean any portion of the Site which is not radiologically surveyed in 18-inch lifts to native sand in accordance with the Work Plan or any portion of the site where any known contamination will remain after completion of the Work.

o. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

p. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any "hazardous material" under Section 3.125 of the Illinois Environmental Protection Act, 415 ILCS 5/3.125 (2002).

q. "Work" shall mean all activities the Respondent is required to perform under this Settlement Agreement.

r. "Work Plan" shall mean the U.S. EPA-approved work plan including schedule described in Section VIII Work to be Performed.

IV. FINDINGS OF FACT

9. Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

a. The Site is located at 515 North Peshtigo Court in Chicago, Illinois.

b. The Site is located one city block East of Lindsay Light II, 316 E. Illinois Street where the Lindsay Light Company ("Lindsay Light") refined monazite ore to produce thorium nitrate and manufacture thorium-impregnated gas mantles.

c. Beginning in 1904, Lindsay Light refined thorium and manufactured gas lights and gas mantles for residential and commercial use at several locations in the Streeterville area of Chicago. Lindsay's thorium refining process resulted in a waste known as mill tailings that was apparently used as fill material or otherwise came to be located in the Streeterville area.

d. The Lindsay Light mill tailings contain thorium-232 which is a radionuclide that is a hazardous substance under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

e. Thorium-232 has a half-life of 14 billion years, and decays by alpha emission, with accompanying gamma radiation. Thorium-232 is the top of a long decay series that contains key radionuclides such as radium-228, its direct decay product, and radon-220.

f. U.S. EPA designated the initial thorium removal action at the 316 East Illinois Street that was the former location of Lindsay Light's ore processing plant as the Lindsay Light II Removal Site. Following that initial removal action, during which approximately 24,000 cubic yards of thorium contaminated soils were removed, U.S. EPA has identified 17 other removal action operable units associated with the Lindsay Light II facility in addition to 630 North McClurg Site and, to date, approximately 50,000 cubic yards of thorium contaminated material associated with the Lindsay Light II facility have been removed from the Streeterville area.

g. In addition to the thorium contamination discovered at 316 East Illinois Street, which is one city block South of the Site, U.S. EPA also has identified subsurface thorium contamination at the adjacent city block immediately south of the Site (Lindsay Light II, OU 10, Kraft Building) and in the city rights-of-way near the intersection of Illinois and Peshtigo.

h. On April 6, 2011, Respondent notified U.S. EPA that Respondent expects to begin to excavate the Site by July 2011 and a planning period of at least 6 months does not exist.

i. On August 29, 2011, Respondent notified U.S. EPA that while excavating an exploratory pothole at the Site, Respondent encountered elevated gamma readings indicative of thorium contamination.

j. Construction laborers, utility workers and the public may be exposed to elevated levels of thorium if the Site is excavated without proper radiation monitoring and management and disposal of radioactively contaminated materials.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

10. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA has determined that:

a. The Site is a part of a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Lindsay Light II facility, as identified in the Findings of Fact above, includes a "hazardous substance" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. The Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. The Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is jointly and severally liable for performance of response action and for response costs incurred and to be incurred at the Site.

i. Respondent is the "owner" and/or "operator" of the Site, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(22) and 101(8) of CERCLA, 42 U.S.C.§§ 9601(22) and 9601(8).

f. The conditions present at the facility constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended ("NCP"), 40 C.F.R. §300.415(b)(2). These factors include, but are not limited to, the following:

i. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the Site due to the existence of elevated levels of thorium found in subsurface soils that will be exposed by the removal of overburden and excavation.

ii. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate; this factor is present at the facility due to the existence of elevated levels of thorium in subsurface soils that will be exposed by the removal of overburden and excavation.

iii. Other situations or factors that may pose threats to public health or welfare or the environment; this factor is present at the facility due to the existence of elevated levels of thorium in subsurface soils that may be unearthed during construction activities that may expose construction laborers, utility workers and the public to excessive levels of thorium.

g. The removal action, including Environmental Covenants, required by this Settlement Agreement is necessary to protect the public health, welfare, or the environment, and, if carried out in compliance with the terms of this Settlement Agreement, will be consistent with the NCP, 42 U.S.C. §§ 9604(a)(1) and 9622(a).

VI. SETTLEMENT AGREEMENT AND ORDER

Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondent shall comply with all provisions of this Settlement Agreement, including, but not limited to, all Exhibits to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

11. Respondent has selected a supervising contractor known as AECOM to perform the Work at the Site. Respondent has provided U.S. EPA with the qualifications of AECOM. If Respondent contracts with any other contractor(s) or subcontractor(s) to perform Work, Respondent must provide notice of the name(s) and qualification(s) of such person(s) at least 5 business days prior to commencement of such Work. U.S. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondent. If U.S. EPA disapproves of a selected contractor, Respondent shall retain a different contractor and shall notify U.S. EPA of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval. The supervising contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the contractor's Quality Management Plan ("QMP"). The QMP should be prepared consistent with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by U.S. EPA.

12. Respondent has designated Steve Kornder of AECOM as the Project Coordinator who shall be responsible for administration of all actions by Respondent required by this Settlement Agreement. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. U.S. EPA retains the right to disapprove of any subsequent designated Project Coordinator. If U.S. EPA disapproves of a designated Project Coordinator, Respondent shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number, and qualifications within 4 business days following U.S. EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondent.

13. U.S. EPA has designated Verneta Simon of the Emergency Response Branch, Region 5, as its On-Scene Coordinator ("OSC") and Gene Jablonowski, Remedial Project Manager, of the Remedial Response Branch, Region 5 as its alternate OSC. Except as otherwise provided in this Settlement Agreement, Respondent shall direct all submissions required by this Settlement Agreement to the OSCs in accordance with Section XXIX Notices and Submissions. Respondent is encouraged to make its submissions to U.S. EPA on recycled paper (which includes significant post consumer waste paper content where possible) and using two-sided copies.

14. U.S. EPA and Respondent shall have the right, subject to Paragraph 11, to change their respective designated OSCs or Project Coordinator. U.S. EPA shall notify the Respondent, and Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

15. Respondent shall perform, at a minimum, the following removal activities:

a) Develop a Work Plan for the radiological assessment of the site.

b) Develop and implement a site health and safety plan.

c) Develop and implement an air monitoring plan.

d) Develop and implement site security measures.

e) Conduct land surveying to the extent necessary locate all property boundaries, special features (pipes, storage tanks, etc.), and any sample locations.

f) Conduct radiation surveillance and sampling in compliance with the U.S. EPA approved work plan.

g) Collect soil samples and analyze for radionuclide content and RCRA characteristics. These results will then be used by the Respondent to correlate subsurface radiation levels and radionuclide content, and to determine the disposal facility.

h) Conduct off-site radiological surveying and sampling as necessary should contamination be discovered within the sidewalk rights-of-ways surrounding the Site and, at a minimum implement 40 C.F.R. § 192 if deemed necessary.

i) Based upon soil results, remove, transport and dispose of all characterized or identified hazardous substances, pollutants, wastes or contaminants at a RCRA/CERCLA approved disposal facility in accordance with the U.S. EPA off-site rule.

j) The soil clean-up criterion is 7.1 picoCuries per gram (pCi/g) total radium (Ra-226 + Ra-228) including background, unless analyses indicate the existence of additional contaminants, hazardous substances, pollutants or waste.

k) If any portion of the Site is not radiologically surveyed in 18-inch lifts or if any known contamination will remain after completion of the Work then, using elevation and Global Positioning System (GPS) coordinates, Respondent shall identify and depict all locations that were not radiologically surveyed in 18-inch lifts or where any known contamination will remain after completion of the Work and shall implement U.S. EPA-approved Environmental Covenants or other U.S. EPA-approved institutional controls pertaining to the Site.

16. Work Plan and Implementation.

a. On July 19, 2011, Respondent submitted to U.S. EPA for approval a draft Work Plan, including a schedule, for performing the removal action generally described in Paragraph 15 above.

b. U.S. EPA may approve, disapprove, require revisions to, or modify the draft Work Plan in whole or in part. If U.S. EPA requires revisions, Respondent shall submit a revised draft Work Plan within 7 business days of receipt of U.S. EPA's notification of the required revisions. Respondent shall implement the Work Plan as approved in writing by U.S. EPA in accordance with the schedule approved by U.S. EPA. Once approved, or approved with modifications, the Work Plan, the schedule, and any subsequent modifications shall be incorporated into and become fully enforceable under this Settlement Agreement.

c. Respondent shall not commence any Work except in conformance with the terms of this Settlement Agreement. Respondent shall not commence implementation of the Work Plan developed hereunder until receiving written U.S. EPA approval pursuant to Paragraph 16(b).

17. Health and Safety Plan. Respondent has submitted for U.S. EPA review and comment a plan that ensures the protection of the public health and safety during performance of on-Site work under this Settlement Agreement. This plan must be prepared consistent with U.S.

EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations found at 29 C.F.R. Part 1910. If U.S. EPA determines that it is appropriate, the plan shall also include contingency planning. Respondent shall incorporate all changes to the plan recommended by U.S. EPA and shall implement the plan during the pendency of the removal action.

18. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements. Respondent shall prepare a Quality Assurance Project Plan ("QAPP") as part of the Work Plan except in circumstances involving emergency or non-complex removal work. The QAPP should be prepared in accordance with "EPA Requirements for Quality Assurance Project Plans (QA/R-5)" (EPA/240/B-01/003, March 2001), and "EPA Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/600/R-98/018, February 1998).

b. Upon request by U.S. EPA, Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for QA monitoring. Respondent shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify U.S. EPA not less than 3 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA. U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary. Upon request, U.S. EPA shall allow Respondent to take split or duplicate

samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

19. Reporting.

a. Respondent shall submit a written progress report to U.S. EPA concerning actions undertaken pursuant to this Settlement Agreement every 30th day after the date of receipt of U.S. EPA's approval of the Work Plan until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC. These reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondent shall submit 3 copies of all plans, reports or other submissions required by this Settlement Agreement, or any approved work plan. Upon request by U.S. EPA, Respondent shall submit such documents in electronic form.

c. Respondent shall prior to the transfer or conveyance of any interest in real property at the Site (excluding condominium units or parking spaces), give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to U.S. EPA of the transfer or conveyance, including the name and address of the transferee. Respondent also agrees to require that its successors comply with the immediately preceding sentence and Sections IX (Site Access), X (Environmental Covenant/Institutional Control Document) and XI (Access to Information).

20. Final Report. Within 60 calendar days after completion of all Work required by Section VIII of this Settlement Agreement, Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal Procedures: Removal Response Reporting – POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (*e.g.*, manifests, invoices, bills, contracts, and permits). The final report shall also

include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

21. Off-Site Shipments.

a. Radioactive Waste Material. Respondent will transport radioactive waste material to a disposal facility licensed to accept radioactive Waste Material from the Site. Prior to the initial shipment of radioactive Waste Material originating from the Site, Respondent shall provide written notification of such shipment to the appropriate state environmental official and to the On-Scene Coordinators.

i. Respondent shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. Other Waste Material. If Respondent encounters any hazardous substances that are not radioactively contaminated in the course of conducting the Work, then before shipping any such non-radioactively contaminated hazardous substances, pollutants, or contaminants from the Site to an off-site location, Respondent shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondent shall only send hazardous substances, pollutants, or contaminants from the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

i. Prior to the initial shipment of non-radioactively contaminated Waste Material originating from the Site, Respondent shall provide written notification of such shipment to the appropriate state environmental official and to the On-Scene Coordinators. Settling Defendant shall

comply with the terms and conditions of the notification requirements of Paragraph 21.a. i. for each such shipment of non-radioactive hazardous substances, pollutants, and contaminants.

ii. The identity of any facility and state receiving the non-radioactively contaminated Waste Material will be determined by Respondent following the award of the contract for the removal action. Respondent shall provide the information required by Paragraph 21(a) and 21(b) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

IX. SITE ACCESS

22. If the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by the Respondent, Respondent shall, commencing on the Effective Date, provide U.S. EPA, the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

23. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondent, Respondent shall use its best efforts to obtain all necessary access agreements within 10 business days after the Effective Date, or as otherwise specified in writing by the OSC. Respondent shall immediately notify U.S. EPA if after using its best efforts it is unable to obtain such agreements. For purposes of this Paragraph, "best efforts" include the payment of reasonable sums of money in consideration of access. Respondent shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondent shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XVI (Payment of Response Costs).

24. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ENVIRONMENTAL COVENANT/ INSTITUTIONAL CONTROL DOCUMENT

25. Post-Removal Site Control. Consistent with Section 300.415(*l*) of the NCP and OSWER Directive No. 9360.2-02, upon completion of all Work required by Section VIII of this Settlement Agreement, if any portion of the Site is not radiologically surveyed in 18-inch lifts to native sand in accordance with the approved Work Plan or if any known contamination will remain after completion of the Work then:

a. In accordance with the Work Plan, Respondent shall submit to U.S. EPA a map of the Uninvestigated Site Area showing elevations and GPS coordinates of actual or potential thorium-contaminated Waste Material; and

b. If Respondent, its contractors, representatives or agents disturb, expose or intrude upon the soils in the Uninvestigated Site Area, Respondent, its contractors, representatives and agents shall notify U.S. EPA, both by telephone and in writing, of plans to work in the Uninvestigated Site Area. Respondent shall notify U.S. EPA at least 72 hours prior to (but no more than 21 calendar days in advance of) commencing such activities. If material containing exceeding 7.1 pCi/g (total radium (Ra-226 +Ra-228) is identified, the Respondent shall provide a letter report to U.S. EPA explaining how the work was conducted in accordance with the Work Plan within 60 days of completion of the work.

26. Within thirty (30) days of the completion of all Work required by Section VIII of the Settlement Agreement, if any portion of the Site is not radiologically surveyed in 18-inch lifts to native sand in accordance with the Work Plan or if any known contamination will remain after completion of the Work, Respondent shall record, with the Recorder of Deeds, Cook County, Illinois, an Environmental Covenant, pursuant to the Uniform Environmental Covenants Act, 765 ILCS Ch. 22 (UECA) or other institutional control document ("Environmental Covenant"), that U.S. EPA has approved in writing for this Site, and Respondent agrees that every subsequent deed or conveyance or transfer of any property interest instrument will be subject to the Environmental Covenant. The Respondent further agrees, as described in Paragraph 27, that U.S. EPA must pre-approve any modification (including any deletion) of that language in the Environmental Covenant.

a. In the event of a conveyance or transfer of property interest, Respondent's obligations under this Settlement Agreement, including, but not limited to, its obligation to provide or secure access and institutional controls, as well as to abide by such institutional controls pursuant to this Section (Environmental Covenants/Institutional Control Document), shall continue to be met by Respondent unless otherwise agreed to by the U.S. EPA in writing. In no event shall the conveyance or transfer of property interest release or otherwise affect the

liability of Respondent to comply with all provisions of this Settlement Agreement unless otherwise agreed to among the Parties hereto in writing.

c. The intent of Respondent is to record an Environmental Covenant that is applicable to all subsequent owners of the Site. The Environmental Covenant will apply to any portion of the Site that is not radiologically surveyed in 18-inch lifts or where any known contamination will remain after completion of the Work. The Environmental Covenant shall provide the following:

1) subject to Paragraph 27, a restriction that "runs with the land" regulating the disturbance of, exposure of or intrusion upon any portion of the Uninvestigated Site Area;

2) the right to enforce said restrictions;

3) a right of access to the Site;

4) prior notice of disturbance, exposure, intrusion, or excavation of the soils in any portion of the Site that is not radiologically surveyed in 18-inch lifts or where any known contamination will remain; and

5) an agreement that when soils are disturbed, exposed, intruded or excavated in those areas, those activities are conducted in accordance with the Work Plan.

d. The Respondent agrees that every subsequent deed or other instrument conveying or transferring a property interest in the real estate underlying the Site or any portion thereof shall be subject to the Environmental Covenant.

27. U.S. EPA may terminate the restrictions in Paragraphs 25 and 26, in whole or in part, in writing, as authorized by law. If requested by the U.S. EPA, such writing will be executed by the Respondent in recordable form and recorded with the Recorder of Deeds, Cook County, Illinois. Respondent may modify or terminate the above restrictions in whole or in part, in writing, with the prior written approval of U.S. EPA. Respondent may seek to modify or terminate, in whole or in part, the restrictions by submitting to U.S. EPA, for approval, a written application that identifies each such restriction to be terminated or modified, describes the terms of each proposed modification and includes proposed revision(s) to the Environmental Covenant and institutional control document described in this Section X (Environmental Covenants/Institutional Control Document). Each application for termination or modification of any restriction shall include a demonstration that the requested termination or modification will not interfere with, impair or reduce protection of human health and the environment. If U.S.

EPA makes a determination that an application satisfies the requirements of this Paragraph, including the criteria specified above, U.S. EPA will notify Respondent in writing. If U.S. EPA does not respond in writing to a request to change land use within 90 days of its receipt of that request, unless Respondent agrees to extend this period beyond 90 days, U.S. EPA may be deemed to have denied the request. If a modification to or termination of restriction is approved, Respondent shall record the revised Environmental Covenant as approved by U.S. EPA, with the Recorder of Deeds, Cook County, Illinois.

XI. ACCESS TO INFORMATION

28. Respondent shall provide to U.S. EPA, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondent shall also make available to U.S. EPA, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

29. Respondent may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA, or if U.S. EPA has notified Respondent that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondent.

30. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondent asserts such a privilege in lieu of providing documents, Respondent shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

31. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydro geologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XII. RECORD RETENTION

32. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVII (Notice of Completion of Work), Respondent shall also instruct its contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

33. At the conclusion of this document retention period, Respondent shall notify U.S. EPA at least 60 days prior to the destruction of any such records or documents, and, upon request by U.S. EPA, Respondent shall deliver any such records or documents to U.S. EPA. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

34. Respondent hereby certifies individually that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by U.S. EPA or the State and that it has fully complied and will fully comply with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XIII. COMPLIANCE WITH OTHER LAWS

35. Respondent shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements ("ARARS") under federal environmental or state environmental or facility siting laws. Respondent shall identify ARARS in the Work Plan subject to U.S. EPA approval.

XIV. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

36. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondent shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XVI (Payment of Response Costs).

37. In addition, in the event of any release of a hazardous substance from the Site, Respondent shall immediately notify the OSC at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondent shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

XV. AUTHORITY OF ON-SCENE COORDINATOR

38. The OSC shall be responsible for overseeing Respondent's implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XVI. PAYMENT OF RESPONSE COSTS

39. Payment for Response Costs.

a. Respondent shall pay U.S. EPA all Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondent a bill requiring payment that consists of an Itemized Cost Summary. Respondent shall make all payments within 30 calendar days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 41 of this Settlement Agreement. Payment shall be made to U.S. EPA by Electronic Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondent by U.S. EPA Region 5, and shall be accompanied by a statement identifying the name and address of the party making payment, the Lindsay Light II Site OU 18 name, and Site/Spill ID Number 05YT, and the U.S. EPA docket number for this action.

b. At the time of payment, Respondent shall send notice that such payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590 and to Mary L. Fulghum, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590.

c. All amounts to be paid by Respondent pursuant to Paragraph 39 shall be deposited in the Lindsay Light II Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

40. In the event that the payment for Response Costs is not made within 30 days of Respondent's receipt of a bill, Respondent shall pay Interest on the unpaid balance. The Interest on Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XIX.

41. Respondent may dispute all or part of a bill for Response Costs submitted under this Settlement Agreement, only if Respondent alleges that U.S. EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs to U.S. EPA as specified in Paragraph 39 on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 39(b) above. Respondent shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which it prevailed from the escrow funds plus interest within 20 calendar days after the dispute is resolved.

XVII. DISPUTE RESOLUTION

42. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

43. If Respondent objects to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Response Costs, it shall notify U.S. EPA in writing of its objection(s) within 10 calendar days of such action, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondent's position, and all supporting documentation on which such party relies. U.S. EPA shall provide its Statement of Position, including supporting documentation, no later than 10 calendar days after receipt of the written notice of dispute. In the event that these 10-day time periods for exchange of written documents may cause a delay in the work, they shall be shortened upon, and in accordance with, notice by U.S. EPA. The time periods for exchange of written documents relating to disputes over billings for response costs may be extended at the sole discretion of U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding paragraph. Upon review of the administrative record, the Director of the Superfund Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement.

44. Respondent's obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XVIII. FORCE MAJEURE

45. Respondent agrees to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any event arising from causes beyond the control of Respondent, or of any entity controlled by Respondent, including but not limited to its contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondent's best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work or increased cost of performance.

46. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondent shall notify U.S. EPA orally within 24 hours of when Respondent first knew that the event might cause a delay. Within 7 calendar days thereafter, Respondent shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondent's rationale for attributing such delay to a *force majeure* event if Respondent intends to assert such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondent an extension of time for performance. Respondent shall have the burden of demonstrating by a preponderance of the evidence that the event is a force majeure, the delay is warranted under the circumstances, and best efforts were exercised to avoid and mitigate the effects of the delay.

47. If U.S. EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, U.S. EPA will notify Respondent in writing of its decision. If U.S. EPA agrees that the delay is attributable to a *force majeure* event, U.S. EPA will notify Respondent in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XIX. STIPULATED PENALTIES

48. Respondent shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraphs 49 and 50 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVIII (*Force Majeure*). "Compliance" by Respondent shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement.

49. Stipulated Penalty Amounts - Work.

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 49(c) (i), ii, or iii:

Violation Per Day	Period of Noncompliance
$500.00	1st through 14th day
$2,000.00	15th through 30th day
$5,000.00	31st day and beyond

b. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 49(c)(iv):

1st Violation- Per Day Penalty	Period of Noncompliance
$ 500.00	1st day
$ 1,000.00	2nd day
$ 1,500.00	3rd through 5th day
$ 3,500.00	6th through 15th day
$ 7,500.00	16th day and beyond

2nd Violation- Per Day Penalty	Period of Noncompliance
$ 1,500.00	1st day
$ 2,250.00	2nd day
$ 3,500.00	3rd through 5th day
$ 5,000.00	6th through 15th
$10,000.00	16th day and beyond

3rd or More Violation Per Day Penalty	Period of Noncompliance
$ 2,500.00	1st day
$ 4,000.00	2nd day
$ 7,500.00	3rd through 5th day
$12,500.00	6th through 15th day
$20,000.00	16th day and beyond

c. Compliance Milestones

i. Payment of Response Costs due 30 days after the Respondent's receipt of U.S. EPA's billing statement.

ii. Recording the Environmental Covenant within 30 calendar days after completion of all Work required by Section VIII of this Settlement Agreement.

iii. Submit to U.S. EPA a draft map and a final revised map of the Uninvestigated Site Area in accordance with the Work Plan.

iv. 72-hour advance notice of intrusive work in Uninvestigated Site Area as required in Paragraph 25b.

50. Stipulated Penalty Amounts - Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents pursuant to Paragraphs 19 and 20:

Violation Per Day	Period of Noncompliance
$250.00	1st through 14th day
$500.00	15th through 30th day
$3000.00	31st day and beyond

51. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondent of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 43 of Section XVII (Dispute Resolution), during the period, if any, beginning on the 21st day after U.S. EPA submits its written statement of position until the date that the Director of the Superfund Division

issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

52. Following U.S. EPA's determination that Respondent has failed to comply with a requirement of this Settlement Agreement, U.S. EPA shall give Respondent written notification of the failure and describe the noncompliance. U.S. EPA may send Respondent a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondent of a violation.

53. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondent's receipt from U.S. EPA of a demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under Section XVII (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check made payable to "U.S. EPA Hazardous Substances Superfund," shall be mailed to U.S. Environmental Protection Agency, Program Accounting & Analysis Section, P.O. Box 70753, Chicago, Illinois 60673, shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Site/Spill ID Number 05YT OU 18, the U.S. EPA Docket Number, and the name and address of the party making payment. Copies of any check paid pursuant to this Section, and any accompanying transmittal letters, shall be sent to U.S. EPA as provided in Paragraph 39(b).

54. The payment of penalties shall not alter in any way Respondent's obligation to complete performance of the Work required under this Settlement Agreement.

55. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 20 days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

56. If Respondent fails to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondent shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 53. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondent's violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(*l*) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(*l*) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement. Should Respondent violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required

actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. §9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. §9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XX. COVENANT NOT TO SUE BY U.S. EPA

57. In consideration of the actions that will be performed and the payments that will be made by Respondent under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondent pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a) for the Work and Response Costs. This covenant not to sue shall take effect upon receipt by U.S. EPA of the Response Costs due under Section XVI of this Settlement Agreement and any Interest or Stipulated Penalties due for failure to pay Response Costs as required by Sections XVI and XIX of this Settlement Agreement. This covenant not to sue is conditioned upon the complete and satisfactory performance by Respondent of its obligations under this Settlement Agreement, including, but not limited to, payment of Response Costs pursuant to Section XVI. This covenant not to sue extends only to Respondent and does not extend to any other person.

XXI. RESERVATIONS OF RIGHTS BY U.S. EPA

58. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

59. The covenant not to sue set forth in Section XX above does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondent with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondent to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of Response Costs;

c. liability for performance of response action other than the Work;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments; and

f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site.

60. Work Takeover. In the event U.S. EPA determines that Respondent have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, U.S. EPA may assume the performance of all or any portion of the Work as U.S. EPA determines necessary. Prior to taking over the Work, U.S. EPA will issue written notice (including electronic mail) to Respondent specifying the grounds upon which such notice was issued and, to the extent U.S. EPA determines there is no imminent or ongoing threat to human health or the environment, the notice will provide Respondent ten days within which to remedy the circumstances giving rise to U.S. EPA's issuance of the notice. Respondents may invoke the procedures set forth in Section XVI (Dispute Resolution) to dispute U.S. EPA's determination that takeover of the Work is warranted under this Paragraph. However, notwithstanding Respondent's invocation of such dispute resolution procedures, and during the pendency of any such dispute, U.S. EPA may in its sole discretion commence and continue a Work Takeover until the earlier of (1) the date that Respondent remedies, to U.S. EPA's satisfaction, the circumstances giving rise to U.S. EPA's issuance of the relevant Work Takeover Notice, or (2) the date that a final decision is rendered in accordance with Paragraph 45 requiring U.S. EPA to terminate such Work Takeover. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Response Costs that Respondents shall pay pursuant to Section XVI (Payment of Response Costs). Notwithstanding any other provision of this Settlement Agreement, U.S. EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XXII. COVENANT NOT TO SUE BY RESPONDENT

61. Respondent covenants not to sue and agrees not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Illinois State Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Site.

These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 59 (b), (c), and (e) - (f), but only to the extent that Respondent's claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

Respondent reserves, and this Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on U.S. EPA's selection of response actions, or the oversight or approval or disapproval of Respondent's plans, reports, other deliverables, work or activities.

62. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIII. OTHER CLAIMS

63. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or U.S. EPA shall not be deemed a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

64. Except as expressly provided in Section XX (Covenant Not to Sue by U.S. EPA), nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondent or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

65. No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIV. CONTRIBUTION

66. a. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondent is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work and Response Costs.

b. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42. U.S.C. § 9613(f)(3)(B), pursuant to which the Respondent has, as of the Effective Date, resolved its liability to the United States for the Work and Response Costs.

c. Nothing in this Settlement Agreement precludes the United States or Respondent from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any persons not parties to this Settlement Agreement. Nothing herein diminishes the right of the United States, pursuant to Section 113(f)(2)and (3), 42 U.S.C. § 9613(f)(2) and (3), to pursue any such persons to obtain additional response costs or response action, and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2).

XXV. INDEMNIFICATION

67. Respondent shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondent agrees to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondent in carrying out activities pursuant to this Settlement Agreement. Neither Respondent nor any such contractor shall be considered an agent of the United States. The Federal Tort Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

68. The United States shall give Respondent notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondent prior to settling such claim.

69. Respondent waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondent shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXVI. INSURANCE

70. At least 10 days prior to commencing any on-Site work under this Settlement Agreement, Respondent shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance with limits of two (2) million dollars and automobile insurance with limits of one (1) million dollars, combined single limit, naming U.S.

EPA as an additional insured. Within the same time period, Respondent shall provide U.S. EPA with certificates of such insurance and a copy of each insurance policy. Respondents shall submit such certificates and copies of policies each year on the anniversary of the Effective Date. In addition, for the duration of the Settlement Agreement, Respondent shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondent in furtherance of this Settlement Agreement. If Respondent demonstrates by evidence satisfactory to U.S. EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondent needs to provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXVII. MODIFICATIONS

71. The OSC may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties.

72. If Respondent seeks permission to deviate from any approved work plan or schedule, Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis. Respondent may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to Paragraph 71.

73. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve Respondent of its obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVIII. NOTICE OF COMPLETION OF WORK

74. When U.S. EPA determines, after U.S. EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, *e.g.*, post-removal site controls, payment of Response Costs, and record retention, U.S. EPA will provide written notice to Respondent. If U.S. EPA determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondent, provide a list of the deficiencies, and require that Respondent modifies the Work Plan if appropriate in order to correct such deficiencies. Respondent shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondent to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXIX. NOTICES AND SUBMISSIONS

75. Whenever, under the terms of this Agreement, notice is required to be given or a document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of this Agreement with respect to U.S. EPA and Respondent.

As to U.S. EPA:

Mary L. Fulghum
Cathleen M. Martwick
Associate Regional Counsel
U.S. EPA (C-14J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

Verneta Simon, P.E.
On-Scene Coordinator
U.S. EPA (SE-6J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

Gene Jablonowski
Project Manager
U.S. EPA (SR-6J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

Vanessa Mbogo
Comptroller's Office
U.S. EPA (MF-10J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

As to Respondent:

c/o Related Midwest
350 W. Hubbard Street
Suite 300
Chicago, Illinois 60610
Attn: Don Biernacki

XXX. INTEGRATION/EXHIBITS

76. This Settlement Agreement and its Exhibit constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following Exhibit is incorporated into this Settlement Agreement:

Exhibit A Site Map.

XXXI. EFFECTIVE DATE

77. This Settlement Agreement shall be effective upon signature of this Settlement by the Director, Superfund Division, U.S. EPA Region 5.

The undersigned representative of Respondent certifies that s/he is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party s/he represents to this document.

Agreed this 30th day of August, 2011.

For Respondent Related BIT 500 Lakeshore Owner LLC:

By: _____
DON BIERNACKI

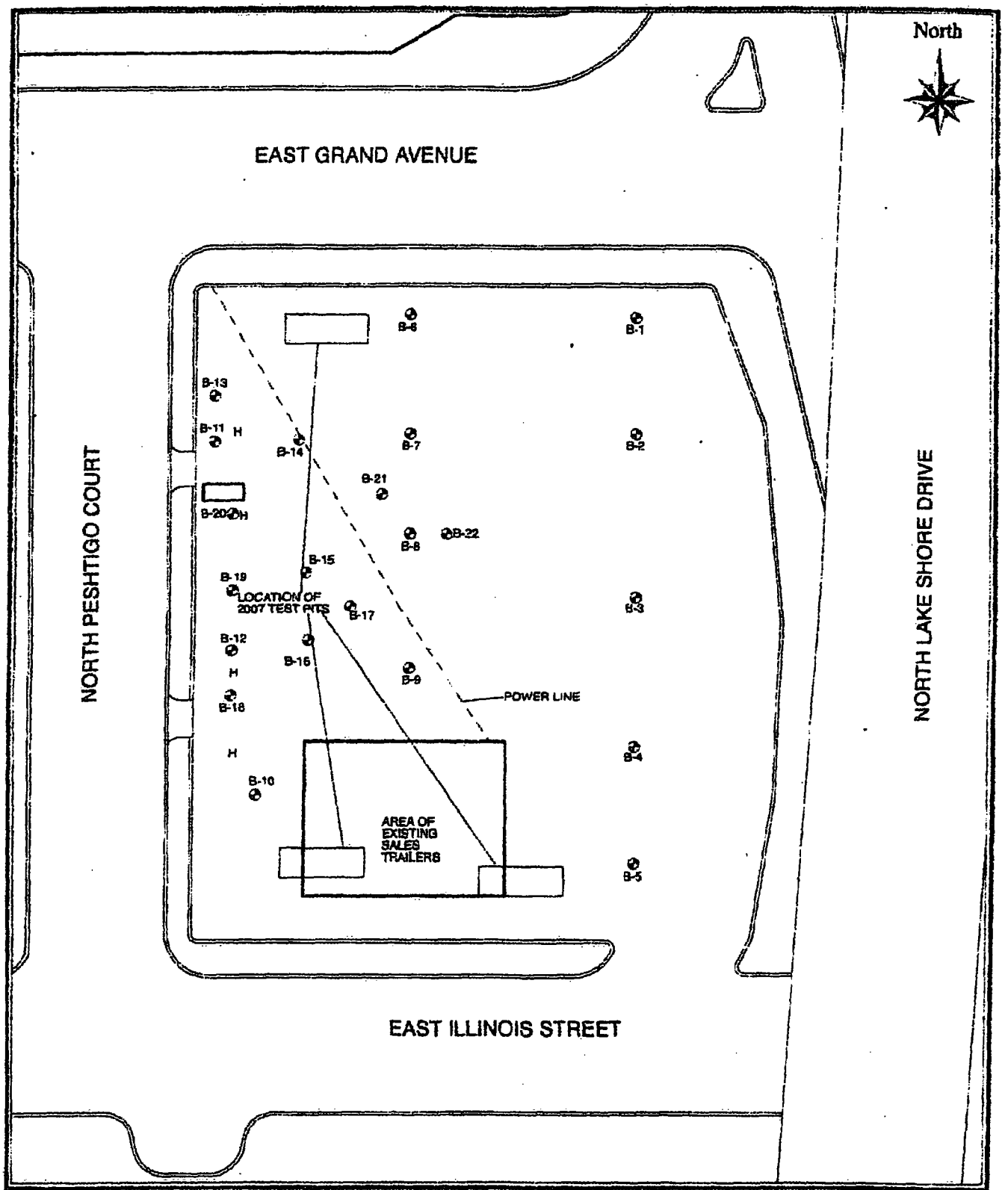
Title: Authorized Representative

IN THE MATTER OF:

Lindsay Light II, OU 18
515 North Peshtigo Court
Chicago, Illinois

It is so ORDERED and Agreed this 2nd day of September, 2011.

BY: _____
Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5



PIONEER
Engineering & Environmental Services, Inc.

Legend:
Approximate Property Line
H=Handicapped Parking
Soil Boring Location

Scale: 1"=40' (0' — 40')
Date: December 2008
Drawn by: Jackson Toomey
Checked by: Joe Kelly
Job No.: 07-1550-103

Exhibit A
Site Map
515 N. Peshtigo Court
Chicago, IL

EXHIBIT C

U.S. EPA approved Work Plan

Prepared for:
515 N. Peshtigo Court
Chicago, IL

Work Plan for Remediation of Radiologically-Contaminated Soil at 515 N. Peshtigo Court

AECOM.
December 2011 (Revised February 2012)
Project No.: 60219374

AECOM

AECOM
750 Corporate Woods Parkway
Vernon Hills, IL 60061

847-279-2500 tel
847-279-2510 fax

May 23, 2012

Ms. Vemeta Simon
U. S. Environmental Protection Agency – Region 5
77 W. Jackson Blvd., SE-5J
Chicago, Illinois 60604

Subject: Work Plan for Remediation of Radiologically-Contaminated Soil, 515 N. Peshtigo Court, Chicago, Illinois, AECOM Project No. 60219374

Dear Ms. Simon:

Enclosed please find the Work Plan for the above-referenced site which includes the comments provided by the agency on August 8 and December 20, 2011 as well as those of February 24, 2012. Per your request, we have provided a single hardcopy for your use and an email with the document attached in PDF format has also been forwarded to your attention.

Please contact us with any questions or comments you may have regarding the plan.

Yours sincerely,

Steven C. Kornder, Ph.D.
Senior Project Geochemist

John L. Petruccione, PG
Department Manager

cc: Donald M. Biernacki, Related BIT 500
Leo Dombrowski, Edwards Wildman Palmer LLP

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1.0 Introduction

This Work Plan was developed for radiological investigation and the potential removal of radiologically-contaminated fill soil from the development of 515 North Peshtigo Court (Site). The Site is currently a parking lot. The Site has been investigated as part of the planned development by Related Midwest of Chicago, IL. The proposed development will be located on an existing vacant, parking lot site located between East Grand Avenue and East Illinois Street (to the north and south, respectively) and North Peshtigo Court and North Lake Shore Drive (to the west and east, respectively) in Chicago, Illinois. The proposed development will consist of a 45 story multi-use concrete high-rise building and a 10 story podium without basements. Ground floor level will be slab on grade that accommodates lobby, retail, mechanical, loading dock and parking entry. The Work Plan describes the:

- Survey methods proposed for identifying potentially radiologically-contaminated materials above the 7.1 picocuries per gram (pCi/g) cleanup threshold (the "Applicable Cleanup Standard") at the Site (the "Work Area").
- Procedures for managing the removal of radiologically-contaminated soil within the Work Area above the Applicable Cleanup Standard should it be discovered.
- Closure Report and Documentation of the work activities performed relating to the removal of radiologically-contaminated fill soil, including health and safety procedures.

Surface and down-hole gamma surveys have been completed at the Site. The results of the surface surveying did not indicate gamma readings that would be indicative of radiologically-contaminated fill soil. The down-hole gamma measurements indicated some elevated results, but soil samples collected and analyzed using gamma spectroscopy did not confirm the presence of radiologically-contaminated fill soil at the Site. Some down-hole gamma measurements indicated gamma readings of up to 6 times background. As a result, there is still uncertainty as to whether radiological soil contamination, exceeding the 7.1 pCi/g Action Level for Streeterville, is present at the site.

Investigation activities at the Site will begin with the removal of the existing asphalt pavement and subsequent walk-over survey. Subsequent activities will be directed toward the investigation of the subsurface in areas that will be disturbed during construction. If radiologically-contaminated fill soils are found on the Site, horizontal delineation of the contaminated fill soil will be the focus of the initial efforts. Remediation of radiologically-contaminated fill soil will not occur until permission is received or this Work Plan is approved of by United States Environmental Protection Agency (USEPA). Remedial efforts will target the removal of radiologically-contaminated material (fill, soil, debris) above the Applicable Cleanup Standard, in areas that require material excavation or other disturbance to support construction-related activities. Additional radiological screening and radiologically-contaminated material removal will occur during construction whenever previously unscreened historical fill materials are excavated. This radiological screening and radiologically-contaminated material removal will occur during activities including the installation of shoring, caissons, utilities, (on-site and in rights-of-ways), and the repair and replacement of curbs and sidewalks.

If the remediation of radiologically-contaminated fill soil is required, the soil will be containerized and temporarily stored on-site until the proper disposal procedures have been implemented. Radiologically-contaminated fill/soil above the Applicable Cleanup Standard, will be transported to a properly permitted and/or licensed commercial disposal facility suitable for the disposal of this material. After completion of the surveying and remediation, a report will be prepared documenting the activities, unsurveyed areas and any known radiologically-contaminated fill soil that remains on-site. The report will also request that USEPA prepare a "Certification of Completion Letter" acknowledging that conditions at the Site are protective of human health and the environment and that the investigation and removal activities were completed in accordance with the work plan.

2.0 BACKGROUND

2.1 Site Location

The Site is irregular in shape and encompasses approximately 0.90 acres. It consists of an asphalt-paved parking lot and decorative landscaping planters in the southwest portion of the Site. It is bounded by East Grand Avenue on the north, East Illinois Street on the south, Lake Shore Drive on the east and Peshtigo Court on the west (refer to Figure 1). The Site is located in an area of reclaimed land where fill soil material was placed along the Lake Michigan shoreline starting in the 1860's. This area of Chicago is commonly referred to as Streeterville. Recent developments in the Streeterville area of Chicago encountered radiologically-contaminated fill soil. These near surface fill soils are generally 8-12 feet thick and are primarily sandy urban fill that contains bricks, mortar, broken concrete, wood and cinders.

The radiologically-contaminated materials were originally generated as a byproduct waste and spills from the former Lindsay Light thorium gas mantle production facilities that had used and produced thorium nitrate in its manufacturing process. These thorium byproduct materials have been incorporated into fill materials used throughout the Streeterville area. The manufacturing operations were located at 22 West Hubbard Street, 161 East Grand Avenue and 316 East Illinois Street in Chicago, Illinois. These manufacturing operations were conducted from the early 1900s through the early 1930s. The radiological contamination typically consists of elevated concentrations of thorium and associated decay products in the fill soils in the vicinity of the former Lindsay Light sites. Cleanup of radiologically-contaminated fill soil has been performed at a number of Streeterville properties under the direction of USEPA. Due to the proximity of this property to the manufacturing site and documented cleanups at other properties in the Streeterville area, screening for thorium-contaminated fill soil is warranted where invasive work is planned. Furthermore, the USEPA, which has oversight authority for radiologically-contaminated sites, requests that radiological surveys be completed prior to and during site development within the moratorium area commonly referred to as the Streeterville thorium investigation area.

2.2 Site History

The Site is currently occupied by a parking lot, which encompasses the majority of the Site. According to a Phase I completed in October of 2010 by Pioneer Engineering and Environmental Services, Inc., (Pioneer) the Site was initially used as a lumber yard with small offices and sheds located on the property beginning in the early 1900's. At that time railroad tracks also ran through the property. By 1939 the property was apparently converted to a parking lot as it currently exists today. In 1950, part of the property was jointly occupied by a small fueling station owned by Pure Oil Co. The previous history of the Site does not indicate that significant subsurface basement foundations were installed within the property boundary.

In November 2000, AECOM (formerly STS Consultants Ltd.) conducted a walk-over radiation survey of the Site. A report submitted to the USEPA entitled "Radiation Survey of Three Parking Lots in the Vicinity of the Former Kraft Building" (Appendix A) summarized surveying activities conducted on three lots (Parcel 4, Parcel 21 and Parcel 24). Based on the report, during the walkover gamma radiation survey no indication of radiologically-contaminated soil was evident on Parcel 24 (the Site).

In October 2007, Pioneer performed test pitting operations at three locations on the Site. As summarized in an October 12, 2007 letter from RSSI, the results of each test pit resulted in finding no indication of radiologically-contaminated soils in each of the three areas excavated.

Between August 11 and October 14, 2008, Pioneer assisted RSSI in the collection of soil samples for gamma spectroscopy analysis and the real-time data collection of down-hole radiation surveys (refer to Appendix A). The down-hole gamma data was collected at one foot intervals in a total of 22 borings to a maximum depth of 10-feet below surface grade (ft-bgs). Instrumentation used for the down-hole investigation by RSSI was

reported to have a response of 16,500 counts per minute (cpm) which was equivalent to background plus 5 picocuries per gram (pCi/g) or approximately the USEPA cleanup threshold. While a majority of the down-hole gamma readings were below the field instrumentation threshold of 16,500 cpm, the down-hole data indicated elevated gamma readings above the instrument threshold in a 3-4 feet thick layer that generally occurred 2-6 feet below the paved surface. Since these elevated gamma readings could potentially indicate radiologically-contaminated material greater than the USEPA cleanup threshold of 7.1 pCi/g, soil samples were also collected and analyzed for radioactive isotopes. Soil samples were collected at 20 of the 22 borings and generally from the depth with the highest gamma readings. These analytical results did not exceed the 7.1 pCi/g USEPA cleanup threshold. Thus, the presence of radiologically-contaminated fill soil was not confirmed by the analysis of the soil samples although the potential for it exists based on the gamma measurements.

On June 29, 2011 a series of seven shallow geoprobe borings were installed by Pioneer to collect soil samples to assess the Site for petroleum related contamination. This investigation was used as another opportunity to collect down-hole data. A geoprobe rig was used to collect the soil samples and install a 1-inch temporary casing which was used to collect down-hole gamma readings at 1-foot intervals. This study conducted by AECOM utilized a ½ X 1 inch NaI probe instead of the 2 X 2 inch probe used by RSSI because of the smaller diameter of the geoprobe borings. Thus, for this probe configuration the gamma count equivalent to the USEPA cleanup threshold is approximately 3,491 cpm. The down-hole gamma results of the June 29, 2011 investigation and a drawing by Pioneer with the boring locations is included at the end of Appendix A. This drawing also includes the location of the 2008 investigation.

These June 2011 results did not indicate gamma readings that were indicative of radiologically-contaminated fill soil above the USEPA cleanup threshold of 7.1 pCi/g. However, USEPA generally considers gamma reading greater than twice background as potentially anomalous results. For the June 2011 investigation, twice background was estimated to be about 2,400 cpm. A review of the results indicates that four gamma readings exceeded twice background. Thus, although no gamma readings greater than the instrument threshold were encountered, several slightly elevated and/or anomalous gamma results were observed.

2.3 Site Lithology and Groundwater Conditions

The lithology is based on geotechnical data and down-hole gamma borings collected at the Site. This information indicates that fill soil was encountered to depths ranging from 9 to 13 feet. The fill soil is primarily sandy urban fill that contains bricks, mortar, broken concrete, wood and cinders in a very loose to medium dense condition. Below the fill soil is natural gray fine sand with varying amounts of silt. This sand layer extends to a depth range of 32 to 37 feet. Groundwater was noted in the borings at depths varying from 6 to 10 feet below grade during the geotechnical and down-hole drilling operations.

3.0 PROPOSED WORK ACTIVITIES

3.1 General Description

The potential work can be divided into two major tasks which include radiological screening and potentially remediation. The initial task will involve a surface gamma survey of the exposed surface of the parking lot after removal of the asphalt. Once the surface survey is complete, radiological screening will be conducted where construction activities will result in the disturbance of the fill soil. This will include all areas where the installation of utilities, shoring, grade beams, caissons, etc. will result in the disturbance of the historical fill material.

As indicated previously, the collection of fill soil samples has not documented the presence of radiologically-contaminated material above the USEPA cleanup threshold. However, down-hole gamma readings have indicated some elevated readings. Thus, the second task will involve the remediation of radiologically-contaminated fill soil material if it discovered during the screening surveys.

3.2 Historical Fill Soil Screening

Excavations in historical fill soil that have not been previously surveyed will be screened for the presence of radiologically-contaminated material. These gamma screening surveys will be conducted consistently with the methodology for excavations discussed in Section 4. Surveys will use a Ludlum 2221 and 2 x 2 NaI probe and a background gamma count will be recorded for each instrument. Screening of the fill soil will be completed primarily using three survey efforts including: the direct screening of the excavation walls and floor, excavated soil screening while still in the excavator bucket, and the excavation spoil piles.

The excavations will proceed in lifts not to exceed 18-inches per lift. The excavation walls and floor will be surveyed at each 18-inch lift if the excavation can be entered safely or the probe can be suspended into the excavation via a longer cable. In the event the excavation is of such a dimension which precludes safe access to survey the walls and floor, spoil material will be surveyed in the excavator bucket and/or at the surface adjacent to the excavation. If elevated gamma radiation measurements are noted within the fill, equal to or exceeding twice the background gamma count, the excavation will proceed in thinner lifts, 6 to 12 inches. If the excavated fill exceeds the Applicable Cleanup Standard, the radiologically-contaminated fill will be placed directly into a super-sack or at a minimum staged on plastic separate from the clean soil until it can be containerized. Appropriate PPE will be required if radiologically-contaminated fill soil is present and the excavation will be treated as an exclusion zone until this contaminated fill is removed from the excavation and the area is released by the USEPA. Radiologically-contaminated fill will be loaded into a super-sack and staged at the Site temporarily until transportation for proper disposal is arranged. The ground surface under the staged pile will also be surveyed to confirm no contamination remains following removal of the staged material.

It should be noted that projects previously conducted in Streeterville utilized Tronox for the transportation and disposal of the radiologically-contaminated soil. In January 2009 Tronox filed for Chapter 11 Bankruptcy which will complicate disposal arrangements and potentially make temporary storage of radiologically-contaminated soil a necessity. In order to efficiently utilize the available storage space, it will be important to limit the disposal of materials to only that which exceeds the Applicable Cleanup Standard. In addition to the described Ludlum screening methods, the sampling of potentially-contaminated soil in a manner similar to that used for verification sampling may be useful to identify whether material is truly above the Applicable Cleanup Standard.

Excavation equipment that has contacted radiologically-contaminated fill will be surveyed with a Ludlum Model 3 Pancake Probe for elevated radioactivity. Indications of elevated radioactivity will require decontamination in accordance with the Work Plan SOP 347, Decontamination. All equipment in contact with the radiologically-

contaminated fill will be documented as clean through a swipe survey and alpha radiation count using the Ludlum Model 220 and Model 43-10 Alpha counter, in accordance with the Work Plan SOP 345, Survey for Surface Contamination and Release of Equipment for Unrestricted Use.

3.3 Excavation of Radiologically-Contaminated Soil

The project activities will also include, if identified, the removal of the radiologically-contaminated soil above the Applicable Cleanup Standard. The radiologically-contaminated fill/soil that is discovered will be removed to levels below the Applicable Cleanup Standard where practicable. In some cases this may mean that radiologically-contaminated material may remain at on-site. The locations of any contaminated material that will remain will be discussed with the USEPA prior to any backfilling activities.

These excavation areas will be designated Exclusion Zones for purposes of health and safety requirements until such time as the contaminated soil identified above the Applicable Cleanup Standard is removed from the excavation areas, loaded into transport boxes and or super-sacks, and the areas are released by the USEPA. The excavation process will utilize an excavator with a maximum bucket volume of less than one cubic yard. This bucket size will facilitate loading of super sacks without spilling and/or spreading the contamination. When possible, the contaminated fill soil will be loaded directly into super-sacks. The shipping container (super-sack) exteriors will be confirmed clean prior to leaving the Site in accordance with SOP-320 (Appendix D). It is anticipated that it will be necessary to temporarily store radiologically-contaminated fill soil in super-sacks on the property until final disposal arrangements can be completed. Stored soil will be properly secured with fencing and placarded with appropriate warning signs (i.e., similar to that utilized for Exclusion Zones).

If concrete (floor) slabs within the historical fill are to be excavated, the slabs will be broken and removed and the soil beneath the slabs screened for verification. Concrete slabs, footings or walls encountered and excavated during the excavation activities will be cleaned of adhering contamination, if any, and will either be removed from the Site or stockpiled on-site for subsequent use or disposal in connection with Site development work.

The excavation of radiologically-contaminated fill above the Applicable Cleanup Standard will be confirmed by surveys conducted during the excavation process. Once the confirmation survey has confirmed the absence of soil contaminated at levels above the Applicable Cleanup Standard (SOP-210) within the Work Area, the excavation will be subject to verification survey and sampling by USEPA, in accordance with Section 4.2.3 of this Work Plan (SOP-223 and SOP-214 of Appendix D).

A primary requirement of dust control is "no visible dust" during activities associated with contaminant removal. The excavation (remediation) and soil handling areas where contaminated soil is present will be required to have no visible dust. Fugitive dust generation is caused by a range of activities including excavation, loading, dumping, transporting and scraping using heavy equipment such as bulldozers, front-end loaders, trucks and graders. Air monitoring is generally conducted for the purpose of documenting and, if detected, initiating measures to control airborne contamination. High volume air sampling equipment has been used in the past for large scale remediation efforts in Streeterville and has not indicated an issue. Therefore, it is apparent that control measures are appropriate for controlling fugitive dust issues and high volume air sampling provides little or no benefit on this project. As stated previously, the presence of radiologically-contaminated material at the Site had not been confirmed prior to Site development. If the volume of contaminated soil that will be excavated is minimal (measured in yards rather than hundreds of yard), the potential to create a fugitive dust issue is reduced significantly and a request to USEPA will be made to limit air monitoring potentially to just personal exposure monitoring.

4.0 METHODS

4.1 Applicable Cleanup Standard

The USEPA has set the cleanup level as 5 pCi/g total radium (Ra-226 and Ra-228) above the background. A level of 2.1 pCi/g total radium is currently considered background for the area by the USEPA. Thus, radiologically-contaminated material is defined by the USEPA for the Streeterville area as exceeding a threshold of 7.1 (pCi/g) total radium.

Field measurements will be taken of gamma radiation levels using a Ludlum 2221 rater-scaler and a 2 x 2 NaI detector. The equipment will be calibrated to determine the gamma count in cpm that is equivalent to 7.1 pCi/g. Equipment calibration will be performed at least annually using the thorium calibration blocks at the former Tronox West Chicago Rare Earth Facility.

Field measurements of gamma counts will include the following surveys of non-native fill material:

- Surveys of excavation as overburden is removed;
- Surveys of excavation as radiologically-contaminated soil is removed;
- Surveys of excavations to document all contaminated soil has been removed; and
- Surveys of utility or foundation excavations.

4.2 Surficial Walk-over and Grading Surveys

Surficial survey methods will be used in the initial phase of this project once the asphalt has been removed to identify the potential presence of radiologically-contaminated materials within the first 18 inches of the Site. This same technique will be used for grading and/or excavation screening within the excavation areas to survey for the presence of radiological impacts above the Applicable Cleanup Standard. A grid with 5-meter spacing will be marked by stakes and flagging at the edges of the Work Area or by paint on the ground surface within the Site. The areas between the grid points will be scanned so as to cover 100 percent of the intra-grid areas.

The surveys will be conducted using a Ludlum 2221 rater-scaler and a 2 x 2 NaI gamma detector. The detector will be unshielded to provide for a broader screening area in assessing the surface survey. Values will be recorded in counts per minute (cpm). The maximum value will be recorded for each grid cell and all anomalously high areas (two times the background concentration) will have the approximate limits designated on the survey data sheets. The locations will be marked in paint on the ground surface. Field screening data sheets will include recording the instrument serial number, calibration date, operator, and site grid coordinates surveyed. A copy of a field data sheet is attached (see Appendix B).

Areas that are identified as exceeding the Applicable Cleanup Standard will be designated as Exclusion Zones until the time as such contaminated soil above the Applicable Cleanup Standard has been removed from the Exclusion Zone, loaded into a super-sack and the area released by the USEPA. Work activities within the Exclusion Zones will be conducted in accordance with the procedures outlined in the HASP and briefly summarized in Section 5.0.

Additional documentation of contaminant levels may be performed through the collection of samples for laboratory analysis using NUTRANL and/or high resolution gamma spectroscopy analyses. These samples may be collected to: a) document where removal is necessary; b) indicate areas where removal has been successful; or c) document areas that are below the USEPA threshold level as indicated by the NaI detector. In limited cases samples may also be collected to document what will be left in-place.

4.3 Confirmation Surveys for Radiologically-Contaminated Areas

Radiological screening surveys will be conducted during the remedial excavation of fill materials identified as radiologically-contaminated above the Applicable Cleanup Standard. Excavated locations will be screened in accordance with SOP-210 (Appendix C). If radiologically-contaminated soil in excess of the Applicable Cleanup Standard is identified, these areas will be designated as Exclusion Zones until the time as such contaminated soil above the Applicable Cleanup Standard has been removed from the Exclusion Zone, loaded into a transport container and the area released by the USEPA. As described in the Health and Safety Plan (HASP) and discussed briefly in Section 5.0, the Exclusion Zones will require appropriate PPE and personal air monitoring to enter. All equipment and personnel that enter an Exclusion Zone will be frisked clean upon leaving the Exclusion Zone. Personnel entering Exclusion Zones must be 40-hour health and safety trained. The surveys will be conducted using a Ludlum 2221 rater-scaler and a 2 x 2 NaI gamma detector. Soil contaminated above the Applicable Cleanup Standard will be excavated where encountered.

Excavation within Exclusion Zones will proceed in lifts not to exceed 18 inches in thickness and soil/fill will be surveyed in-place where practical. Excavation may proceed in thinner lifts to minimize the potential for mixing clean and radiologically-contaminated soil. Excavation of radiologically-contaminated material will proceed using an excavator with a maximum bucket volume of one cubic yard or less. This bucket size will facilitate loading the super-sacks without spilling and spreading the radiologically-contaminated soil contamination. Also, if discrete deposits of radiologically-contaminated material are encountered, a hand shovel may be used to dig out radiologically-contaminated material to help minimize waste volume and can be done in a timely and cost-effective manner.

Soil screening during the course of the remedial excavation activities within the Work Area is also intended to minimize the incorporation of clean material into contaminated materials which are designated for offsite disposal. Soil indicative of levels below the Applicable Cleanup Standard by the screening process prior to excavation will be staged for potential use as backfill. As previously indicated, excavation conducted to remove radiologically-contaminated material will proceed using an excavator with a maximum bucket volume of one cubic yard or less. This bucket size will also allow the excavated soil to be screened a second time before being placed on the backfill pile. This potentially non-contaminated soil will also be subject to verification surveys in accordance with SOP-214 (Appendix C).

If the soil screening after remediation indicates the absence of radiologically-contaminated material above the cleanup threshold, soil/fill samples will be collected over a maximum 100 m^2 area for confirmation/pre-verification analysis. Each confirmation/pre-verification sample will be a composite sample made up of five subsamples collected from an area not to exceed 100 m^2. The confirmation/pre-verification sample will be a composite sample made up of five subsamples obtained by dividing the 100 m^2 area (10-meter x 10-meter) into four equal quadrants of 5-meters x 5-meters. Four of the subsamples will be collected from the center of the 5-meter x 5-meter quadrants. The fifth subsample will be obtained from the center of the 10-meter x 10-meter sample area. Sample collection will be in accordance with SOP-214. For confirmation/pre-verification, the five subsamples will be composited and a analyzed as a single sample.

It is anticipated that NUTRANL software will be the primary sample analysis method and will be conducted at an off-site (fixed) laboratory. NUTRANL samples will be collected and analyzed by Stan Huber and Associates. After confirmation analysis shows the area to be clean, the area will be subject to a verification survey and sampling by USEPA. The excavations will not be backfilled until a signed radiological verification closure form is received from USEPA.

Prior to the initiation of activities, gamma count rate background levels shall be established for each applicable survey instrument. Six locations shall be chosen in non-radiologically-contaminated areas of the Site. A one-minute integrated count shall be obtained at the surface of each location, for each survey instrument (Ludlum 2221 with 2" x 2" NaI probe). The measurements collected from each location shall be averaged to establish instrument specific background gamma count rates.

4.4 Verification Sampling

As previously indicated, the excavation screening of the complete Site is not intended, but may include the screening of historical fill down to native soil at numerous locations. Excavated fill soil identified as exhibiting contamination at concentrations above the Applicable Cleanup Standard of 7.1 pCi/g total radium (Ra-226 + Ra 228) will be removed, placed in super-sacks and temporary stored on-site while awaiting shipment to an offsite disposal site. Excavated locations will be screened in accordance with SOP-210 (Appendix C). For remediated areas, initial field demonstration that the location has been excavated to clean limits will be made with a shielded 2 x 2 NaI detector. This will be followed by the collection of a confirmation/pre-verification sample in accordance with SOP-223 (Appendix C). This sample will be analyzed using NUTRANL software or gamma spectroscopy analyses. If the confirmation analysis shows the area to be clean, the area will be subject to a verification survey and sampling by USEPA.

The verification survey sampling program will be conducted by the USEPA in a manner essentially identical to that performed for the confirmation sampling. Specifically, the verification sample results will be made up of five subsamples obtained by dividing the 100 m^2 area (10-meter x 10-meter) into four equal quadrants of 5-meters x 5-meters. Four of the subsamples will be collected from the center of the 5-meter x 5-meter quadrants, while the fifth subsample will be obtained from the center of the 10-meter x 10-meter sample area. The five verification samples will be composited, homogenized and, if analyzed using NUTRANL, split back into five individual subsamples for analysis. The results of the five subsamples will be averaged for each 100 m^2 verification area. This differs slightly from the confirmation/pre-verification subsamples, which were composited and analyzed as a single sample. The verification sample will be collected and prepared in general accordance with SOP-223 and SOP-214 (Appendix C) and analyzed using NUTRANL software. The Exclusion Zones will not be backfilled until a signed radiological verification closure form is received from USEPA or USEPA has agreed that the material may remain in-place.

NUTRANL results would be provided in two forms. The initial NUTRANL data set will consist of one set per sample and will include the radionuclide concentrations and error limits for uranium 238, thorium 232, radium 226, and potassium 40; the sample number; date and time sampled; laboratory number (sequential); identify the analyst; and analytic method (NUTRANL). The second field lab data form will be a consolidated spreadsheet with all analysis in sequence by laboratory number. This table will include the sample number, data and time sampled, radionuclide concentrations and error limits for the four NUTRANL analytes, and a line totaling the thorium and radium concentrations. In addition, QA/QC samples including daily blanks (empty vial), a daily standard approximately equal to the Applicable Cleanup Standard, periodic duplicates and a set of USEPA laboratory QC check standards using NIST traceable sources will be analyzed to establish the reliability and accuracy of the NUTRANL results.

High resolution gamma spectroscopy analyses may also be sent to a subcontract laboratory operated by RSSI. The laboratory data package will include available chain-of-custody copies, tabulated data summaries, calibration records, and standards, QC sample results, and any corrective action reports. Gamma spec analysis will be conducted using a Library Energy Tolerance of 1.2 keV and a Gamma Fraction Limit of 71%.

4.5 Materials Management

Material from the Site that is not radiologically-contaminated at levels above the Applicable Cleanup Standard may be replaced in their original locations, placed in another location on the Site, salvaged (i.e. recyclable materials), or handled (i.e. soils delivered to a designated landfill) in accordance with applicable laws and regulations. Materials that are not radiologically-contaminated above the Applicable Cleanup Standard, and are designated to be removed from the Site, will be disposed of in accordance with applicable regulations as necessary. All shipments of radioactive waste material and non-radioactive waste materials shall comply with the requirements of the 515 North Peshtigo/Related BIT Administrative Settlement Agreement and Order on Consent, U.S. EPA Region 5 No. V-W-11-C-976, paragraph 21regarding off-site shipments of waste.

Material that is contaminated above the Applicable Cleanup Standard will be sent to a permitted commercial disposal facility. These materials may be temporarily stored on-site pursuant with USEPA approval. Projects previously conducted in Streeterville have involved Tronox in the transportation and disposal of the radiologically-contaminated soil. In January 2009 Tronox filed for Chapter 11 Bankruptcy. At present the shipping and disposal of contaminated materials is undetermined, but are likely to be either EnergySolutions of Clive Utah or US Ecology in Idaho. Shipping and placarding will be in accordance with all Department of Transportation regulations for shipping radiologically-contaminated material. Permitting for disposal will be arranged before contaminated material is loaded for long distance shipment.

Radiologically-contaminated materials will be transported between the Site and the permitted commercial disposal facility according to DOT regulations. Procedures which will be used to minimize the potential for and effects of spills and accidents during transport of materials radiologically-contaminated above the Applicable Cleanup Standard include, but are not limited to, the following:

- Drivers will have the proper licenses, training, and certifications for transporting potentially radioactive materials.
- Trucks transporting low-level radioactive materials in excess of 7.1 pCi/g total radium will have sealed or lined containment. In addition, covers for the roll-off containers or flatbed trailers will be placed over the load prior to exiting the Site. Trucks will carry all necessary papers and placarding.
- If necessary, any contaminated vehicles and equipment will be decontaminated first using broom cleaning to remove all adhering surface dirt. As needed, pressurized water spray will be used for further decontamination. Water generated during decontamination will be contained and evaporated, used for dust control on contaminated soils designated for disposal, or possibly sent for disposal at an permitted commercial disposal facility.
- Prior to transporting radiologically-contaminated excavated soils or other materials, transport equipment will be surveyed for contamination if there is reason to believe that it may have come in contact with contaminated material. Contamination surveyed will include tires and fenders and the sides and back of the bed. Contamination surveys of the cabs of trucks will not be necessary unless loading has been over the front of the truck.

Two categories of historical fill material will be distinguished in the excavation process: radiologically-contaminated fill/soil exceeding the cleanup threshold of 7.1 pCi/g total radium, and excavated soil suitable for backfill that is not radiologically-contaminated in excess of 7.1 pCi/g total radium. There also may be materials that will be specified by the owner as unsuitable or suitable for backfill, based on engineering properties, non-radiological impacts, or other specifications. For this Work Plan, a distinction is proposed for radiologically-contaminated materials above the Applicable Cleanup Standard and non-radiologically-contaminated materials. Handling or disposal of non-radiologically-contaminated materials at an off-site location will comply with all applicable laws and regulations.

No non-radiologically-contaminated materials (i.e., petroleum, etc.) are known to be present at the Site. However, materials that, based on visual or olfactory observations, are suspected to be grossly contaminated by non-radiological contamination may be temporarily staged on-site to allow for proper sampling and characterization for disposal. These materials will be placed on liners and will be covered to minimize potential for erosion and spread of contamination.

4.6 Data Management and Report

Data management for the Site consists of site safety and training records, health physics data (i.e., personnel monitoring data), soil radioactivity field and laboratory data, shipping and transport records, and civil construction and excavation data (i.e., land surveys, excavation volume estimates, etc.). A local laboratory will be used to analyze soil samples as excavation and removal proceeds, and for pre-verification sampling that the radiological cleanup criteria have been met. Analytical records will be kept at the AECOM office in Vernon

Hills, Illinois. Air monitoring analyses, if necessary, will be maintained at the AECOM office and will be transmitted with the monthly project progress reports to USEPA.

Monthly progress reports will be submitted to USEPA beginning 30 days after initiation of the field work and will be electronically submitted monthly by the 15th of each month until submission of the Completion Report document, unless otherwise directed by the USEPA On-Scene Coordinator (OSC). These reports will describe all significant developments during the preceding period, including the work performed, and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions.

4.7 Exclusion Zone Access and Security

Access by unauthorized personnel to the Exclusion Zone excavation areas will be controlled during operational and non operational hours because of hazards created by open excavations, moving contractors' equipment, and traffic. Only authorized personnel will be permitted within the fenced area. Exclusion Zone access will be directed by the Project Coordinator, Field Team Leader or their designated representative (see HASP). The excavation Work Area will be fenced with a temporary chain-link fence unless the access is restricted by fencing at the Site perimeter. In the case of a perimeter fence, access to the excavation areas will be restricted through the use of temporary fencing (i.e., plastic barrier fencing). This fencing will include appropriate signage to provide security during non operational hours. Access gates/points will be closed and locked when not in use.

During operational hours, the project management consultant, its contractors and subcontractors, and their representatives will have access to the excavation area to implement the excavation activities. The contractor responsible for radiological soil transport, and their contractors, will have access to implement health physics and transportation activities. Information on restrictions to the excavation areas, and various signs and barricades, will be disseminated during the project kick-off meeting held at the beginning of the project.

All visitors desiring access to the excavation area will be required to register with the Project Coordinator or his designee. The Project Coordinator or his designee will provide necessary orientation and training, provide radiation monitors as appropriate, and escort the visitors. The visitors will be required to observe all health and safety requirements and follow all instructions given by the Field Team Leader.

Regulatory and governmental officials who visit the excavation areas for regular or unscheduled visits will be requested to notify the Project Coordinator or the Field Team Leader. Visitors will be required to comply with all Health and Safety rules. US EPA personnel may make unscheduled visits to the Site following the above guidelines.

During non operational hours, barricades, warning signs, and temporary fencing, as appropriate, will be placed to prevent unauthorized entry into an Exclusion Zone. Exclusion Zones will be surrounded with magenta and yellow rope and stakes or fence posts until a determination that it meets the Applicable Cleanup Standard. Signs will be placed on the excavation area perimeter fencing identifying the area as a construction area and prohibiting unauthorized entry. The warning signs will be installed at maximum 100 foot intervals on the perimeter fence.

4.8 Decontamination

All discarded materials, waste materials, and other field equipment and supplies will be handled in such a way to prevent the potential spread of contamination during excavation and restoration activities. Discarded items that have contacted contaminated materials will be containerized and stored for disposal at the permitted commercial disposal facility. Non-contaminated items to be discarded will be collected for disposal as general refuse waste. Personnel and sampling equipment decontamination are described in the Decontamination Procedure included as SOP-347 of Appendix D.

4.9 Temporary Storage of Radiologically-Contaminated Material

As per discussions with the US EPA, there may be a need for the temporary on-site storage of radiologically-contaminated materials. Projects previously conducted in Streeterville have involved Tronox in the transportation and disposal of the radiologically-contaminated soil. In January 2009 Tronox filed for Chapter 11 Bankruptcy. The bankruptcy complicates disposal arrangements and makes temporary storage a necessity. If discovered, it is anticipated that radiologically-contaminated soil will be staged temporarily on-site in super-sacks until the remediation efforts are complete or sufficient volume has been staged for transportation. Stored soil will be properly secured with fencing and placarded with appropriate warning signs (i.e., similar to that utilized for Exclusion Zones).

5.0 HEALTH AND SAFETY PLAN (HASP) SUMMARY

A project specific HASP is provided under separate cover. Site surveys, excavation and remediation activities will be conducted in accordance with the Site HASP. Additionally, reference is made to the following documents included within Appendices D, E and F:

- Dust Control Plan
- SOP-210 – Gamma Radiological Surveys
- SOP-217 – Excavation Procedure
- SOP-223 – Verification Survey Procedure
- Construction Health and Safety

The HASP addresses required training, personnel protection equipment, general work precautions, and medical monitoring among other issues. In general, as radiologically-contaminated soil above the Applicable Cleanup Standard is detected, either by the initial surface survey or in the course of monitoring the excavations, the areas will be designated with a magenta and yellow rope and stakes or fence posts. These areas will be designated Exclusion Zones, and will require appropriate PPE and personal air monitoring to enter. All equipment and personnel that enter an Exclusion Zone will need to be frisked clean upon leaving the Exclusion Zone. Personnel entering Exclusion Zones must be 40-hour health and safety trained.

All accidents or injury "near misses" will be documented and communicated to the Project Coordinator and Field Team Leader in a timely manner. Project safety briefings will be held on a weekly basis, and a project tailgate meeting will be held on a daily basis as a regular part of project communication between the Field Team Leader and project contractors and subcontractors.

5.1 Key Personnel

While health and safety will be the concern of every person on the job, the radiation survey and soil excavation management team will be responsible for the implementation of the HASP. These persons are the Project Coordinator, Health and Safety Officer/Coordinator and the Field Team Leader. Figure 2 presents the project management work organization chart. The responsibilities for these positions are detailed in the HASP. Radiation laboratory subcontract services will be provided through Stan A. Huber Consultants, Inc. (Huber).

5.2 Potential Hazards

Potential hazards that could be encountered during the removal activities include contact with contaminated materials and the hazards associated with construction work. Contaminants of concern include the entire decay series for U-238 and Th-232. Radiological and air monitoring as described in this Work Plan will be performed during excavation to define the presence of radiological contaminants.

The mechanisms for exposure to the radiologically-contaminated soil material are direct exposure, inhalation, ingestion and eye/skin contact. The primary mechanism of exposure is direct exposure to external gamma radiation. All workers will be instructed in appropriate measures to protect against exposure to the above materials, and PPE will be worn until monitoring shows PPE is not necessary.

Physical hazards which might be encountered at this Site include but are not limited to the following:

- Construction equipment (front-end loaders, trak excavators, trucks, compactors, bulldozers);
- Power tools (saws, drills, jack hammers, compactors);

- Heat and cold stress;
- Overhead power lines;
- Excavations;
- Confined space;
- Noise;
- Demolition of structures;
- Slip, trip and fall conditions, especially during wet or freezing periods; and
- Buried utilities which may or may not be live.

For this project, "utilities" may include natural gas, water, sewer, communication, cable television lines, and electrical power distribution systems. Prior to the physical Site survey, city and utility company records concerning location and construction of utilities on and in the general vicinity will be reviewed and consolidated on a single Utility Plan Drawing. The appropriate utility companies or their designees will be asked to verify the location by originating a request through the Chicago Utility Alert Network (DIGGER) phone number: 312-744-7000, and through application to the Office of Underground Coordination (OUC).

The locations of the identified utilities will be "ground-truthed" by observing the locations of power and phone poles, above-ground transformers (where electrical distribution lines are below ground), manholes, water meters, natural gas meters, phone boxes, surface indications such as utility vaults, catch basins, and surface depressions which can occur over utility trenches, and the locations marked by the utility companies or their representatives. Procedures for working in the vicinity of utilities and repair to damaged utilities will be discussed with the excavation contractor crews. All work on and in the vicinity of utilities will be in accordance with City and utility company specifications.

Additional details on these and other safety provisions are addressed in the HASP.

5.3 Training and Communications

Site and project specific radiation and health and safety training will be provided for all on-site personnel prior to work on the Site. All personnel required to work in the Exclusion Zone or Contamination Reduction Zone will complete training conforming to the requirements of 29 CFR 1910.120(e) including 40-hours of initial hazardous waste site worker training. Where appropriate, they will have 8-hours of annual refresher training, and 8-hour supervisor training as appropriate. Field personnel will complete radiation safety training in compliance with 32 IAC 400. This training shall include training pertaining to radiation safety and awareness. Training will be conducted by a qualified safety specialist and/or a qualified senior health physics technician, at a minimum. As noted in the HASP, Federal safety requirements take precedence over state requirements.

All site personnel will be trained and briefed on radiation basics, anticipated hazards, equipment to be worn, safety practices to be followed, contamination prevention practices, emergency procedures, radiation basics and communications. Procedures for leaving the Exclusion Zone shall be planned and implemented prior to going on-site. Work Areas and decontamination procedures will be established based on expected site conditions, and updated as necessary during construction. Other guidelines such as heat and cold stress, excavation safety and confined space are included within the HASP.

In addition to this formal health and safety training, "tailgate" safety meetings will be held daily, or more frequently, dependent on safety issues arising during the project. These meetings may be led by the field team leader or the worker's foremen and every employee must sign in before beginning work. The subject covered and persons present will be recorded for each meeting and kept as part of the project records. Health and safety incidents and monitoring results will be discussed in the tailgate safety meetings, when appropriate.

Visitors to the Site will be briefed on the requirements of the HASP before being allowed within the Work Area, and will be accompanied by a foreman or supervisor whenever possible.

5.4 Personal Protective Equipment

Disposable coveralls, steel-toed work shoes, boot covers, hard hat, safety glasses and gloves will also be required in all Exclusion Zones. Prior to exiting any Exclusion Zones, personnel will pass through decontamination, disposal of all appropriate PPE, and frisking procedures as described in the HASP. Personnel operating in Exclusion Zones will be required to have personal air monitors (PAMs).

5.5 Air Quality Monitoring

The principal objectives of the air monitoring activities are to:

- Ensure worker and general population safety and provide radiological control information;
- Evaluate work procedures and site control measures. In addition to identifying the need for corrective action, air monitoring also documents the effectiveness of such control actions; and
- Measure releases of airborne radioactivity (should any occur) and ensure that people living and working in the surrounding area are not exposed to radiation above acceptable limits.

A primary requirement of dust control is "no visible dust" during activities associated with contaminant removal. The excavation (remediation) and soil handling areas where contaminated soil is present will be required to have no visible dust. Fugitive dust generation is caused by a range of activities including excavation, loading, dumping, transporting and scraping using heavy equipment such as bulldozers, front-end loaders, trucks and graders.

Air monitoring is generally conducted for the purpose of documenting and, if detected, initiating measures to control airborne contamination. High volume air sampling equipment has been used in the past for large scale remediation efforts in Streeterville and has not indicated an issue. Therefore, it is apparent that control measures are appropriate for controlling fugitive dust issues and high volume air sampling provides little or no benefit on this project. As stated previously, the presence of radiologically-contaminated material at the Site has not been confirmed. If the volume of contaminated soil that will be excavated is minimal (measured in yards rather than hundreds of yard), the potential to create a fugitive dust issue is reduced significantly and a request to USEPA will be made to limit air monitoring potentially to just personal exposure monitoring.

During the excavation and handling of radiologically-contaminated materials, the procedures to be followed to control dust will include traffic speed control and use of covered stockpiles. Excavated radiologically-contaminated soil above the Applicable Cleanup Standard will be loaded directly into the super sacks as the material is excavated. Radiologically-contaminated material stored on-site will be stored in super-sacks. Stockpiled clean materials, including excavated and imported borrow material, will be piled (height limited) to minimize dust generation. If these initial efforts appear to be inadequate to control dust, water will be applied during the course of excavation and restoration activities as directed by the Field Team Leader to prevent, mitigate or reduce dust resulting from excavation activities. The Dust Control Plan (Appendix E) provides additional detail on the control measures that may be implemented, if necessary, at the Site.

5.5.1 Personal Exposure Monitoring

Personnel operating in Exclusion Zones will be required to have personal air monitors (PAMs). Procedures for personal air monitoring are discussed in the HASP and SOP-212 (Appendix D). Lapel samplers worn for personal air monitoring will be utilized for airborne radioactivity monitoring. Air filters will be analyzed on a daily basis and additional evaluation of samples will be performed when determined necessary based on elevated results. Procedural changes or control measures, such as wetting of soils, will be employed prior to the prescription of respiratory protective equipment.

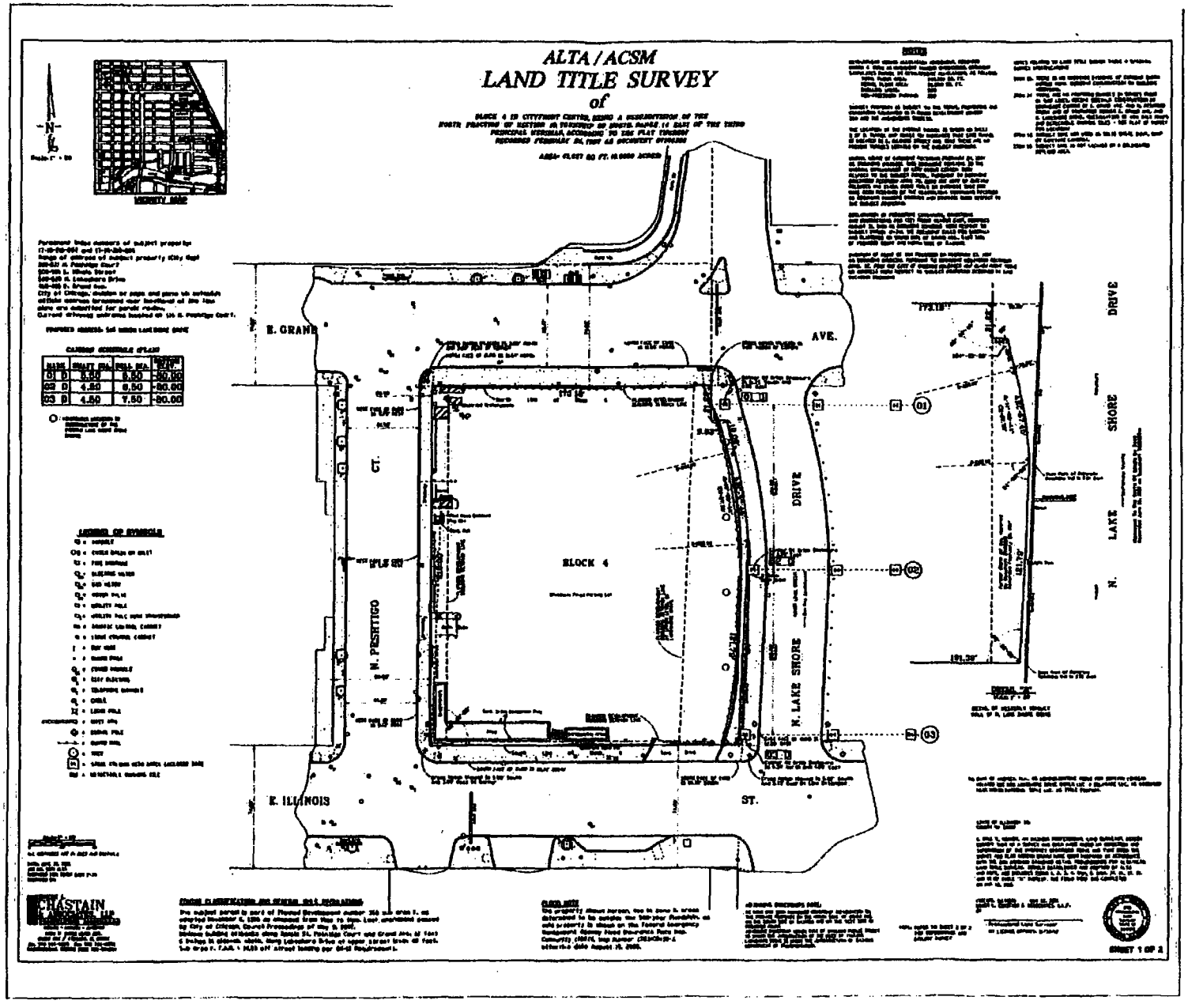
6.0 COMPLETION DOCUMENTATION

An objective of the Work Plan is to document the excavation screening activities, as well as the identification, handling, and disposal of radiologically-contaminated soil should it be encountered during the construction activities. The following types of data will be generated during the project:

- Surface gamma survey records;
- Soil sampling records;
- Soil sample field laboratory data;
- Fixed laboratory soil analyses data (USEPA contract and AECOM subcontract laboratories);
- Air quality (personnel) sampling records;
- Air quality (personnel) analytical data; and,
- An estimate of the cost for the remediation of the radiologically contaminated fill soil.

The results of the Work Plan investigation and the potential removal work will be presented in a final completion report. The report will provide a summary of unsurveyed portions of the Site, remediation areas, and if applicable, locations of radiologically-contaminated material remaining above the Applicable Cleanup Standard identified during the project. The report will include field data, laboratory results, documentation of the volume of material removed and its disposal location. The report will present the information as the basis for and will request issuance by USEPA of a "Certification of Completion Letter" for the Site. The draft Completion Report will be submitted within 60 days of completion of the removal work and on-site investigations. AECOM will incorporate U.S. EPA's comments, if any, and submit the final report within 15 days of receiving U.S. EPA's written comments, if any, on the draft Completion Report.

FIGURE 1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PROJECT MANAGEMENT ORGANIZATION CHART

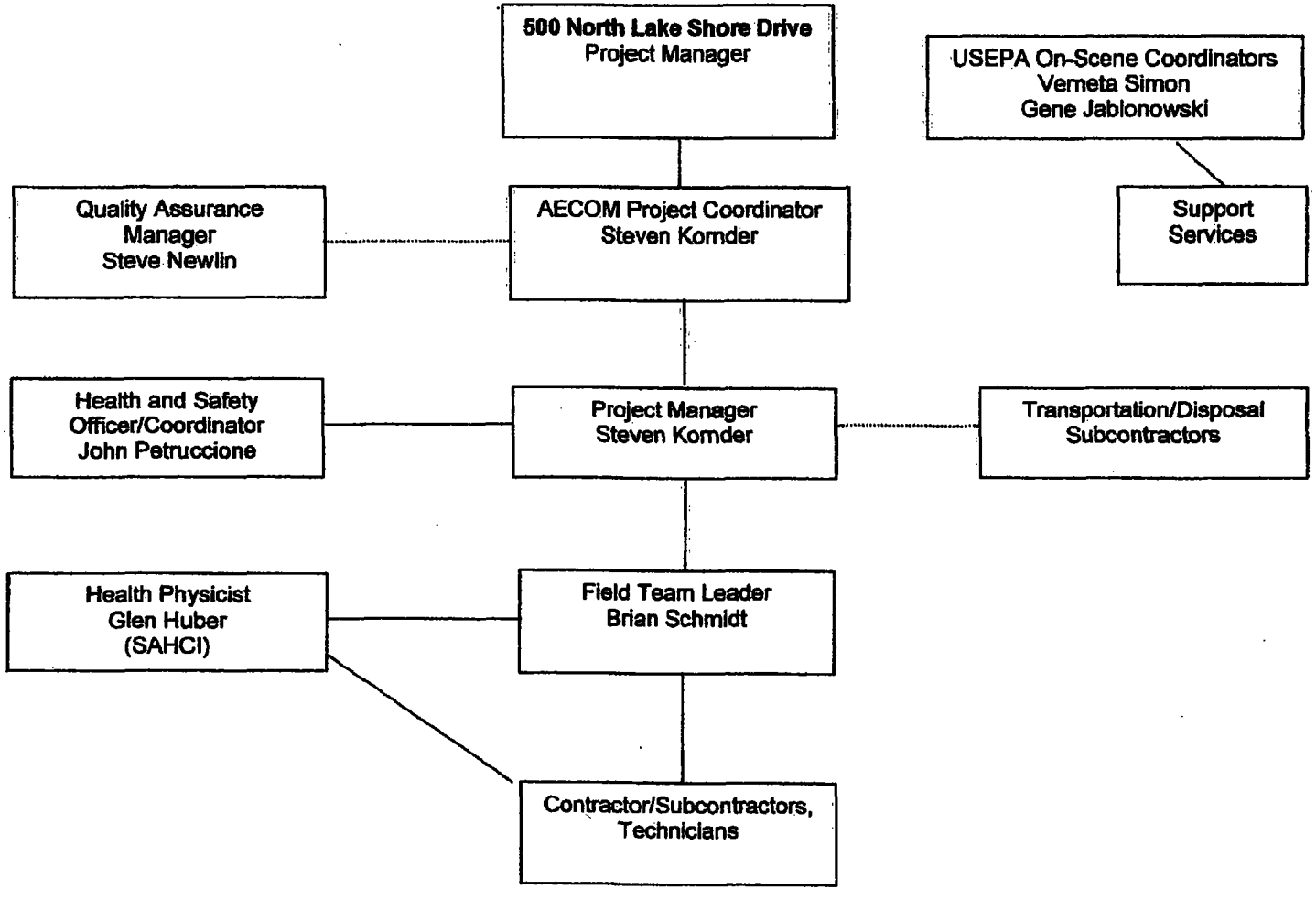


Figure 2

Appendix A

Historical Radiological Survey Results Reports

SUBSURFACE RADIATION MEASUREMENTS
AT 515 NORTH PESHTIGO COURT
CHICAGO, ILLINOIS
PERFORMED ON
AUGUST 11 - 12, 2008
AND
OCTOBER 14, 2008

FOR

PIONEER ENGINEERING & ENVIRONMENTAL SERVICES, INC.
700 NORTH SACRAMENTO BLVD, SUITE 101
CHICAGO, ILLINOIS

BY

RSSI
6312 W. OAKTON STREET
MORTON GROVE, ILLINOIS

December 23, 2008

H:\HOME\400001 Health Physics\Pioneer\515 N. Peshtigo Court\downhole survey report.doc

I. INTRODUCTION

In the early 1900s, Lindsay Light and Chemical Company refined and used thorium in industrial operations between Illinois Street and Grand Avenue east of Michigan Avenue, in Chicago's Streeterville area. Thorium is naturally radioactive. The predominate isotope of thorium, thorium-232 (Th-232), decays to radium-228 (Ra-228). Another isotope, thorium-230 (Th-230), decays to radium-226 (Ra-226).

The US Environmental Protection Agency (EPA) reported that the material from Lindsay Light and Chemical Company refining operations may have been in fill used throughout the Streeterville area. The property at 515 North Peshtigo Court, Chicago, Illinois is located in Streeterville and was assessed to address this concern. The EPA has set a standard of 5 picocuries per gram (pCi/g) of Ra-226 plus Ra-228 above background concentrations. Background concentrations in the Streeterville area are assumed by the EPA to be 2.1 pCi/g of combined Ra-226 and Ra-228 resulting in an action level of 7.1 pCi/g combined Ra-226 and Ra-228.

II. METHODOLOGY

Borehole Radiation Level Measurements

On August 11 - 12, 2008, borehole radiation levels were measured at twelve locations selected by Pioneer. On October 14, 2008, radiation levels were measured in ten additional boreholes. Borehole locations are in Appendix A. Borehole measurements were performed using a Ludlum Model 2200 scaler ratemeter equipped with a Ludlum model 44-10 (Model 44-10) scintillation detector. No shielding was used for down-hole measurements to maximize the response to photons from all directions. Borehole measurement results are in Appendix B.

The Ludlum Model 2200 is a scaler, ratemeter and Single Channel Analyzer with a timer and adjustable high voltage, threshold and window. It is used with a Ludlum Model 44-10 scintillation detector. The Model 44-10 is a thallium doped sodium iodide (NaI(Tl)) gamma scintillator coupled to photomultiplier tube (PMT). Gamma scintillation detectors are sensitive to photons

and are used to identify and quantify gamma emitting radionuclides.

The instrument was calibrated in simulated boreholes with a known concentration of thorium from the uranium and thorium series in monazite sands. The radionuclides in the series are in equilibrium with their daughters which include Ra-226 and Ra-228. The instrument response was approximately 2,300 cpm per pCi/g of Ra-226 and Ra-228 in an extended homogenous source. An instrument response of 11,500 cpm above background (See Section III) corresponds to approximately 5 pCi/g.

Soil Analysis

Ten soil samples were collected on August 11 - 12, 2008, in 500 ml Marinelli containers from the boreholes at the depth of the maximum radiation level in each borehole. The scope of the work limited initial sample collection to soil from 10 boreholes. No samples were collected from two boreholes, BH-4 and BH-7. Borehole BH-4 was only 3 feet in depth and did not produce enough soil for a sample. No significant elevated radiation levels were measured in borehole BH-7. Samples were collected on October 14, 2008, from ten additional boreholes at the depth of the maximum radiation level in each borehole. Samples were counted for one hour on an Ortec DART high-resolution gamma spectroscopy system. The client requested recounting the sample collected from BH-8, because the initial concentration of radium surrogates, 4.7 pCi/g, had potential to increase to over 7.1 pCi/g after ingrowth of radon daughters.

The DART gamma spectrometer is an 8k channel, multichannel analyzer (MCA). The DART provides all functionality required to support a high purity germanium (HPGe) detector in a gamma spectrometer system. The DART system includes a computer controlled amplifier, a bias supply, a spectrum stabilizer, an analog-to-digital circuit, data memory, and a ratemeter. It is used with an Ortec GEM-30185 HPGe detector and Maestro-32 MCA Emulator Software. Data are reduced using Quantum Technology GDR gamma spectroscopy software. This system performs qualitative and quantitative analysis of spectra from the HPGe detector, identifying radionuclides and the quantities of each present in samples.

The samples were analyzed using GDR software for the uranium series, thorium series, and naturally occurring potassium-40 (K-

40). Radium-228 (Ra-228) from the thorium series emits no significant photons. Radium-226 (Ra-226) from the uranium series has only one significant photon at 186 keV and its abundance is low, 0.03. These properties make identification and quantification of the isotopes of radium unlikely with normal counting protocols.

The concentrations of surrogates with more abundant high energy photons usually represent the concentration of Ra-226 and Ra-228. Actinium-228 (Ac-228), in the thorium series, is used as a surrogate for Ra-228, and Lead-214 (Pb-214), in the uranium series, is used as a surrogate for Ra-226.

Ra-228 remains in equilibrium with Ac-228 when samples are collected. The equilibrium between Ra-226 and Pb-214 may be disturbed during sample collection because an intermediate progeny, Rn-222 is a gas and some Rn-222 may escape the sample during collection. Equilibrium is reestablished within seven to ten half-lives of Rn-222, which has a half-life of 3.8 days. Results from samples analyzed immediately after collection may underestimate the concentration of Ra-226. In the standard analysis protocol for Ra-226, samples are held for a 30-day ingrowth period to reestablish equilibrium.

Because Ac-228 remains in equilibrium with Ra-228, the only ingrowth is in Pb-214. Little change in the total activity of radium surrogates is expected in samples when the Pb-214 concentration is significantly lower than the Ac-228 concentration and when much of the Rn-222 remains entrained in the interstices of the soil matrix.

Several parameters are set in the GDR software. The sensitivity discriminates against statistically poor peaks. With a lower sensitivity, smaller and less defined peaks can be recognized. The GDR default value of 0.2 is used. The low energy cutoff sets the value below which energies will not be considered in the peak search routine. The low energy cutoff is set to 35 keV because of fall off in detector response at low energy. The library energy tolerance determines how close a peak energy must be to a library energy to identify the peak for activity reporting. The library energy tolerance is set to 1.2 keV. The gamma fraction limit specifies the fraction of secondary peaks that must be present in the spectrum to recognize a radionuclide. The gamma fraction limit is set to 10%.

Equipment survey

Drilling and other equipment used for soil boring was surveyed using a Ludlum Model 3 survey meter with a 44-9 pancake probe at the end of each workday. The Ludlum Model 3 is a general purpose portable survey instrument. It is used with a Ludlum Model 44-9 pancake type Geiger-Mueller (GM) detector. The Model 44-9 is sensitive to alpha and beta radiation emitted by the uranium series and thorium series and has limited sensitivity to photons.

III. RESULTS

Borehole Radiation Level Measurement Results

The background radiation level with the Ludlum 2200 was approximately 3,000 cpm during the survey on August 11 and 12, corresponding to an instrument response of 14,500 cpm in an extended homogenous source or 5 pCi/g Ra-226 plus Ra-228. On October 14, the background reading was approximately 5,000 cpm, corresponding to an instrument response of 16,500 cpm in an extended homogenous source of 5 pCi/g Ra-226 plus Ra-228. The maximum observed instrument response was 31,615 cpm in BH-17 at a depth of 5 ft, corresponding to approximately 11.3 pCi/g if the probe was in an extended homogenous source. The results of down-hole measurements are in Appendix B.

Soil Analysis Results

With the exception of the sample collected from BH-8, the sum of the Ac-228 and Pb-214 in the samples collected on August 11, 2008 and August 12, 2008 was not expected to be in excess of 7.1 pCi/g after ingrowth. The highest initial concentration of Ac-228 plus Pb-214 was 4.7 pCi/g in a sample collected from BH-8 at a depth of 4 ft- 6 ft. After allowing for radon daughter ingrowth, the concentration rose to a total of 5.0 pCi/g, below the EPA action level of 7.1 pCi/g. Samples are identified as SBnn. They were collected from boreholes BHnn, where nn is the sample number. The high-resolution gamma spectroscopy analyses of the boring samples are provided in Appendix D.

Equipment Survey Results

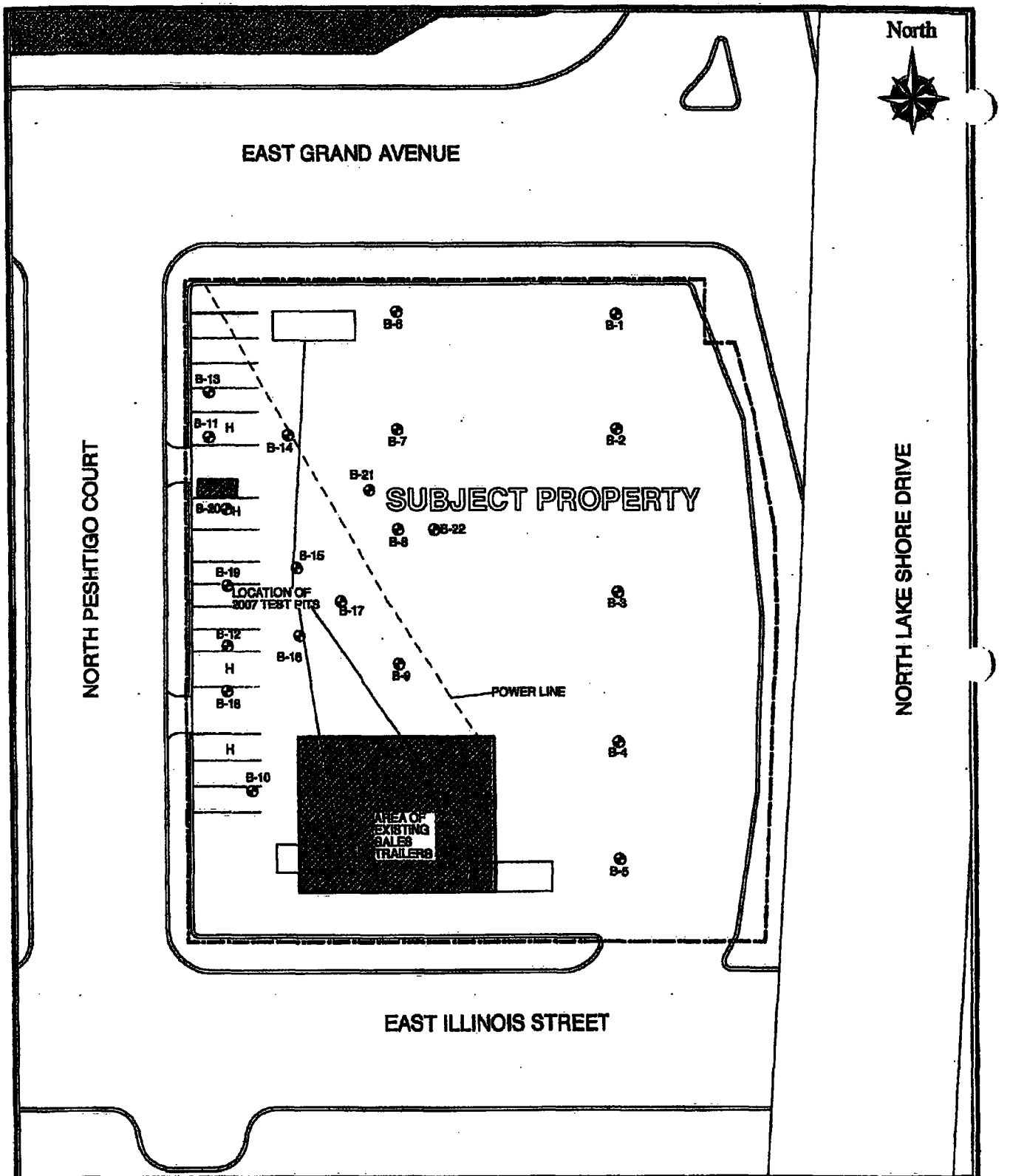
The background radiation level with the Ludlum 3 was 50 cpm. Surveyed equipment radiation levels were indistinguishable from background. Equipment survey results are in Appendix C.

IV. CONCLUSIONS

None of the results for samples analyzed immediately after collection were above 7.1 pCi/g, the EPA's action level, of Ra-226 and Ra-228 surrogates. Sample SB-8 had the highest concentration of Pb-214 and was reanalyzed after allowing for Pb-214 ingrowth. After the sample was recounted, the sum of the radium surrogates was below the 7.1 pCi/g level. The instrument response in three boreholes, BH-8, BH-11, and BH-12 indicate that concentrations of radioactivity above the EPA limits may be adjacent to the boreholes. The elevated borehole screening results may also be attributable to the presence of thorium and other radionuclides in bricks and granite pavers in the Chicago fire rubble used to fill Streeterville.

APPENDIX A

Borehole locations



PIONEER
Engineering & Environmental Services, Inc.

Legend:
Approximate Property Line
H=Handicapped Parking
Soil Boring Location

Scale: 1"=40'
0' 40'

Drawn by: Jackson Toomey

Job No.: 07-1550-103

Date: December 2008

Checked by: Joe Kelly

FIGURE 1
Site Diagram
550 N. Peshtigo Ct.
Chicago, IL

APPENDIX B

Borehole radiation level measurements

Client: Pioneer **Date:** 8/11/08
Location: 515 N. Peshtigo Court **Performed By:** Sangho Nam
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 1	BH : 2	BH : 3
0	3996	4919	3399
1	10800	7904	4447
2	10783	**15216**	8269
3	9402	**14781**	14911
4	**12643**	**9629**	**17132**
5	**11996**	11678	**14856**
6	**10760**	9846	**10013**
7	10114	7930	9749
8	10487	8587	9128
9		12023	7872
10			5298
Background	2969	2969	2969
Samples collected	4′ - 6′	2′ - 4′	4′- 6′

Client: Pioneer **Date:** 8/11/08
Location: 515 N. Peshtigo Court **Performed By:** Sangho Nam
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 4	BH : 5	BH : 6
0	4319	3739	4951
1	5011	3256	5312
2	16571	8883	**14493**
3	14015	15510	**15156**
4		**14515**	**15238**
5		**14196**	14385
6		**11694**	13746
7		11288	12696
8			11349
9			9306
10			
Background	2969	2969	2969
Samples collected	No Sample	4′ - 6′	2′ - 4′

Client: Pioneer **Date:** 8/11/08
Location: 515 N. Peshtigo Court **Performed By:** Sangho Nam
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 7	BH : 8	BH : 9
0	4002	4219	4007
1	4090	4137	3841
2	10646	9929	11375
3	12157	13471	14513
4	11045	**21578**	11531
5	12238	**18551**	11718
6	11293	**13015**	**14302**
7	11531	11030	**14160**
8	9960	11132	**12976**
9	6642	8856	10742
10			
Background	2969	2969	2969
Samples collected	No Sample	4′ - 6′	6′- 8′

Client: Pioneer **Date:** 8/11/08 - 8/12/08
Location: 515 N. Peshtigo Court **Performed By:** Sangho Nam
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 10	BH : 11	BH : 12
0	4098	3730	3914
1	8416	5187	8890
2	**15671**	**11571**	**17222**
3	**15947**	**22282**	**22367**
4	**15488**	**19745**	**20108**
5	12550	16685	18093
6	12019	12611	16327
7	10572	14447	12613
8		16115	8073
9		15663	
10			
Background	2969	2923	2923
Samples collected	2′ - 4′	2′ - 4′	2′ - 4′

Client: Pioneer **Date:** 10/14/2008
Location: 515 N. Peshtigo Court **Performed By:** Juan Correa
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 13	BH : 14	BH : 15
0	4917	4976	4851
1	6900	5142	6145
2	20561	14313	9564
3	20968	15637	10052
4	22015	20338	14059
5	18181	19777	19706
6	19676	20100	17181
7	18539	20424	14895
8	18783	16389	15112
9			
10			
Background	4853	4853	4853
Samples collected	No Sample	No Sample	No Sample

Client: Pioneer **Date:** 10/14/2008
Location: 515 N. Peshtigo Court **Performed By:** Juan Correa
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : 16	BH : 17	BH : 18
0	4918	9477	6165
1	10201	8039	18427
2	19666	21072	29085
3	22498	17970	30975
4	20074	17625	28652
5	23172	31615	22505
6	21268	27117	20450
7	14115	18217	21234
8	12142	14252	18538
9			
10			
Background	4853	4853	4853
Samples collected	No Sample	No Sample	No Sample

Client: Pioneer **Date:** 10/14/2008
Location: 515 N. Peshtigo Court **Performed By:** Juan Correa
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : B19	BH : B20	BH : B21
0	6595	9036	5197
1	16727	19084	13663
2	12884	20185	12710
3	12078	19355	16748
4	14881	15388	17398
5	20184	16313	18057
6	17688	15669	14877
7	18573	20340	10222
8	13171	19129	8694
9			
10			
Background	4853	4853	4853
Samples collected	4'-6'	No Sample	No Sample

Client: Pioneer **Date:** 10/14/2008
Location: 515 N. Peshtigo Court **Performed By:** Juan Correa
Instrument: Ludlum 2200 **S/N:** 69279 **Probe:** 44-10

Borehole Count Rates

Depth	BH : B22
0	4386
1	10052
2	18417
3	19069
4	23180
5	22344
6	15925
7	14672
8	10642
9	
10	
Background	4853
Samples collected	4'-6'

APPENDIX C

Gamma spectroscopy analysis summary table and reports

- Gamma Spectroscopy Results Summary

Sample NO.	Borehole ID	Depth Ft	Pb-214 pCi/g	Ac-228 pCi/g	TOTAL pCi/g
081941	SB-1	4 - 6	0.8	0.6	1.4
081942	SB-2	2 - 4	1.8	1.0	2.8
081943	SB-3	4 - 6	1.2	0.8	2.0
081944	SB-5	4 - 6	1.4	0.8	2.2
081945	SB-6	2 - 4	1.4	1.0	2.4
081946	SB-8	4 - 6	3.7	1.0	4.7
081946A	SB-8	4 - 6	3.9	1.1	5.0
081947	SB-9	6 - 8	1.7	1.0	2.7
081948	SB-10	2 - 4	1.6	1.1	2.7
081949	SB-11	2 - 4	1.3	0.8	2.1
081950	SB-12	2 - 4	1.5	0.8	2.3
082400	SB-13	2 - 4	1.5	1.0	2.5
082401	SB-14	4 - 6	1.1	0.8	1.9
082402	SB-15	4 - 6	1.2	0.8	2.0
082403	SB-16	4 - 6	2.3	1.2	3.5
082404	SB-17	4 - 6	3.0	0.8	3.8
082405	SB-18	2 - 4	2.5	1.0	3.5
082406	SB-19	4 - 6	1.3	0.8	2.1
082407	SB-20	2 - 4	1.4	0.9	2.3
082408	SB-21	2 - 4	0.7	0.5	1.2
082409	SB-22	4 - 6	1.9	1.2	3.1

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081941 PIONEER PESHTIGO SITE B-1

Sample Size	9.44e+002 g	Spectrum File . .	.H:\MAESTROS\081941.CHN
Sampling Start.	.00-00-00 00:00	Counting Start.	08-13-08 11:29
Sampling Stop	.00-00-00 00:00	Live Time	3600 Sec
Current Date.	.00-00-00 00:00	Real Time	3604 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	0 / 8191
Sigma Multiplier.	1.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.80	292.85	234	51	97	643	0.83	a
2	76.88	301.85	434	53	97	693	1.03	b
3	86.84	344.84	121	46	87	644	0.86	
4	92.57	369.61	139	52	100	735	1.68	
5	185.86	772.39	314	49	90	563	1.43	
6	209.29	873.52	192	45	86	450	1.23	
7	238.52	999.74	1059	53	87	410	1.11	a
8	241.73	1013.62	291	49	94	454	1.37	b
9	270.26	1136.78	90	35	67	307	1.23	
10	295.04	1243.77	549	43	75	287	1.14	a
11	299.92	1264.85	59	29	55	219	0.90	b
12	338.09	1429.64	187	33	59	230	0.98	
13	351.75	1488.64	991	43	58	218	1.28	
14	462.48	1966.71	22	24	47	152	1.84	NET < CL
15	510.61	2174.53	179	31	58	179	1.89	
16	583.03	2487.19	378	29	44	107	1.76	
17	609.11	2599.81	736	34	43	106	1.41	
18	727.13	3109.35	66	22	41	93	1.95	
19	794.86	3401.80	53	16	30	50	1.54	
20	860.44	3684.97	79	15	26	37	1.14	
21	911.04	3903.41	246	24	36	73	1.47	
22	934.05	4002.77	20	18	35	70	0.36	NET < CL
23	964.36	4133.64	74	19	36	43	2.07	a
24	968.83	4152.93	201	22	37	50	1.63	b
25	1120.06	4805.89	157	22	37	71	1.65	
26	1460.48	6275.68	1277	38	27	32	1.81	
27	1729.43	7436.92	36	7	9	4	1.61	
28	1763.97	7586.03	124	15	22	21	2.05	

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BACKGROUND SUBTRACT RESULTS

Sample ID : 081941 PIONEER PESHTIGO SITE B-1

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-13-08 11:29
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.80	0.83	234	51	176	51	
4	92.57	1.68	139	52	89	52	NET < CL
5	185.86	1.43	314	49	285	49	
7	238.52	1.11	1059	53	1029	54	
10	295.04	1.14	549	43	525	43	
13	351.75	1.28	991	43	935	43	
15	510.61	1.89	179	31	92	32	
16	583.03	1.76	378	29	355	29	
17	609.11	1.41	736	34	642	35	
21	911.04	1.47	246	24	223	24	
24	968.83	1.63	201	22	189	23	
25	1120.06	1.65	157	22	141	22	
26	1460.48	1.81	1277	38	1092	38	
28	1763.97	2.05	124	15	104	15	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081941 PIONEER PESHTIGO SITE B-1

Sample Size . . . . . 9.44e+002 g | Spectrum File . .H:\MAESTROS\081941.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 11:29
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	Average:	5.52e-007 +-2.86e-008	1.06e+001	4 of 4
	74.82	I.D.Only		
	77.11	I.D.Only		
	238.63	5.53e-007 +-2.88e-008		
	300.09	4.91e-007 +-2.41e-007		
Pb-214	Average:	7.92e-007 +-3.12e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	8.01e-007 +-1.57e-007		
	295.21	7.62e-007 +-6.30e-008		
	351.92	8.02e-007 +-3.69e-008		
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	5.98e-007 +-4.41e-008	6.13e+000	3 of 3
	338.32	5.09e-007 +-8.90e-008		
	911.07	5.54e-007 +-5.94e-008		
	969.11	8.25e-007 +-9.82e-008		
Tl-208	Average:	2.01e-007 +-1.60e-008	5.09e-002	2 of 3
	510.84	1.82e-007 +-6.31e-008		
	583.14	2.02e-007 +-1.66e-008		
Bi-214	Average:	7.02e-007 +-3.38e-008	3.32e-001	3 of 4
	609.31	6.88e-007 +-3.70e-008		
	1120.30	7.61e-007 +-1.19e-007		
	1764.50	7.79e-007 +-1.14e-007		
Bi-212	727.17	5.58e-007 +-1.84e-007	1.01e+000	1 of 4
K-40	1460.80	1.04e-005 +-3.63e-007	1.12e+013	1 of 1
TOTAL:		1.38e-005 uCi/g		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.84	344.84	121	46	87	644	0.86	1.052e+000
209.29	873.52	192	45	86	450	1.23	1.481e+000
270.26	1136.78	90	35	67	307	1.23	8.258e-001
794.86	3401.80	53	16	30	50	1.54	1.141e+000
860.44	3684.97	79	15	26	37	1.14	1.822e+000
964.36	4133.64	74	19	36	43	2.07	1.859e+000
1729.43	7436.92	36	7	9	4	1.61	1.462e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081942 PIONEER PESHTIGO SITE B-2

Sample Size . . . . . 6.10e+002 g | Spectrum File . .H:\MAESTROS\081942.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 13:03
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3605 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.67	292.29	310	55	105	745	0.86 a	
2	76.89	301.88	503	53	94	712	0.87 b	
3	84.10	333.01	157	57	114	717	1.17 a	
4	86.93	345.25	254	57	110	722	1.11 b	
5	92.70	370.14	198	53	101	755	1.28	
6	185.75	771.90	473	52	94	572	1.65	
7	238.55	999.88	1287	60	99	498	1.19 a	
8	241.58	1012.96	375	50	93	481	1.39 b	
9	270.10	1136.09	157	42	81	363	2.45	
10	295.02	1243.70	796	43	65	272	1.25	
11	338.11	1429.73	227	32	56	216	1.06	
12	351.74	1488.60	1425	48	58	221	1.38	
13	462.73	1967.78	33	27	52	179	0.61	NET < CL
14	510.60	2174.46	163	31	58	179	1.57	
15	582.97	2486.95	369	28	42	104	1.47	
16	609.16	2600.02	1005	38	42	101	1.35	
17	727.05	3109.02	78	22	40	95	1.21	
18	768.33	3287.26	104	22	41	80	1.56	
19	785.62	3361.90	18	18	35	75	4.93	NET < CL
20	794.73	3401.25	51	19	36	76	2.82	
21	911.02	3903.34	294	24	35	62	1.48	
22	933.87	4001.98	65	18	32	60	1.44	
23	964.39	4133.77	35	16	30	54	0.88 a	
24	968.87	4153.11	180	21	32	56	1.51 b	
25	1120.05	4805.84	214	24	40	77	1.24	
26	1237.70	5313.81	71	18	32	57	2.51	
27	1377.46	5917.25	70	12	19	16	2.07	
28	1407.53	6047.05	14	14	28	42	1.02	NET < CL
29	1460.39	6275.28	1108	37	36	58	2.00	
30	1729.29	7436.28	52	11	17	13	7.47	

31	1763.98	7586.08	199	16	14	9	2.00

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081942 PIONEER PESHTIGO SITE B-2

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-13-08 13:03
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.67	0.86	310	55	260	56	
3	84.10	1.17	157	57	143	57	
5	92.70	1.28	198	53	148	54	
6	185.75	1.65	473	52	444	52	
7	238.55	1.19	1287	60	1257	60	
10	295.02	1.25	796	43	761	43	
12	351.74	1.38	1425	48	1369	48	
14	510.60	1.57	163	31	76	31	
15	582.97	1.47	369	28	346	29	
16	609.16	1.35	1005	38	911	38	
21	911.02	1.48	294	24	271	24	
24	968.87	1.51	180	21	168	21	
25	1120.05	1.24	214	24	198	24	
29	1460.39	2.00	1108	37	923	38	
31	1763.98	2.00	199	16	179	16	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081942 PIONEER PESHTIGO SITE B-2

Sample Size . . . . . 6.10e+002 g | Spectrum File . .H:\MAESTROS\081942.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 13:03
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	74.82	I.D.Only	1.06e+001	3 of 4
	77.11	I.D.Only		
	238.63	1.05e-006 +-4.99e-008		
Pb-214	Average:	1.79e-006 +-5.19e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	1.82e-006 +-2.48e-007		
	295.21	1.71e-006 +-9.68e-008		
	351.92	1.82e-006 +-6.36e-008		
Th-228	84.37	I.D.Only	1.68e+004	1 of 2
Th-234	92.80	I.D.Only	5.78e+002	1 of 3
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	1.04e-006 +-6.73e-008	6.13e+000	3 of 3
	338.32	9.58e-007 +-1.35e-007		
	911.07	1.04e-006 +-9.36e-008		
	969.11	1.13e-006 +-1.40e-007		
Tl-208	Average:	3.00e-007 +-2.43e-008	5.09e-002	2 of 3
	510.84	2.33e-007 +-9.69e-008		
	583.14	3.04e-007 +-2.51e-008		
Bi-214	Average:	1.58e-006 +-5.65e-008	3.32e-001	4 of 4
	609.31	1.51e-006 +-6.29e-008		
	768.36	1.91e-006 +-4.08e-007		
	1120.30	1.65e-006 +-2.03e-007		
	1764.50	2.08e-006 +-1.82e-007		
Bi-212	727.17	1.02e-006 +-2.86e-007	1.01e+000	1 of 4
K-40	1460.80	1.36e-005 +-5.54e-007	1.12e+013	1 of 1
TOTAL:		2.04e-005 uCi/g		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.93	345.25	254	57	110	722	1.11	2.215e+000
270.10	1136.09	157	42	81	363	2.45	1.432e+000
794.73	3401.25	51	19	36	76	2.82	1.098e+000
933.87	4001.98	65	18	32	60	1.44	1.593e+000
964.39	4133.77	35	16	30	54	0.88	8.740e-001
1237.70	5313.81	71	18	32	57	2.51	2.207e+000
1377.46	5917.25	70	12	19	16	2.07	2.364e+000
1729.29	7436.28	52	11	17	13	7.47	2.107e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081943 PIONEER PESHTIGO SITE B-3

Sample Size . . . . . 7.05e+002 g | Spectrum File . .H:\MAESTROS\081943.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 14:06
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3604 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.90	293.30	316	56	106	717	0.93	a
2	77.01	302.39	395	51	93	664	0.98	b
3	87.25	346.62	141	49	94	691	0.78	
4	92.58	369.64	160	53	101	755	1.30	
5	186.07	773.29	288	49	91	568	1.35	
6	238.65	1000.32	1000	56	95	473	1.13	a
7	241.81	1013.93	372	49	91	469	1.33	b
8	270.77	1138.97	64	37	71	352	1.36	NET < CL
9	295.28	1244.83	635	41	64	266	1.11	
10	327.65	1384.56	66	29	56	219	2.13	
11	338.32	1430.65	200	33	59	227	1.42	
12	351.95	1489.48	1167	46	63	246	1.33	
13	510.90	2175.77	160	31	58	171	1.96	
14	583.12	2487.61	335	30	47	130	1.32	
15	609.25	2600.43	899	35	38	80	1.75	
16	727.20	3109.66	79	19	34	67	2.63	
17	768.37	3287.43	89	21	40	77	2.24	
18	911.17	3903.98	250	21	29	48	1.67	
19	933.72	4001.34	51	18	33	66	2.10	
20	968.76	4152.64	174	18	26	35	1.69	
21	1120.38	4807.26	190	20	31	49	1.45	
22	1238.09	5315.49	90	20	36	62	1.37	
23	1377.46	5917.23	23	17	35	54	0.63	NET < CL
24	1460.61	6276.26	860	31	21	20	1.91	
25	1729.30	7436.32	41	6	0	0	1.49	
26	1764.04	7586.32	148	15	19	16	2.10	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081943 PIONEER PESHTIGO SITE B-3

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-13-08 14:06
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.90	0.93	316	56	248	56	
4	92.58	1.30	160	53	110	53	
5	186.07	1.35	288	49	259	49	
6	238.65	1.13	1000	56	973	56	
9	295.28	1.11	635	41	600	41	
12	351.95	1.33	1167	46	1111	47	
13	510.90	1.96	160	31	73	31	
14	583.13	1.32	335	30	312	30	
15	609.25	1.75	899	35	805	35	
18	911.17	1.67	250	21	227	21	
20	968.76	1.69	174	18	162	18	
21	1120.38	1.45	190	20	174	20	
24	1460.61	1.91	860	31	675	31	
26	1764.04	2.10	148	15	128	15	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081943 PIONEER PESHTIGO SITE B-3

Sample Size . . . . . 7.05e+002 g	Spectrum File . .H:\MAESTROS\081943.CHN
Sampling Start. 00-00-00 00:00	Counting Start. 08-13-08 14:06
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.H:\GDR\EFF\500MAR.EFF	Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI	ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	74.82	I.D.Only	1.06e+001	3 of 4
	77.11	I.D.Only		
	238.63	7.00e-007 +-4.04e-008		
Pb-214	Average:	1.24e-006 +-4.35e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	1.28e-006 +-2.11e-007		
	295.21	1.17e-006 +-7.96e-008		
	351.92	1.28e-006 +-5.35e-008		
Th-234	92.80	I.D.Only	5.78e+002	1 of 3
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	7.97e-007 +-5.30e-008	6.13e+000	3 of 3
	338.32	7.32e-007 +-1.19e-007		
	911.07	7.55e-007 +-7.10e-008		
	969.11	9.46e-007 +-1.07e-007		
Tl-208	Average:	2.35e-007 +-2.18e-008	5.09e-002	2 of 3
	510.84	1.96e-007 +-8.30e-008		
	583.14	2.38e-007 +-2.26e-008		
Bi-214	Average:	1.18e-006 +-4.55e-008	3.32e-001	4 of 4
	609.31	1.16e-006 +-5.09e-008		
	768.36	1.41e-006 +-3.41e-007		
	1120.30	1.26e-006 +-1.47e-007		
	1764.50	1.28e-006 +-1.54e-007		
Bi-212	727.17	8.93e-007 +-2.14e-007	1.01e+000	1 of 4
K-40	1460.80	8.59e-006 +-3.97e-007	1.12e+013	1 of 1
TOTAL:		1.36e-005 uCi/g		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
87.25	346.62	141	49	94	691	0.78	1.227e+000
327.65	1384.56	66	29	56	219	2.13	6.934e-001
933.72	4001.34	51	18	33	66	2.10	1.253e+000
1238.09	5315.49	90	20	36	62	1.37	2.778e+000
1729.30	7436.32	41	6	0	0	1.49	1.669e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081944 PIONEER PESHTIGO SITE B-5

Sample Size . . . . . 8.41e+002 g | Spectrum File . .H:\MAESTROS\081944.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 16:52
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3605 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.83	293.00	343	61	118	865	0.99	a
2	77.08	302.71	539	62	113	880	1.01	b
3	87.19	346.35	118	53	102	817	0.48	
4	92.94	371.17	274	56	105	815	1.11	
5	186.10	773.40	423	54	99	683	1.57	
6	209.01	872.33	122	43	83	503	1.43	
7	238.68	1000.42	1295	57	91	471	1.06	a
8	241.88	1014.25	481	56	106	569	1.45	b
9	270.12	1136.18	116	38	72	357	1.72	
10	295.31	1244.94	840	48	79	309	1.17	a
11	300.21	1266.10	72	36	71	285	1.13	b
12	328.06	1386.33	52	36	71	295	0.73	NET < CL
13	338.37	1430.86	266	36	65	275	1.24	
14	351.96	1489.52	1568	48	55	198	1.35	
15	463.01	1969.02	138	26	46	124	1.81	
16	510.81	2175.38	191	33	60	200	1.48	
17	583.25	2488.15	419	32	49	143	1.41	
18	609.34	2600.79	1101	41	49	139	1.58	
19	727.16	3109.49	70	24	45	113	1.46	
20	768.28	3287.05	75	25	47	123	1.17	
21	860.72	3686.14	85	20	36	61	1.64	
22	911.26	3904.37	308	24	34	63	2.40	
23	933.86	4001.93	73	20	38	68	3.00	
24	968.83	4152.92	196	23	38	82	1.27	
25	1120.14	4806.24	232	25	40	81	2.26	
26	1238.39	5316.80	76	23	45	92	1.63	
27	1377.44	5917.15	38	16	31	49	0.71	
28	1460.61	6276.26	1242	37	25	27	1.88	
29	1729.15	7435.71	45	11	19	16	2.96	
30	1764.05	7586.36	179	16	19	17	1.67	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081944 PIONEER PESHTIGO SITE B-5

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-13-08 16:52
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.83	0.99	343	61	278	62	
4	92.94	1.11	274	56	224	56	
5	186.10	1.57	423	54	394	55	
7	238.68	1.06	1295	57	1270	58	
10	295.31	1.17	840	48	809	48	
14	351.96	1.35	1568	48	1512	48	
16	510.81	1.48	191	33	104	33	
17	583.25	1.41	419	32	396	32	
18	609.34	1.58	1101	41	1007	41	
22	911.26	2.40	308	24	285	24	
24	968.83	1.27	196	23	184	23	
25	1120.14	2.26	232	25	216	25	
28	1460.61	1.88	1242	37	1057	37	
30	1764.05	1.67	179	16	159	16	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081944 PIONEER PESHTIGO SITE B-5

Sample Size . . . . . 8.41e+002 g | Spectrum File . .H:\MAESTROS\081944.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-13-08 16:52
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	Average:	7.65e-007 +-3.46e-008	1.06e+001	4 of 4
	74.82	I.D.Only		
	77.11	I.D.Only		
	238.63	7.66e-007 +-3.48e-008		
	300.09	6.72e-007 +-3.35e-007		
Pb-214	Average:	1.42e-006 +-3.94e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	1.46e-006 +-2.03e-007		
	295.21	1.32e-006 +-7.85e-008		
	351.92	1.46e-006 +-4.67e-008		
Th-234	92.80	I.D.Only	5.78e+002	1 of 3
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	8.21e-007 +-5.16e-008	6.13e+000	3 of 3
	338.32	8.15e-007 +-1.11e-007		
	911.07	7.95e-007 +-6.78e-008		
	969.11	8.99e-007 +-1.14e-007		
Tl-208	Average:	2.51e-007 +-1.97e-008	5.09e-002	2 of 3
	510.84	2.33e-007 +-7.35e-008		
	583.14	2.52e-007 +-2.04e-008		
Bi-214	Average:	1.23e-006 +-4.41e-008	3.32e-001	4 of 4
	609.31	1.21e-006 +-4.95e-008		
	768.36	9.96e-007 +-3.29e-007		
	1120.30	1.31e-006 +-1.50e-007		
	1764.50	1.33e-006 +-1.37e-007		
Bi-212	727.17	6.64e-007 +-2.26e-007	1.01e+000	1 of 4
K-40	1460.80	1.13e-005 +-3.98e-007	1.12e+013	1 of 1
TOTAL:		1.64e-005 uCi/g		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
87.19	346.35	118	53	102	817	0.48	1.028e+000
209.01	872.33	122	43	83	503	1.43	9.362e-001
270.12	1136.18	116	38	72	357	1.72	1.057e+000
463.01	1969.02	138	26	46	124	1.81	1.908e+000
860.72	3686.14	85	20	36	61	1.64	1.946e+000
933.86	4001.93	73	20	38	68	3.00	1.782e+000
1238.39	5316.80	76	23	45	92	1.63	2.353e+000
1377.44	5917.15	38	16	31	49	0.71	1.283e+000
1729.15	7435.71	45	11	19	16	2.96	1.839e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081945 PIONEER PESHTIGO SITE B-6

Sample Size . . . . . 7.15e+002 g | Spectrum File . .H:\MAESTROS\081945.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 10:39
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3605 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.75	292.65	340	53	98	702	0.81	a
2	77.02	302.45	580	55	98	736	0.98	b
3	83.98	332.48	106	62	127	844	1.31	a NET < CL
4	87.19	346.35	216	58	112	788	1.03	b
5	93.01	371.48	295	57	108	800	1.70	
6	185.96	772.83	436	53	98	623	1.31	
7	238.71	1000.57	1493	58	88	446	1.05	a
8	241.72	1013.56	460	66	133	690	1.96	b
9	270.49	1137.77	74	41	81	386	0.68	NET < CL
10	295.24	1244.62	750	46	76	285	1.20	a
11	300.20	1266.06	66	24	43	169	0.64	b
12	328.33	1387.52	40	32	62	261	0.49	NET < CL
13	338.32	1430.63	281	34	60	235	0.97	
14	351.89	1489.23	1328	46	57	201	1.23	
15	463.23	1969.97	92	23	43	115	4.96	
16	510.72	2174.98	194	32	58	179	2.05	
17	583.41	2488.83	482	30	42	101	1.42	
18	609.38	2600.97	958	38	44	114	1.35	
19	665.55	2843.47	39	18	34	72	0.94	
20	727.27	3109.98	131	21	35	70	1.48	
21	768.37	3287.43	78	22	41	94	1.28	
22	795.02	3402.51	88	18	31	49	1.98	
23	861.04	3687.54	40	20	38	77	1.19	
24	911.30	3904.56	327	24	32	51	1.94	
25	933.84	4001.84	44	17	32	57	1.86	
26	964.60	4134.69	71	25	50	77	1.99	a
27	969.16	4154.36	187	20	31	50	1.54	b
28	1120.33	4807.05	233	22	33	55	1.61	
29	1238.44	5316.99	51	19	36	70	0.88	
30	1377.59	5917.80	58	10	15	11	1.49	

31	1408.19	6049.92	18	14	27	37	0.75	NET < CL
32	1460.86	6277.32	984	34	28	36	1.76	
33	1729.32	7436.44	40	10	16	12	1.93	
34	1764.37	7587.75	170	17	24	25	2.63	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081945 PIONEER PESHTIGO SITE B-6

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-14-08 10:39
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.75	0.81	340	53	286	53	
3	83.98	1.31	106	62	93	63	NET < CL
5	93.01	1.70	295	57	245	57	
6	185.96	1.31	436	53	407	54	
7	238.71	1.05	1493	58	1468	58	
10	295.24	1.20	750	46	721	46	
14	351.89	1.23	1328	46	1272	46	
16	510.72	2.05	194	32	107	32	
17	583.41	1.42	482	30	459	30	
18	609.38	1.35	958	38	864	38	
24	911.30	1.94	327	24	304	24	
27	969.16	1.54	187	20	175	21	
28	1120.33	1.61	233	22	217	22	
32	1460.86	1.76	984	34	799	34	
34	1764.37	2.63	170	17	150	17	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081945 PIONEER PESHTIGO SITE B-6

Sample Size	7.15e+002 g	Spectrum File . .	H:\MAESTROS\081945.CHN
Sampling Start.	00-00-00 00:00	Counting Start.	08-14-08 10:39
Sampling Stop	00-00-00 00:00	Buildup Time.	0.00e+000 Hrs
Current Date.	00-00-00 00:00	Decay Time [OFF].	0.00e+000 Hrs
Efficiency File.	H:\GDR\EFF\500MAR.EFF	Library File. . . .	H:\GDR\LIB\1001.LIB
ID.	500 MARINELLI	ID.	TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Pb-212	Average:	1.03e-006	+-4.07e-008	1.06e+001	4 of 4
	74.82		I.D.Only		
	77.11		I.D.Only		
	238.63	1.04e-006	+-4.12e-008		
	300.09	7.21e-007	+-2.63e-007		
Pb-214	Average:	1.43e-006	+-4.46e-008	4.47e-001	4 of 4
	77.11		I.D.Only		
	241.98	1.44e-006	+-2.83e-007		
	295.21	1.38e-006	+-8.81e-008		
	351.92	1.44e-006	+-5.26e-008		
Th-234	92.80		I.D.Only	5.78e+002	1 of 3
Ra-226	186.10		I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	1.00e-006	+-5.79e-008	6.13e+000	3 of 3
	338.32	1.01e-006	+-1.24e-007		
	911.07	9.98e-007	+-7.86e-008		
	969.11	1.01e-006	+-1.18e-007		
Tl-208	Average:	3.40e-007	+-2.19e-008	5.09e-002	2 of 3
	510.84	2.80e-007	+-8.40e-008		
	583.14	3.44e-007	+-2.27e-008		
Bi-214	Average:	1.27e-006	+-4.83e-008	3.32e-001	4 of 4
	609.31	1.22e-006	+-5.38e-008		
	768.36	1.22e-006	+-3.45e-007		
	1120.30	1.54e-006	+-1.58e-007		
	1764.50	1.48e-006	+-1.72e-007		
Bi-212	727.17	1.47e-006	+-2.30e-007	1.01e+000	1 of 4
K-40	1460.80	1.00e-005	+-4.30e-007	1.12e+013	1 of 1
TOTAL:		1.66e-005 uCi/g			

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
87.19	346.35	216	58	112	788	1.03	1.875e+000
463.23	1969.97	92	23	43	115	4.96	1.283e+000
665.55	2843.47	39	18	34	72	0.94	7.263e-001
795.02	3402.51	88	18	31	49	1.98	1.895e+000
861.04	3687.54	40	20	38	77	1.19	9.194e-001
933.84	4001.84	44	17	32	57	1.86	1.089e+000
964.60	4134.69	71	25	50	77	1.99	1.779e+000
1238.44	5316.99	51	19	36	70	0.88	1.579e+000
1377.59	5917.80	58	10	15	11	1.49	1.946e+000
1729.32	7436.44	40	10	16	12	1.93	1.628e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081946 PIONEER PESHTIGO SITE B-8

Sample Size . . . . . 7.67e+002 g | Spectrum File . .H:\MAESTROS\081946.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 11:43
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3607 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.05	242.12	234	60	113	945	1.21	
2	74.42	291.23	613	73	138	1249	0.99	a
3	76.66	300.91	1030	72	127	1220	0.99	b
4	86.83	344.79	183	68	130	1332	0.62	
5	92.40	368.86	580	70	130	1238	1.21	
6	185.72	771.77	814	68	121	1088	1.17	
7	238.43	999.34	1640	70	118	766	1.06	a
8	241.67	1013.34	1026	68	122	828	1.33	b
9	269.98	1135.58	212	57	113	672	2.00	
10	294.94	1243.36	2170	66	96	445	1.23	a
11	299.69	1263.84	87	30	56	251	0.71	b
12	327.76	1385.06	84	41	81	399	0.92	
13	337.99	1429.23	290	46	86	450	0.90	
14	351.64	1488.14	3521	71	80	390	1.29	
15	462.52	1966.88	89	32	63	228	1.04	
16	510.44	2173.79	229	35	65	230	1.95	
17	582.98	2486.99	583	37	57	180	1.38	
18	609.09	2599.73	2721	57	46	124	1.48	
19	665.30	2842.40	91	25	47	130	1.78	
20	727.05	3109.01	128	25	45	110	1.79	
21	768.14	3286.45	298	27	42	88	2.40	
22	785.88	3363.03	61	24	45	119	1.52	
23	795.09	3402.79	95	20	36	68	2.37	
24	806.11	3450.36	64	20	36	76	2.31	
25	860.81	3686.54	50	22	43	103	1.59	
26	911.01	3903.31	364	29	46	112	2.22	
27	933.49	4000.36	87	25	48	119	1.16	
28	968.80	4152.79	215	26	45	110	1.53	
29	1120.05	4805.84	511	32	46	104	1.58	
30	1154.58	4954.91	64	19	36	70	1.21	

31	1237.97	5314.95	206	24	41	84	1.53	
32	1280.36	5498.01	75	16	27	37	1.96	
33	1377.36	5916.82	173	19	29	37	2.03	
34	1400.93	6018.58	60	18	34	38	1.98	a
35	1407.43	6046.64	75	21	42	49	2.28	b
36	1460.52	6275.86	850	34	35	56	2.18	
37	1508.83	6484.45	86	18	33	48	3.58	
38	1729.11	7435.50	79	14	24	27	1.75	
39	1764.09	7586.55	462	25	25	26	2.45	
40	1847.03	7944.65	80	11	14	9	1.64	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081946 PIONEER PESHTIGO SITE B-8

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-14-08 11:43
ID.:. . . . . 24 Hour Background | Current Date . . . . . , 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
2	74.42	0.99	613	73	575	73	
5	92.40	1.21	580	70	530	70	
6	185.72	1.17	814	68	785	68	
7	238.43	1.06	1640	70	1610	71	
10	294.94	1.23	2170	66	2147	66	
14	351.64	1.29	3521	71	3465	71	
16	510.44	1.95	229	35	142	35	
17	582.98	1.38	583	37	560	37	
18	609.09	1.48	2721	57	2627	57	
26	911.01	2.22	364	29	341	30	
28	968.80	1.53	215	26	203	26	
29	1120.05	1.58	511	32	495	32	
36	1460.52	2.18	850	34	665	34	
39	1764.09	2.45	462	25	442	25	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081946 PIONEER PESHTIGO SITE B-8

Sample Size . . . . . 7.67e+002 g | Spectrum File . .H:\MAESTROS\081946.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 11:43
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Th-234	63.29	I.D.Only	5.78e+002	2 of 3
	92.80	I.D.Only		
Pb-212	Average:	1.06e-006 +-4.61e-008	1.06e+001	3 of 4
	74.82	I.D.Only		
	238.63	1.06e-006 +-4.66e-008		
	300.09	8.89e-007 +-3.07e-007		
Pb-214	Average:	3.71e-006 +-6.17e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	3.66e-006 +-2.70e-007		
	295.21	3.83e-006 +-1.17e-007		
	351.92	3.66e-006 +-7.54e-008		
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	1.04e-006 +-6.83e-008	6.13e+000	3 of 3
	338.32	9.73e-007 +-1.53e-007		
	911.07	1.04e-006 +-9.05e-008		
	969.11	1.09e-006 +-1.42e-007		
Tl-208	Average:	3.88e-007 +-2.48e-008	5.09e-002	2 of 3
	510.84	3.48e-007 +-8.66e-008		
	583.14	3.92e-007 +-2.59e-008		
Bi-214	Average:	3.53e-006 +-6.66e-008	3.32e-001	4 of 4
	609.31	3.46e-006 +-7.52e-008		
	768.36	4.36e-006 +-3.89e-007		
	1120.30	3.28e-006 +-2.11e-007		
	1764.50	4.07e-006 +-2.26e-007		
Bi-212	Average:	1.40e-006 +-2.54e-007	1.01e+000	2 of 4
	727.17	1.34e-006 +-2.57e-007		
	785.46	4.14e-006 +-1.62e-006		
K-40	1460.80	7.78e-006 +-3.95e-007	1.12e+013	1 of 1

TOTAL: 1.89e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.83	344.79	183	68	130	1332	0.62	1.595e+000
269.98	1135.58	212	57	113	672	2.00	1.937e+000
327.76	1385.06	84	41	81	399	0.92	8.871e-001
462.52	1966.88	89	32	63	228	1.04	1.234e+000
665.30	2842.40	91	25	47	130	1.78	1.697e+000
795.09	3402.79	95	20	36	68	2.37	2.036e+000
806.11	3450.36	64	20	36	76	2.31	1.394e+000
860.81	3686.54	50	22	43	103	1.59	1.141e+000
933.49	4000.36	87	25	48	119	1.16	2.136e+000
1154.58	4954.91	64	19	36	70	1.21	1.870e+000
1237.97	5314.95	206	24	41	84	1.53	6.364e+000
1280.36	5498.01	75	16	27	37	1.96	2.396e+000
1377.36	5916.82	173	19	29	37	2.03	5.841e+000
1400.93	6018.58	60	18	34	38	1.98	2.052e+000
1407.43	6046.64	75	21	42	49	2.28	2.591e+000
1508.83	6484.45	86	18	33	48	3.58	3.132e+000
1729.11	7435.50	79	14	24	27	1.75	3.222e+000
1847.03	7944.65	80	11	14	9	1.64	3.451e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081946A PIONEER RE-RUN B-8 4-6 767.7g

Sample Size . . . . . 7.68e+002 g | Spectrum File . h:\maestros\081946A.chn
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 10-28-08 16:22
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3607 Sec

Detector #: 1

Energy(keV)= 6.68 + 0.231*Ch + 5.01e-008*Ch^2 + 0.00e+000*Ch^3 10-28-08 09:11

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	62.33	240.65	119	59	113	1010	0.79	
2	74.09	291.49	616	70	131	1180	0.91	a
3	76.28	300.95	992	73	130	1265	0.95	b
4	83.30	331.31	113	65	128	1090	0.89	a NET < CL
5	86.38	344.63	400	69	132	1205	0.98	b
6	91.99	368.89	531	72	134	1315	1.34	
7	185.23	772.02	1025	70	123	1053	1.22	
8	208.41	872.23	167	57	110	843	1.23	
9	237.86	999.51	1750	73	124	805	1.09	a
10	241.11	1013.56	986	67	122	816	1.36	b
11	269.27	1135.31	256	50	95	555	1.64	
12	294.41	1243.94	2157	67	99	475	1.18	a
13	299.28	1264.98	91	42	84	409	1.13	b
14	337.55	1430.42	308	44	80	417	1.33	
15	351.06	1488.81	3772	72	74	354	1.39	
16	462.31	1969.52	195	32	59	186	1.40	
17	510.23	2176.58	261	36	66	228	2.03	
18	582.37	2488.23	534	38	61	212	1.17	
19	608.51	2601.13	2745	58	50	137	1.36	
20	664.86	2844.53	53	25	47	138	0.86	
21	726.41	3110.38	117	25	47	120	1.34	
22	767.61	3288.32	225	29	52	140	1.46	
23	785.18	3364.19	65	25	49	121	3.13	
24	794.50	3404.42	103	24	46	106	1.48	
25	805.49	3451.87	66	24	45	117	1.33	
26	838.92	3596.22	36	21	42	95	2.25	NET < CL
27	859.99	3687.19	70	21	39	89	3.53	
28	910.44	3905.00	398	30	45	109	1.88	
29	933.41	4004.16	118	25	45	109	1.08	
30	963.99	4136.20	61	24	47	93	1.45	a

31	968.35	4155.02	217	26	44	89	1.59	b
32	1119.67	4808.14	538	31	44	92	2.12	
33	1154.72	4959.36	73	19	35	64	1.57	
34	1237.80	5317.85	201	24	40	77	1.64	
35	1280.82	5503.48	73	20	37	65	1.94	
36	1377.42	5920.18	150	20	32	48	1.42	
37	1407.38	6049.41	67	17	31	42	2.29	
38	1460.72	6279.49	868	34	35	52	2.39	
39	1509.08	6488.00	81	16	28	38	1.70	
40	1630.66	7012.27	15	12	24	25	0.65	NET < CL
41	1729.93	7440.24	74	17	31	41	2.19	
42	1764.86	7590.81	437	24	24	25	1.90	
43	1847.93	7948.84	29	14	27	33	0.72	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081946A PIONEER RE-RUN B-8 4-6 767.7g

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 10-28-08 16:22
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
2	74.09	0.91	616	70	603	70	
6	91.99	1.34	531	72	481	72	
7	185.23	1.22	1025	70	1012	70	
9	237.86	1.09	1750	73	1734	73	
12	294.41	1.18	2157	67	2148	67	
15	351.06	1.39	3772	72	3752	72	
17	510.23	2.03	261	36	174	36	
18	582.37	1.17	534	38	526	38	
19	608.51	1.36	2745	58	2651	58	
28	910.44	1.88	398	30	375	30	
31	968.35	1.59	217	26	205	26	
32	1119.67	2.12	538	31	522	31	
38	1460.72	2.39	868	34	683	34	
42	1764.86	1.90	437	24	417	24	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081946A PIONEER RE-RUN B-8 4-6 767.7g

Sample Size . . . . . 7.68e+002 g | Spectrum File . h:\maestros\081946A.chn
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 10-28-08 16:22
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Th-234	63.29	I.D.Only	5.78e+002	2 of 3
	92.80	I.D.Only		
Pb-212	Average:	1.14e-006 +-4.81e-008	1.06e+001	3 of 4
	74.82	I.D.Only		
	238.63	1.14e-006 +-4.84e-008		
	300.09	9.27e-007 +-4.32e-007		
Pb-214	Average:	3.92e-006 +-6.19e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	3.91e-006 +-2.67e-007		
	295.21	3.82e-006 +-1.19e-007		
	351.92	3.95e-006 +-7.55e-008		
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	1.11e-006 +-6.77e-008	6.13e+000	3 of 3
	338.32	1.03e-006 +-1.46e-007		
	911.07	1.15e-006 +-9.13e-008		
	969.11	1.10e-006 +-1.39e-007		
Tl-208	Average:	3.72e-007 +-2.53e-008	5.09e-002	2 of 3
	510.84	4.25e-007 +-8.90e-008		
	583.14	3.68e-007 +-2.64e-008		
Bi-214	Average:	3.52e-006 +-6.72e-008	3.32e-001	4 of 4
	609.31	3.49e-006 +-7.62e-008		
	768.36	3.29e-006 +-4.27e-007		
	1120.30	3.46e-006 +-2.08e-007		
	1764.50	3.84e-006 +-2.19e-007		
Bi-212	Average:	1.29e-006 +-2.60e-007	1.01e+000	2 of 4
	727.17	1.22e-006 +-2.63e-007		
	785.46	4.43e-006 +-1.71e-006		
K-40	1460.80	7.99e-006 +-3.98e-007	1.12e+013	1 of 1

TOTAL: 1.93e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.38	344.63	400	69	132	1205	0.98	3.512e+000
208.41	872.23	167	57	110	843	1.23	1.287e+000
269.27	1135.31	256	50	95	555	1.64	2.334e+000
462.31	1969.52	195	32	59	186	1.40	2.695e+000
664.86	2844.53	53	25	47	138	0.86	9.862e-001
794.50	3404.42	103	24	46	106	1.48	2.210e+000
805.49	3451.87	66	24	45	117	1.33	1.433e+000
859.99	3687.19	70	21	39	89	3.53	1.615e+000
933.41	4004.16	118	25	45	109	1.08	2.887e+000
963.99	4136.20	61	24	47	93	1.45	1.548e+000
1154.72	4959.36	73	19	35	64	1.57	2.125e+000
1237.80	5317.85	201	24	40	77	1.64	6.230e+000
1280.82	5503.48	73	20	37	65	1.94	2.318e+000
1377.42	5920.18	150	20	32	48	1.42	5.066e+000
1407.38	6049.41	67	17	31	42	2.29	2.315e+000
1509.08	6488.00	81	16	28	38	1.70	2.936e+000
1729.94	7440.24	74	17	31	41	2.19	3.020e+000
1847.93	7948.84	29	14	27	33	0.72	1.232e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081947 PIONEER PESHTIGO SITE B-9

Sample Size . . . . . 6.88e+002 g | Spectrum File . .H:\MAESTROS\081947.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 12:46
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3605 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.50	291.57	380	55	103	753	0.86	a
2	76.79	301.47	539	57	102	765	1.00	b
3	86.84	344.86	267	56	106	823	1.41	
4	92.54	369.48	358	55	101	748	1.94	
5	185.92	772.62	425	52	94	616	1.29	
6	209.04	872.46	103	41	78	485	0.79	
7	238.42	999.32	1654	65	105	547	1.19	a
8	241.52	1012.70	503	53	99	538	1.34	b
9	270.41	1137.44	102	41	80	390	1.52	
10	294.95	1243.38	911	47	74	276	1.19	a
11	299.82	1264.42	120	41	82	318	1.33	b
12	338.09	1429.63	266	33	57	221	0.91	
13	351.67	1488.30	1483	50	63	246	1.26	
14	409.07	1736.13	80	28	54	168	1.43	
15	462.48	1966.69	94	25	47	138	0.88	
16	510.60	2174.47	261	31	54	160	1.49	
17	582.98	2486.98	538	32	45	117	1.29	
18	609.12	2599.85	1121	42	51	149	1.39	
19	726.99	3108.78	110	21	36	76	1.14	
20	767.98	3285.74	105	22	40	82	1.48	
21	785.42	3361.02	56	16	29	48	1.07	
22	794.72	3401.18	50	19	36	81	1.45	
23	860.18	3683.82	57	18	35	63	0.96	
24	910.97	3903.10	290	26	41	88	1.67	
25	933.88	4002.02	73	16	28	43	2.73	
26	964.06	4132.35	60	20	40	62	1.63	a
27	968.75	4152.60	239	25	42	69	1.75	b
28	1120.02	4805.70	234	23	35	62	1.40	
29	1237.92	5314.76	113	16	24	30	2.32	
30	1377.39	5916.96	67	15	25	31	1.69	

31	1407.38	6046.43	31	13	24	27	2.33
32	1460.55	6276.01	746	31	28	38	2.21
33	1508.86	6484.58	25	12	22	25	0.92
34	1587.51	6824.15	33	13	25	31	1.09
35	1729.29	7436.30	57	9	10	4	2.12
36	1764.22	7587.12	224	18	20	17	1.92

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081947 PIONEER PESHTIGO SITE B-9

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-14-08 12:46
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.50	0.86	380	55	341	56	
4	92.54	1.94	358	55	308	55	
5	185.92	1.29	425	52	396	52	
7	238.42	1.19	1654	65	1623	65	
10	294.95	1.19	911	47	889	47	
13	351.67	1.26	1483	50	1427	50	
16	510.60	1.49	261	31	174	31	
17	582.98	1.29	538	32	515	32	
18	609.12	1.39	1121	42	1027	42	
24	910.97	1.67	290	26	267	26	
27	968.75	1.75	239	25	227	25	
28	1120.02	1.40	234	23	218	23	
32	1460.55	2.21	746	31	561	31	
36	1764.22	1.92	224	18	204	18	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081947 PIONEER PESHTIGO SITE B-9

Sample Size . . . . . 6.88e+002 g | Spectrum File . .H:\MAESTROS\081947.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 12:46
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Pb-212	Average:	1.20e-006	+-4.79e-008	1.06e+001	4 of 4
	74.82		I.D.Only		
	77.11		I.D.Only		
	238.63	1.20e-006	+-4.81e-008		
	300.09	1.37e-006	+-4.65e-007		
Pb-214	Average:	1.70e-006	+-4.87e-008	4.47e-001	4 of 4
	77.11		I.D.Only		
	241.98	1.68e-006	+-2.37e-007		
	295.21	1.77e-006	+-9.36e-008		
	351.92	1.68e-006	+-5.87e-008		
Th-234	92.80		I.D.Only	5.78e+002	1 of 3
Ra-226	186.10		I.D.Only	1.40e+007	1 of 1
Ra-224	240.98	1.04e-006	+-4.49e-007	8.69e+001	1 of 1
Ac-228	Average:	1.02e-006	+-6.54e-008	6.13e+000	3 of 3
	338.32	9.94e-007	+-1.23e-007		
	911.07	9.10e-007	+-8.96e-008		
	969.11	1.36e-006	+-1.52e-007		
Tl-208	Average:	4.08e-007	+-2.41e-008	5.09e-002	2 of 3
	510.84	4.76e-007	+-8.55e-008		
	583.14	4.02e-007	+-2.51e-008		
Bi-214	Average:	1.58e-006	+-5.46e-008	3.32e-001	4 of 4
	609.31	1.51e-006	+-6.16e-008		
	768.36	1.71e-006	+-3.58e-007		
	1120.30	1.61e-006	+-1.70e-007		
	1764.50	2.09e-006	+-1.83e-007		
Bi-212	Average:	1.39e-006	+-2.36e-007	1.01e+000	2 of 4
	727.17	1.28e-006	+-2.41e-007		
	785.46	4.29e-006	+-1.22e-006		

K-40 1460.80 7.31e-006 +-4.00e-007 1.12e+013 1 of 1

TOTAL: 1.57e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.84	344.86	267	56	106	823	1.41	2.327e+000
209.04	872.46	103	41	78	485	0.79	7.911e-001
270.41	1137.44	102	41	80	390	1.52	9.328e-001
409.07	1736.13	80	28	54	168	1.43	1.007e+000
462.48	1966.69	94	25	47	138	0.88	1.303e+000
794.72	3401.18	50	19	36	81	1.45	1.076e+000
860.18	3683.82	57	18	35	63	0.96	1.309e+000
933.88	4002.02	73	16	28	43	2.73	1.785e+000
964.06	4132.35	60	20	40	62	1.63	1.510e+000
1237.92	5314.76	113	16	24	30	2.32	3.496e+000
1377.39	5916.96	67	15	25	31	1.69	2.274e+000
1407.38	6046.43	31	13	24	27	2.33	1.071e+000
1508.86	6484.58	25	12	22	25	0.92	8.917e-001
1587.51	6824.15	33	13	25	31	1.09	1.265e+000
1729.29	7436.30	57	9	10	4	2.12	2.305e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081948 PIONEER PESHTIGO SITE B-10

Sample Size	7.00e+002 g	Spectrum File . .	H:\MAESTROS\081948.CHN
Sampling Start.	.00-00-00 00:00	Counting Start.	08-14-08 14:59
Sampling Stop	.00-00-00 00:00	Live Time	3600 Sec
Current Date.	.00-00-00 00:00	Real Time	3605 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	0 / 8191
Sigma Multiplier.	1.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.50	291.58	347	61	117	825	0.93	a
2	76.81	301.56	564	52	90	659	0.87	b
3	83.97	332.45	100	45	85	566	0.77	a
4	86.98	345.45	192	58	115	811	1.03	b
5	92.60	369.71	284	57	108	811	1.97	
6	185.86	772.36	469	51	92	579	1.74	
7	209.07	872.58	179	50	98	591	1.34	
8	238.48	999.55	1680	62	96	486	1.17	a
9	241.58	1012.97	495	55	104	552	1.41	b
10	270.40	1137.38	102	40	78	375	1.15	
11	295.06	1243.84	849	45	70	265	1.13	a
12	299.68	1263.81	73	29	55	225	0.82	b
13	327.62	1384.44	82	32	61	238	1.00	
14	338.13	1429.80	326	37	64	255	0.97	
15	351.73	1488.53	1423	47	55	198	1.35	
16	462.64	1967.39	86	26	48	150	1.23	
17	510.54	2174.23	234	29	50	156	1.63	
18	582.98	2486.98	524	30	40	90	1.64	
19	609.07	2599.64	1066	38	40	95	1.81	
20	727.36	3110.38	147	23	39	77	2.56	
21	767.99	3285.79	115	22	40	73	1.95	
22	785.88	3363.01	41	20	38	76	1.49	
23	794.98	3402.31	57	20	37	70	1.14	
24	860.14	3683.63	30	20	38	90	0.82	NET < CL
25	910.95	3903.01	347	25	35	63	1.68	
26	933.95	4002.32	42	16	29	51	2.85	
27	964.74	4135.28	60	21	42	61	2.23	a
28	968.70	4152.36	207	22	34	51	1.40	b
29	1120.02	4805.71	254	20	26	33	2.01	
30	1238.05	5315.32	79	17	31	48	4.49	

31	1377.25	5916.33	70	13	21	20	1.66
32	1460.40	6275.33	745	30	25	28	2.16
33	1630.85	7011.29	24	10	17	11	2.00
34	1729.34	7436.50	35	11	20	19	1.47
35	1764.00	7586.16	177	16	19	16	1.80

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081948 PIONEER PESHTIGO SITE B-10

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-14-08 14:59
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.50	0.93	347	61	306	61	
3	83.97	0.77	100	45	93	45	
5	92.60	1.97	284	57	234	57	
6	185.86	1.74	469	51	440	51	
8	238.48	1.17	1680	62	1648	62	
11	295.06	1.13	849	45	825	45	
15	351.73	1.35	1423	47	1367	47	
17	510.54	1.63	234	29	147	30	
18	582.98	1.64	524	30	501	30	
19	609.07	1.81	1066	38	972	38	
25	910.95	1.68	347	25	324	25	
28	968.70	1.40	207	22	195	22	
29	1120.02	2.01	254	20	238	20	
32	1460.40	2.16	745	30	560	30	
35	1764.00	1.80	177	16	157	16	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081948 PIONEER PESHTIGO SITE B-10

Sample Size . . . . . 7.00e+002 g | Spectrum File . .H:\MAESTROS\081948.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 14:59
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	Average:	1.19e-006 +-4.47e-008	1.06e+001	4 of 4
	74.82	I.D.Only		
	77.11	I.D.Only		
	238.63	1.19e-006 +-4.51e-008		
	300.09	8.20e-007 +-3.25e-007		
Pb-214	Average:	1.59e-006 +-4.54e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	1.58e-006 +-2.40e-007		
	295.21	1.61e-006 +-8.81e-008		
	351.92	1.58e-006 +-5.43e-008		
Th-228	84.37	I.D.Only	1.68e+004	1 of 2
Th-234	92.80	I.D.Only	5.78e+002	1 of 3
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ra-224	240.98	1.09e-006 +-4.55e-007	8.69e+001	1 of 1
Ac-228	Average:	1.13e-006 +-6.26e-008	6.13e+000	3 of 3
	338.32	1.20e-006 +-1.35e-007		
	911.07	1.09e-006 +-8.48e-008		
	969.11	1.15e-006 +-1.28e-007		
Tl-208	Average:	3.85e-007 +-2.23e-008	5.09e-002	2 of 3
	510.84	3.95e-007 +-7.97e-008		
	583.14	3.84e-007 +-2.33e-008		
Bi-214	Average:	1.47e-006 +-4.90e-008	3.32e-001	4 of 4
	609.31	1.40e-006 +-5.55e-008		
	768.36	1.85e-006 +-3.50e-007		
	1120.30	1.73e-006 +-1.48e-007		
	1764.50	1.58e-006 +-1.62e-007		
Bi-212	Average:	1.72e-006 +-2.54e-007	1.01e+000	2 of 4
	727.17	1.68e-006 +-2.58e-007		

	785.46	3.05e-006 +-1.47e-006			
K-40	1460.80	7.18e-006 +-3.84e-007	1.12e+013	1 of	1

TOTAL: 1.57e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.98	345.45	192	58	115	811	1.03	1.674e+000
209.07	872.58	179	50	98	591	1.34	1.379e+000
270.40	1137.38	102	40	78	375	1.15	9.328e-001
327.62	1384.44	82	32	61	238	1.00	8.657e-001
462.64	1967.39	86	26	48	150	1.23	1.190e+000
794.98	3402.31	57	20	37	70	1.14	1.235e+000
933.95	4002.32	42	16	29	51	2.85	1.032e+000
964.74	4135.28	60	21	42	61	2.23	1.525e+000
1238.05	5315.32	79	17	31	48	4.49	2.448e+000
1377.25	5916.33	70	13	21	20	1.66	2.354e+000
1630.85	7011.29	24	10	17	11	2.00	9.176e-001
1729.34	7436.50	35	11	20	19	1.47	1.424e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081949 PIONEET PESHTIGO SITE B-11

Sample Size . . . . . 7.49e+002 g | Spectrum File . .H:\MAESTROS\081949.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 16:00
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3604 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.32	290.81	211	51	97	677	0.83	a
2	76.66	300.88	443	55	100	762	0.98	b
3	86.81	344.73	200	49	91	658	0.97	
4	92.38	368.78	254	52	97	698	1.51	
5	185.49	770.77	543	51	91	513	1.88	
6	208.88	871.76	86	42	81	488	0.95	
7	238.29	998.73	1127	55	90	442	1.10	a
8	241.33	1011.86	370	50	95	483	1.32	b
9	270.05	1135.87	102	36	70	317	2.14	
10	294.82	1242.81	718	46	78	279	1.30	a
11	299.80	1264.35	68	27	50	182	0.83	b
12	337.97	1429.14	265	33	56	207	1.45	
13	351.53	1487.68	1270	45	56	192	1.24	
14	462.54	1966.99	72	23	43	114	2.04	
15	510.56	2174.31	206	29	51	152	1.55	
16	582.84	2486.40	404	28	40	87	1.58	
17	608.93	2599.04	954	37	40	95	1.45	
18	726.80	3107.95	67	21	39	89	1.30	
19	768.35	3287.32	68	21	40	90	1.40	
20	795.02	3402.48	45	19	36	67	1.24	
21	860.15	3683.70	36	17	31	60	1.38	
22	910.77	3902.28	257	24	36	67	1.37	
23	933.42	4000.05	48	16	29	48	1.60	
24	964.24	4133.14	53	20	39	57	1.57	a
25	968.61	4151.97	165	23	40	64	1.88	b
26	1119.84	4804.92	170	21	33	54	2.10	
27	1237.87	5314.53	66	19	35	62	2.32	
28	1377.45	5917.19	54	11	17	15	2.73	
29	1460.18	6274.39	862	31	21	20	2.10	
30	1729.13	7435.61	37	9	14	9	2.21	

31	1763.97	7586.05	139	15	20	17	1.65

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081949 PIONEET PESHTIGO SITE B-11

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-14-08 16:00
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.32	0.83	211	51	185	51	
4	92.38	1.51	254	52	204	52	
5	185.49	1.88	543	51	514	51	
7	238.29	1.10	1127	55	1100	56	
10	294.82	1.30	718	46	697	46	
13	351.53	1.24	1270	45	1214	45	
15	510.56	1.55	206	29	119	29	
16	582.84	1.58	404	28	381	28	
17	608.93	1.45	954	37	860	37	
22	910.77	1.37	257	24	234	24	
25	968.61	1.88	165	23	153	23	
26	1119.84	2.10	170	21	154	21	
29	1460.18	2.10	862	31	677	31	
31	1763.97	1.65	139	15	119	15	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081949 PIONEET PESHTIGO SITE B-11

Sample Size . . . . . 7.49e+002 g | Spectrum File . .H:\MAESTROS\081949.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-14-08 16:00
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs

Efficiency File.H:\GDR\EFF\500MAR.EFF | Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI | ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Pb-212	Average:	7.44e-007 +-3.72e-008	1.06e+001	4 of 4
	74.82	I.D.Only		
	77.11	I.D.Only		
	238.63	7.45e-007 +-3.76e-008		
	300.09	7.09e-007 +-2.79e-007		
Pb-214	Average:	1.30e-006 +-4.15e-008	4.47e-001	4 of 4
	77.11	I.D.Only		
	241.98	1.31e-006 +-2.04e-007		
	295.21	1.27e-006 +-8.42e-008		
	351.92	1.31e-006 +-4.90e-008		
Th-234	92.80	I.D.Only	5.78e+002	1 of 3
Ra-226	186.10	I.D.Only	1.40e+007	1 of 1
Ac-228	Average:	7.97e-007 +-5.56e-008	6.13e+000	3 of 3
	338.32	9.11e-007 +-1.12e-007		
	911.07	7.32e-007 +-7.43e-008		
	969.11	8.40e-007 +-1.27e-007		
Tl-208	Average:	2.75e-007 +-1.94e-008	5.09e-002	2 of 3
	510.84	2.99e-007 +-7.37e-008		
	583.14	2.73e-007 +-2.01e-008		
Bi-214	Average:	1.14e-006 +-4.42e-008	3.32e-001	4 of 4
	609.31	1.16e-006 +-4.98e-008		
	768.36	1.02e-006 +-3.21e-007		
	1120.30	1.04e-006 +-1.41e-007		
	1764.50	1.12e-006 +-1.44e-007		
Bi-212	727.17	7.20e-007 +-2.24e-007	1.01e+000	1 of 4
K-40	1460.80	8.11e-006 +-3.74e-007	1.12e+013	1 of 1
TOTAL:		1.31e-005 uCi/g		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
86.81	344.73	200	49	91	658	0.97	1.747e+000
208.88	871.76	86	42	81	488	0.95	6.586e-001
270.05	1135.87	102	36	70	317	2.14	9.288e-001
462.54	1966.99	72	23	43	114	2.04	9.982e-001
795.02	3402.48	45	19	36	67	1.24	9.582e-001
860.15	3683.71	36	17	31	60	1.38	8.268e-001
933.42	4000.04	48	16	29	48	1.60	1.166e+000
964.24	4133.14	53	20	39	57	1.57	1.329e+000
1237.87	5314.54	66	19	35	62	2.32	2.032e+000
1377.45	5917.19	54	11	17	15	2.73	1.835e+000
1729.13	7435.61	37	9	14	9	2.21	1.519e+000

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 081950 PIONEER PESHTIGO SITE B-12

Sample Size . . . . . 7.04e+002 g | Spectrum File . .H:\MAESTROS\081950.CHN
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 08-12-08 17:41
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3604 Sec

Detector #: 1

Energy(keV)= 6.97 + 0.232*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 07-21-08 11:19

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.39	243.60	80	48	94	611	0.77	NET < CL
2	74.81	292.91	382	61	118	781	1.15	a
3	76.95	302.17	554	52	92	630	0.97	b
4	87.13	346.10	87	51	97	747	0.62	NET < CL
5	92.67	370.03	310	51	92	674	1.64	
6	186.01	773.01	480	50	90	557	1.32	
7	238.53	999.81	1261	58	95	456	1.17	a
8	241.69	1013.42	466	53	99	496	1.50	b
9	269.82	1134.89	100	42	83	377	1.55	
10	277.24	1166.91	78	35	68	303	1.20	
11	295.10	1244.05	833	46	74	253	1.30	a
12	300.07	1265.48	85	38	76	267	1.40	b
13	327.80	1385.24	65	33	64	252	1.79	
14	338.12	1429.79	261	31	54	190	1.12	
15	351.81	1488.90	1364	46	54	190	1.34	
16	462.69	1967.63	58	22	42	113	1.71	
17	510.74	2175.09	214	28	49	127	1.97	
18	583.03	2487.21	363	29	44	120	1.35	
19	609.19	2600.16	1017	38	43	100	1.57	
20	727.14	3109.43	77	21	38	81	1.05	
21	768.33	3287.26	39	23	44	120	0.82	NET < CL
22	794.30	3399.40	72	18	33	56	4.58	
23	911.05	3903.48	278	23	34	63	1.74	
24	933.73	4001.39	51	15	28	42	1.39	
25	964.38	4133.73	69	21	42	61	1.60	a
26	968.83	4152.92	132	19	33	51	1.58	b
27	1119.96	4805.44	209	24	40	77	1.21	
28	1237.94	5314.85	106	17	27	39	1.74	
29	1376.89	5914.77	65	13	21	20	1.97	
30	1460.34	6275.10	796	31	26	31	2.52	

31	1729.27	7436.19	44	9	14	8	5.64
32	1763.97	7586.03	180	18	27	30	1.97
33	1846.76	7943.48	16	8	15	11	0.81

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 081950 PIONEER PESHTIGO SITE B-12

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 08-12-08 17:41
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
2	74.81	1.15	382	61	313	61	
5	92.67	1.64	310	51	260	51	
6	186.01	1.32	480	50	451	51	
7	238.53	1.17	1261	58	1230	58	
11	295.10	1.30	833	46	806	46	
15	351.81	1.34	1364	46	1308	46	
17	510.74	1.97	214	28	127	28	
18	583.03	1.35	363	29	340	29	
19	609.19	1.57	1017	38	923	38	
23	911.05	1.74	278	23	255	24	
26	968.83	1.58	132	19	120	20	
27	1119.96	1.21	209	24	193	24	
30	1460.34	2.52	796	31	611	31	
32	1763.97	1.97	180	18	160	19	

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 081950 PIONEER PESHTIGO SITE B-12

Sample Size . . . . . 7.04e+002 g	Spectrum File . .H:\MAESTROS\081950.CHN
Sampling Start. 00-00-00 00:00	Counting Start. 08-12-08 17:41
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.H:\GDR\EFF\500MAR.EFF	Library File. . . . H:\GDR\LIB\1001.LIB
ID. . . . . 500 MARINELLI	ID. . . . . TH, U, AND K SERIES

Eff.= 1/[2.90e-002*En^-2.65e+000 + 9.35e+001*En^8.20e-001] 02-19-08 12:00

Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Pb-212	Average:	8.87e-007	+-4.17e-008	1.06e+001	4 of 4
	74.82		I.D.Only		
	77.11		I.D.Only		
	238.63	8.86e-007	+-4.19e-008		
	300.09	9.46e-007	+-4.18e-007		
Pb-214	Average:	1.52e-006	+-4.46e-008	4.47e-001	4 of 4
	77.11		I.D.Only		
	241.98	1.51e-006	+-2.28e-007		
	295.21	1.57e-006	+-8.91e-008		
	351.92	1.51e-006	+-5.29e-008		
Th-234	92.80		I.D.Only	5.78e+002	1 of 3
Ra-226	186.10		I.D.Only	1.40e+007	1 of 1
Ra-224	240.98	9.70e-007	+-4.32e-007	8.69e+001	1 of 1
Tl-208	Average:	2.67e-007	+-2.12e-008	5.09e-002	3 of 3
	277.35	4.10e-007	+-1.85e-007		
	510.84	3.39e-007	+-7.54e-008		
	583.14	2.59e-007	+-2.22e-008		
Ac-228	Average:	8.39e-007	+-5.66e-008	6.13e+000	3 of 3
	338.32	9.55e-007	+-1.15e-007		
	911.07	8.50e-007	+-7.88e-008		
	969.11	6.99e-007	+-1.15e-007		
Bi-214	Average:	1.35e-006	+-5.04e-008	3.32e-001	3 of 4
	609.31	1.33e-006	+-5.49e-008		
	1120.30	1.40e-006	+-1.75e-007		
	1764.50	1.60e-006	+-1.86e-007		
Bi-212	727.17	8.73e-007	+-2.35e-007	1.01e+000	1 of 4
K-40	1460.80	7.78e-006	+-3.96e-007	1.12e+013	1 of 1

TOTAL: 1.45e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
269.82	1134.89	100	42	83	377	1.55	9.161e-001
327.80	1385.24	65	33	64	252	1.79	6.865e-001
462.69	1967.63	58	22	42	113	1.71	7.997e-001
794.30	3399.40	72	18	33	56	4.58	1.549e+000
933.73	4001.39	51	15	28	42	1.39	1.253e+000
964.38	4133.73	69	21	42	61	1.60	1.739e+000
1237.94	5314.85	106	17	27	39	1.74	3.265e+000
1376.89	5914.77	65	13	21	20	1.97	2.195e+000
1729.27	7436.19	44	9	14	8	5.64	1.786e+000
1846.76	7943.48	16	8	15	11	0.81	7.079e-001

GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

Sample ID : 082400 PIONEER B-13 2-4 539.5

Sample Size . . . . . 5.40e+002 g | Spectrum File . .H:\maestros\082400.chn
Sampling Start. . . . .00-00-00 00:00 | Counting Start. 10-16-08 11:14
Sampling Stop . . . . .00-00-00 00:00 | Live Time . . . . . 3600 Sec
Current Date. . . . . .00-00-00 00:00 | Real Time . . . . . 3604 Sec

Detector #: 1

Energy(keV)= 7.26 + 0.231*Ch + 3.28e-008*Ch^2 + 0.00e+000*Ch^3 10-16-08 10:31

FWHM(keV) = 0.94 + 0.015*En + 2.91e-004*En^2 + 0.00e+000*En^3 08-13-07 15:28
Where En = Sqrt(Energy in keV)

Sensitivity . . . . . 0.20 | Search Start / End. . . . . 0 / 8191
Sigma Multiplier. . . . . 1.00 |

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.85	292.38	294	51	96	594	0.94	a
2	77.09	302.09	319	43	76	490	0.83	b
3	87.19	345.77	106	39	72	478	1.09	
4	92.79	370.00	209	46	86	548	1.09	
5	185.75	772.04	314	43	78	421	1.14	
6	209.02	872.70	168	41	79	387	1.33	
7	238.59	1000.59	1034	56	94	448	1.21	a
8	241.76	1014.28	291	45	84	413	1.25	b
9	270.48	1138.48	64	36	71	291	1.30	NET < CL
10	295.09	1244.92	596	40	66	223	1.18	a
11	300.14	1266.73	37	22	41	142	0.64	b NET < CL
12	338.08	1430.80	208	32	57	198	1.41	
13	351.81	1490.17	1061	43	55	189	1.31	
14	462.70	1969.61	73	21	38	89	1.44	
15	510.87	2177.88	190	28	51	137	3.58	
16	583.11	2490.15	331	26	39	89	1.55	
17	609.10	2602.50	705	35	45	120	1.35	
18	727.34	3113.60	84	20	36	70	1.89	
19	768.39	3290.98	52	19	36	81	1.19	
20	794.52	3403.94	35	15	29	51	1.23	
21	911.08	3907.63	266	21	27	36	1.96	
22	964.64	4139.06	52	22	44	71	2.04	a
23	968.80	4157.01	100	20	35	61	1.23	b
24	1120.14	4810.85	174	19	28	39	1.56	
25	1237.95	5319.74	79	16	27	39	1.86	
26	1460.88	6282.49	714	30	27	33	2.29	
27	1729.89	7443.92	28	9	16	12	1.10	
28	1764.82	7594.70	141	13	9	4	2.21	

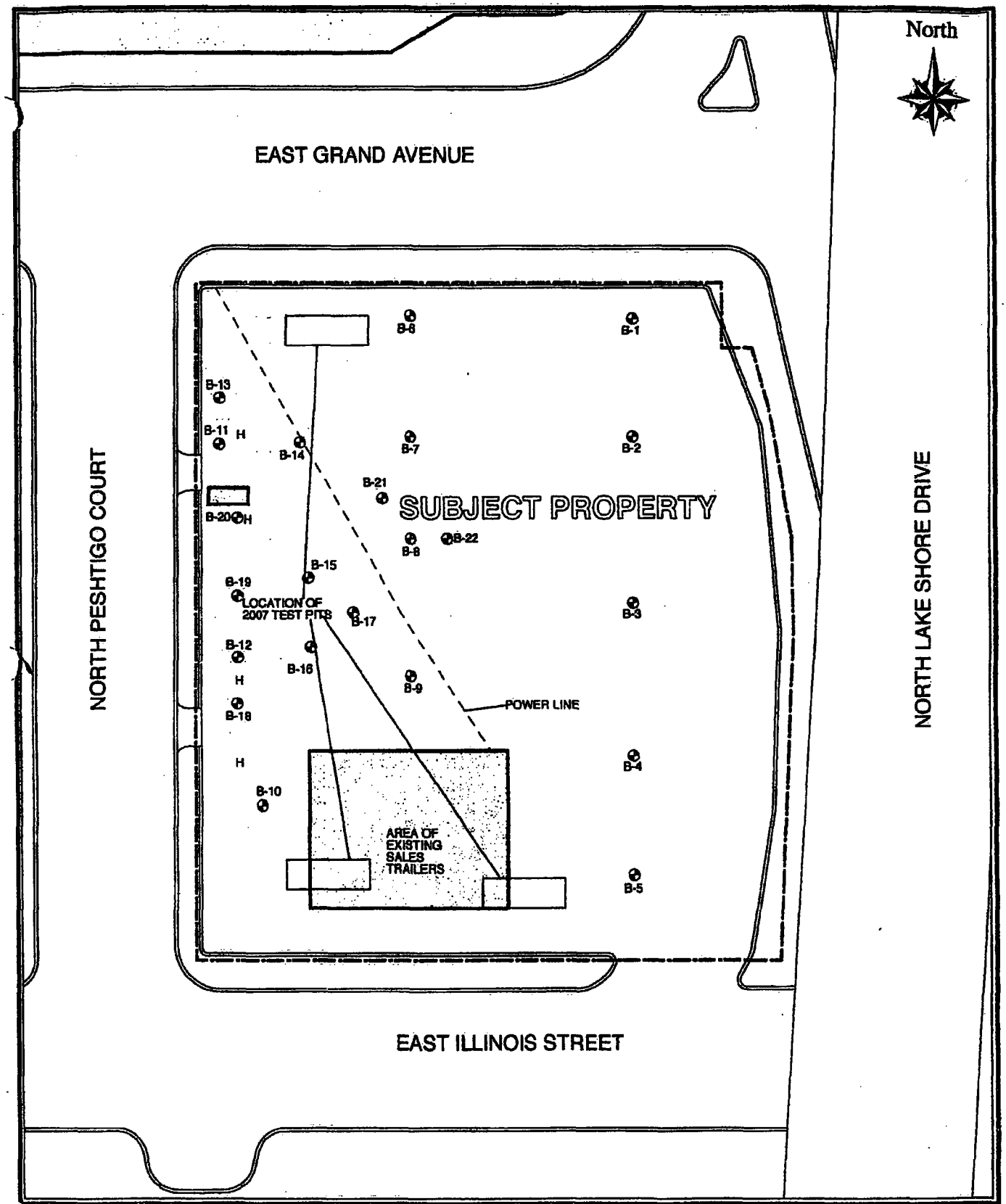
GDR/PC RSSI High Resolution Gamma Spectroscopy Ver. 6.02a

BACKGROUND SUBTRACT RESULTS

Sample ID : 082400 PIONEER B-13 2-4 539.5

Bkg File: . . . .H:\GDR\BKG\NOCAL.BKG | Counting Start. 10-16-08 11:14
ID.:. . . . . 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	74.85	0.94	294	51	229	51	
4	92.79	1.09	209	46	159	47	
5	185.75	1.14	314	43	285	44	
7	238.59	1.21	1034	56	1004	56	
10	295.09	1.18	596	40	570	40	
13	351.81	1.31	1061	43	1005	43	
15	510.87	3.58	190	28	103	29	
16	583.11	1.55	331	26	308	27	
17	609.10	1.35	705	35	611	35	
21	911.08	1.96	266	21	243	21	
23	968.80	1.23	100	20	88	20	
24	1120.14	1.56	174	19	158	19	
26	1460.88	2.29	714	30	529	30	
28	1764.82	2.21	141	13	121	13	



PIONEER Engineering & Environmental Services, Inc.

Legend:
Approximate Property Line
H=Handicapped Parking
Soil Boring Location

Scale: 1"=40'
0' 40'

Date: December 2008

Drawn by: Jackson Toomey

Checked by: Joe Kelly

Job No.: 07-1550-103

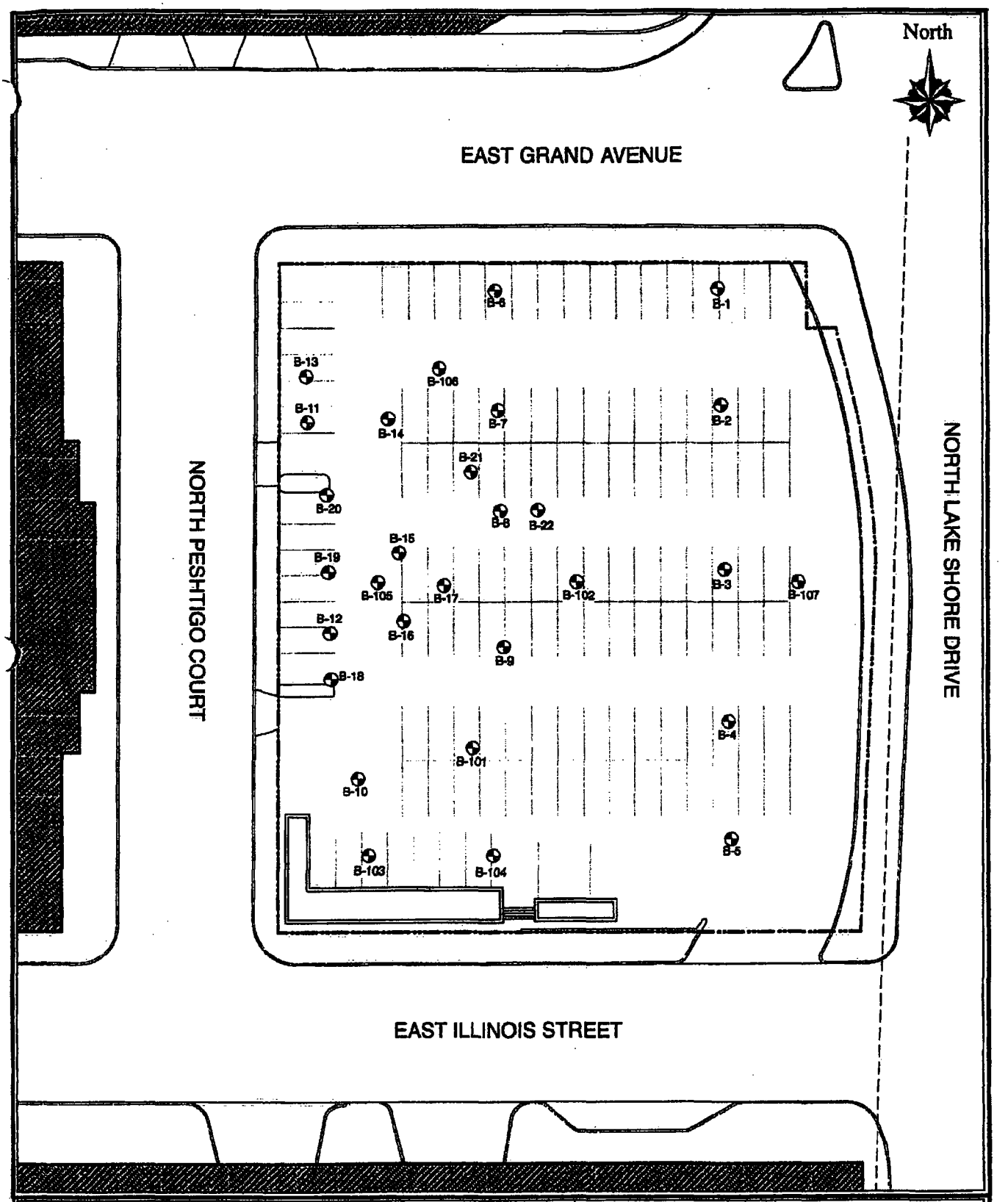
FIGURE 1
Site Diagram
550 N. Peshtigo Ct.
Chicago, IL

AECOM – Down-hole Gamma Results – June 29, 2011

Down-hole Gamma Results
June 29, 2011
515 North Peshtigo Court

Depth	B-101	B-102	B-103	B-104	B-105	B-106	B-107
(ft-bgs)	DTB: 10.53	DTB: 10.05	DTB: 11.52	DTB: 11.46	DTB: 11.51	DTB: 11.53	DTB: 10.11
0	220	273	269	222	247	279	323
0.5	460		224	198	267	295	
1		689					472
1.5	1513		777	857	1148	1528	
2		1569					1211
2.5	1152		921	1552		1891	
3		2086					1498
3.5	1150		1893	2313	1499	1569	
4							1423
4.5	1251		1435		1664	1381	
5		1660					1140
5.5	1177		894	1675	1778	1214	
6		1306					1196
6.5			1099	1460	920	1158	
7		1155					1135
7.5	1677		1309	1397	824	845	
8		1172					868
8.5	1213		827	911	1210	583	
9		877					880
9.5	1069		896	726	997	505	
10		629					561
10.5	935		1109	911	754	452	
11							
11.5			880	1006	561	533	

Notes: Conducted with a 1/2 by 1-inch NaI probe with a 1-inch lead end cap.
Site down-hole background estimated at 1,200 cpm.
Value equivalent to the USEPA threshold of 7.1 pCi/g is approximately 3,491 cpm.
= Values greater than twice background.



PIONEER ENVIRONMENTAL SERVICES, LLC

Legend: Soil Boring Location; Approximate Property Line	Scale: 1"=40' (0' – 40')	Date: June 2011	**FIGURE 1** **Boring Location Diagram** **515 North Peshtigo Court** **Chicago, IL**
	Drawn by: Jackson Toomey	Checked by: Jeff McClelland	
	Job No.: 10-0607-102		

Appendix B

Field Gamma Survey Form

AECOM

Sheet ___ of ___

RADIATION SURVEY FORM - GENERAL

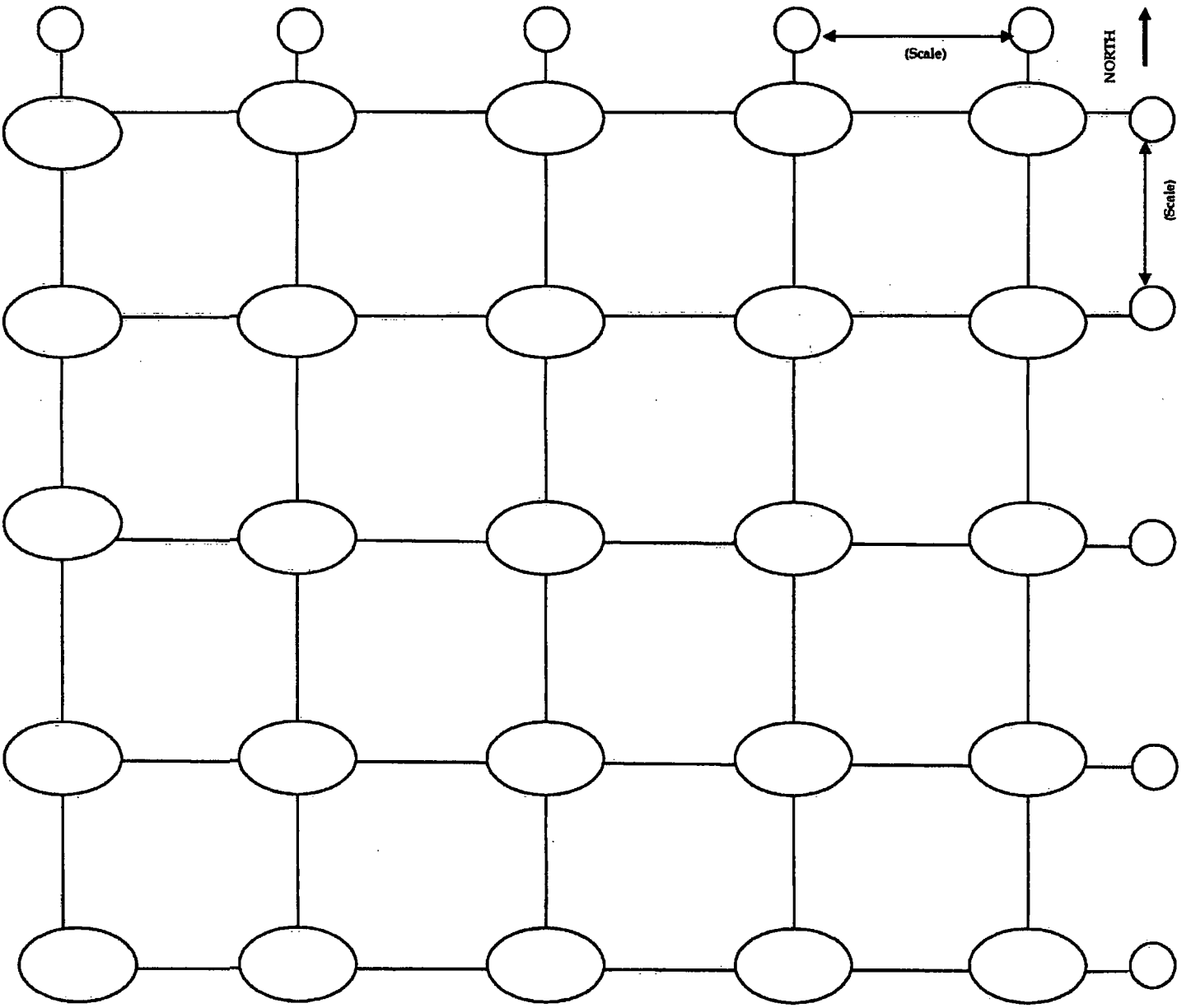
Project No. _____ Project Name _____

Date _____ Technician _____

Inst. Model _____ Serial No. _____

Inst. Calibrated (Y/N)? _____ Lift Elevation _____

Write grid designations in circles. Indicate excavated area with heavy line. Record counts at intersections in CPM. Indicate areas with audible alarms by shading the area.



Appendix C

Standard Operating Procedures

SOP-210 **Gamma Radiological Surveys**
SOP-212 **Air Monitoring Procedure**
SOP-214 **Soil Sampling Procedure**
SOP-215 **Field Logbook Procedure**
SOP-217 **Excavation Procedure**
SOP-223 **Verification Survey**
SOP-320 **Radiological Materials Shipments**
SOP-343 **Operation of Ludlum Model 2221 Scaler/Ratemeter with Ludlum Model 44-10 2"x2" NaI Scintillation Probe**
SOP-345 **Survey for Surface Contamination and Release of Equipment for Unrestricted Use**
SOP-347 **Decontamination**
SOP-364 **Sample Preparation Procedure for Gamma Spectral Analysis**

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Gamma Radiological Surveys

Document: SOP-210

Revision Number:

Date: July 1, 2011 Replaces: New

GAMMA RADIOLOGICAL SURVEYS

1.0 PURPOSE

This procedure provides protocols for conducting gamma radiological surveys for potentially contaminated soil and/or fill material.

2.0 SCOPE

Radiological surveys will be performed at the designated Site as part of the pre-excavation, excavation, pre-verification, and/or verification surveying programs.

3.0 REFERENCES

- NUREG 1507 – *Minimum Detectable Concentrations With Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*
- NUREG 1575, Rev. 1 - Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)

4.0 EQUIPMENT AND MATERIALS

The following equipment may be used as part of the survey programs. Other equipment may be substituted if necessary because of availability of the items listed or the conditions encountered at the site.

- Trimble Pathfinder Pro XR 4.1 global positioning system (GPS), or equivalent (optional).
- Ludlum Model 44-10 2-inch by 2-inch sodium iodide (NaI) (Tl) gamma detector.
- 6-inch collimated lead shield for detector.
- Ludlum Model 2221 portable scaler ratemeter analyzer.

5.0 INSTRUCTIONS FOR RADIOLOGICAL SURVEY

5.1 Establishment of Background Gamma Count Rate

5.1.1 The gamma count rate background levels shall be established for each applicable survey instrument. Six randomly selected locations of similar media (i.e., paved, landscaped, etc.) shall be chosen in non-radiologically impacted areas of the Site. A one-minute integrated count shall be obtained at the surface of each location for each survey instrument (Ludlum 2221 with 2" X 2" NaI probe). The measurements collected from each location shall be averaged to establish an instrument specific background gamma count rate.

5.2 Land Surface Survey Procedure - Manual

5.2.1 Establish a Grid Network

5.2.1.1 Two perpendicular baselines will be established.

5.2.1.2 A grid along the baseline will be established using cloth or steel tape and a compass, if necessary. Stakes, survey flags, or paint will be placed as needed to delineate grid or traverse lines. The grids will be spaced about five meters apart.

5.2.1.3 The baseline, permanent structures, areas of remediation, and other areas of interest will be illustrated in the field logbook.

5.2.2 Gamma Survey Procedure – Manual Data Recording

5.2.2.1 The Ludlum ratemeter is set for 2-second time-weighted average count rate.

5.2.2.2 Hold the survey meter probe base parallel to the ground surface at a height as close as practical and not more than 3-inches from the ground surface. Note: It is important to keep the meter at a consistent height since counts will vary with the distance from the surface.

5.2.2.3 Walk along grid lines at a maximum speed of about 0.5 meters per second (1 mile per hour). Grid will be traversed with a serpentine pattern, spaced 3 feet apart.

5.2.2.4 Identify locations with count rates greater than twice the background count rate and record them or the Radiation Survey Form – Surface Gamma Scan.

5.3 Land Surface Survey Procedure – Continuous Data Logging with GPS

5.3.1 Gamma Survey Procedure

5.3.1.1 Position the survey meter probe base parallel to the ground surface at a height as close as practical and not more than 3-inches from the ground surface. Note: It is important to keep the meter at a consistent height since counts will vary with the distance from the surface.

5.3.1.2 Traverse the survey area at a maximum speed of about 0.5 meters per second (1 mile per hour). The survey area will be traversed in a serpentine pattern, spaced 3 feet apart.

5.3.1.3 Ludlum and GPS equipment will be interfaced with a computer/data logger that will collect gamma surface readings, and the associated GPS coordinates, at two second intervals.

5.3.1.4 The GPS coordinates and gamma survey results will be plotted with locations exhibiting gamma count rates greater than twice background highlighted.

5.4 Radiological Survey of On-Site Materials

5.4.1 Material that is excavated and placed in the clean stockpile will be surveyed two times. The first survey will be performed prior to excavation activities, if the excavation can be entered safely.

5.4.2 The second survey will be performed during the excavation of the non-contaminated soil.

The soils will be surveyed before they are placed in the stockpile. Based on the gamma scan, the material will either be designated as contaminated material and immediately loaded for transportation and disposal or tentatively designated as clean and stockpiled for subsequent soil sampling per SOP-214.

5.5. Daily Surveys

5.5.1 Routine daily surveys shall be performed for each day of operations at the site.

5.5.2 The routine surveys will monitor areas in the immediate vicinity of excavations and along soil movement paths to ensure that radiation levels are not affected by activities.

5.5.3 Routine surveys shall be documented by preparing a drawing of the survey results in the field logbook, indicating either the location and value of individual measurements, or contours of the measured gamma field.

5.5.4 Surveys of excavation areas will be made at the request of the Field Team Leader to assess the progress of the removal. These surveys will not be documented, but will be used by the Field Team Leader to manage the excavation.

5.6 Pre-Verification or Verification Survey

5.6.1 Upon completion of remediation excavation activities, either a pre-verification survey shall be performed to ensure that the excavation is ready for a final verification survey by regulatory authority (i.e., USEPA and/or IEMA) or a verification survey shall be performed to ensure that the excavation is ready for backfill based on the approval of the regulatory authority.

5.6.2 The survey is conducted at the same time as the excavation work phase. The survey method is performed as specified in Sections 5.2 and/or 5.3. Upon completion of the survey and excavation phase, a Notification of Successful Pre-Verification or Verification is sent to the regulatory authority requesting a final verification survey or approval to backfill.

5.7 Site Grading Survey

5.7.1 Surveys will likely be conducted prior to or at the same time as the grading activities and will be performed as specified in Sections 5.2 and/or 5.3 of this SOP.

5.7.2 The corners or boundaries of the area to be surveyed will be tied into a site-wide coordinate/survey network. Stakes, survey flags, or paint will be placed along the boundaries of the survey area using a cloth/steel tape or wheel at approximately 5 meter intervals to subdivide the area into 5 x 5 meter areas.

5.7.3 Each 5 X 5 meter area will be traversed using a line spacing of approximately 1 meter. Readings greater than twice background will be painted and flagged for further investigation.

5.7.4 The maximum gamma count and readings over twice background will be recorded on the radiation survey form for site grading. Permanent structures and other issues of interest also will be included on the radiation survey form.

5.8 Caisson Construction Radiological Surveying

5.8.1 Procedures for Caisson Probe Test Pits

5.8.1.1 The ground surface will be surveyed for elevated gamma radiation prior to beginning excavation. Excavation monitoring will include three survey efforts: 1) surveys of the excavation walls and floor until native sand is encountered, 2) surveys of the excavated fill while still in the excavator bucket and 3) surveys of the excavation spoil pile,.

5.8.1.2 Excavation will proceed in lifts not to exceed 18 inches per lift. The excavation walls and floor will be surveyed at each 18 inch lift until native sand is encountered. Additionally, the excavation spoil pile will be surveyed as excavation proceeds. Appropriate sloping of the test pit walls will be required to allow safe access for persons to enter the excavation for surveying the walls and floor. In the event the excavation is of such a dimension to preclude safe access of personnel to survey the walls and floor, surveys of the spoil will be done in the excavator bucket and spoil pile to characterize the in-place material.

5.8.1.3 If elevated gamma radiation measurements are noted, equal to or exceeding twice the background gamma count, the excavation will proceed in thinner lifts, 6 to 12 inches. If

the excavated fill exceeds the applicable cleanup standard, the radiologically-impacted fill will be staged on plastic separate from the clean soil and the pile will be marked with radiation rope. Alternatively, the impacted fill will be loaded directly into a Baker type box or super-sack.

5.8.1.4 Excavation equipment that has contacted radiologically-impacted fill will be surveyed with a Ludlum Model 3 Pancake Probe for elevated radioactivity. Indications of elevated radioactivity will require decontamination in accordance with the Work Plan SOP 347, Decontamination. Equipment in contact with the radiologically-impacted fill will be documented as clean through a swipe survey and alpha radiation count using the Ludlum Model 220 and Model 43-10 Alpha counter, in accordance with the Work Plan SOP 345, Survey for Surface Contamination and Release of Equipment for Unrestricted Use.

5.8.2 Procedures for Surveying during Caisson Installation

5.8.2.1 Areas previously screened to native soil will not be resurveyed. Auger spoils from caisson borings through unscreened fill (including fill from below the groundwater table) will be screened after the materials are removed from the borehole.

5.8.2.2 When practical, spoil on the caisson augers will be screened before being spun off. If the field screening indicates elevated gamma measurements, the auger spoil will be spun off onto an area covered with plastic to temporary contain the material for later placement in containers for offsite transport and disposal. Clean fill will be spun off and handled as appropriate for soil management.

5.8.2.3 Management of impacted fill during caisson construction will consist of the following. Radiation-trained laborers or excavating equipment will place that fill into approved containers (Baker type boxes or super-sacks, depending on apparent volume).

5.8.2.4 Prior to moving to a new location the Health Physics Technician will release the auger and other equipment that may have come in contact with impacted fill using SOP-345. Decontamination procedures are outlined in the Work Plan SOP 347.

5.8.3 Required Documentation

5.8.3.1 Caisson locations found to contain impacted fill and will be recorded. The background gamma count and maximum gamma radiation reading will be noted, along with the equipment specific threshold indicative of 7.1 pCi/g total radium and the depth at which the impacted fill material was encountered. Records will also identify any samples taken, the person(s) conducting the monitoring, the date the work was started and completed, and equipment serial numbers.

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CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Air Monitoring Procedure

Document: SOP-212

Revision Number: 0

Date: July 1, 2011 Replaces: New

AIR MONITORING PROCEDURE

1.0 INTRODUCTION

The Air Monitoring Procedure provides for measuring the concentration of radioactive airborne dust that could be generated and emitted into the atmosphere as a result of the excavation, moving, and loading activities planned at the Site. The objectives of data collection for air monitoring activities are as follows:

- Collect airborne radioactivity data for the purpose of determining the exposure of workers participating in Site activities to airborne particulates
- Collect airborne radioactivity data to measure releases of airborne radioactivity to the environment and ensure that people living and working in the surrounding areas of the Site are not exposed to radiation above acceptable limits
- Collect airborne radioactivity data to evaluate work procedures and Site control measures for the purpose of keeping exposures to both workers and the general public as low as reasonably achievable (ALARA).

2.0 REGULATORY REQUIREMENTS AND ADMINISTRATIVE LIMITS

As specified in 10 CFR Part 20 (unless more restrictive in 32 IAC 340) the licensee must demonstrate compliance with the dose limits for individual members of the public. The Site Air Monitoring Plan is based on being able to demonstrate that the average concentrations of radioactive materials in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the limits specified in Table 2 of Appendix B to 10 CFR 20. The radionuclides in the thorium and uranium series that could potentially be encountered during Site activities are listed in Table 1 of the Air Monitoring Plan. Th-232 has the most restrictive concentrations for both the Derived Air Concentration (DAC) and Air Effluent Limits.

Th-232	Class W	DAC=$5x10^{-13}$µCi/ml	Air Effluent=$4x10^{-15}$µCi/ml

Both worker exposure to airborne particulates and effluent release limits will be based on Th-232.

3.0 AIR MONITORING EQUIPMENT AND MATERIALS

- Staplex Model TFIA High Volume Air Samplers (or equivalent)
- Gilan Model BDXII Low Volume Personal Air Sampler (or equivalent)
- Staplex Model TFA810 "Ashless" Filter Papers – 95% collection efficiency of 1-micron particles. Effective efficiency of 70% (penetration absorption 30%)
- Zefon Model 739 MCE Filter Cartridges – 37mm x 0.8um membrane filters
- Ludlum Model 2200 Scaler w/ Model 43-10 alpha scintillation detector
- Radiological Air Sample Data Form – Area Monitors, Form SOP 212-10
- Radiological Air Sample Data Form – Personal Air Monitors, Form SOP 212-11

4.0 SITE AIR MONITORING PROCEDURE

4.1 Background Air Quality

One downwind, high volume air sample shall be collected for a minimum of forty hours (five 10-hour days) prior to the commencement of excavation activities. This sample shall be analyzed the day after collection and then again after four days to allow for the decay of short lived radon and thoron daughters. The count, after four days decay, will serve as the official measurement of the background airborne alpha concentration. Future results during Site operations should be compared to this value to see if further engineering controls or procedural changes are warranted.

4.2 Perimeter Air Monitoring – High Volume Samplers

Four air monitoring locations shall be used during all excavation activities. These monitoring units will be at the property boundary or no more than 200 feet from the limits of the areas anticipated to be excavated. Samples shall be collected during all operations where potentially contaminated soils are being excavated, moved, or loaded. One monitor shall be placed on each perimeter of the site (North, South, East, and West) and collect samples at a height between one and two meters above the ground. Monitors will be located so as to provide unobstructed air flow from the source to the monitors. Flow rate through air samplers shall remain between 20 and 60 cubic feet per minute. Air sample filters shall be collected and replaced daily and submitted to the laboratory for analysis. Samples analyzed from the perimeter high volume monitors shall be used to determine the amount of airborne radionuclides leaving the Site.

4.3 Personal Air Monitoring – Lapel Samplers (Low Volume)

All workers participating in Site activities that involve the excavation, movement, or loading of potentially contaminated soils within a radiological exclusion zone shall wear a Personal Air Monitor (PAM) to evaluate the air quality in the worker's breathing zone. The Health and Safety Coordinator may require that additional personnel wear PAMs if there is a potential for that worker to encounter airborne particulates during Site operations. Samples shall be collected the entire time a worker is inside the exclusion zone and the cumulative time recorded. Flow rate through air samples shall remain between 2 and 4 liters per minute. Air sample filters shall be collected and replaced daily and submitted to the laboratory for analysis. Samples analyzed from the PAMs shall be used to determine potential contributions to worker's dose from airborne radionuclides.

5.0 AIR SAMPLE ANALYSIS

The Th-232 decay series contains seven alpha-emitting nuclides: Th-232, Th-228, Ra-224, Rn-220, Po-216, Bi-212 and Po-212. Of these, the first three nuclides can be assumed to be in complete equilibrium. The noble gas Rn-220 (thoron) may be ejected from the original matrix by recoil from the alpha particle decay of Ra-224. The fraction of Rn-220 that is removed via emanation is dependent on several variables, and is assumed to range from 10% to 40%. The emanating fraction is assumed to be transported away from the original matrix. If 40% of the Rn-220 escapes, the activity of the Rn-220 and its three alpha-emitting progeny nuclides will be at 60% of the Th-232 activity. These four alpha-emitting nuclides produce a total of 3.35 alpha emissions per Rn-220 decay. Since the Rn-220 activity is 60% of the Th-232 activity, these four nuclides only emit the equivalent of two alpha particles per Th-232 decay. These two alphas when combined with the three alpha particles from the nuclides in full equilibrium with the parent, result in the total emission of the five alpha particles. Thus, the Th-232 contribution will be one-fifth or 20% of the total alpha activity.

For the reasons stated above, gross alpha concentrations shall be divided by a factor of five to determine the air concentration of Th-232, which is the most limiting of the applicable air effluent concentration limits (4×10^{-15} µCi/ml).

5.1 High Volume Sample Analysis

A 1.75 inch diameter cutout shall be obtained from each 8"x10" high volume sample collected. All data pertaining to the sample shall be included on the *Radiological Air Sample Data Form – Area Monitors* worksheet. This worksheet contains the calculations required to determine total sample volume and sample concentration.

Each sample shall be analyzed the day after collection for gross alpha concentration. The minimum counting time is 30 minutes for Th-Alpha. The "day after" count will serve as a comparison to identify high gross counts from the previous day. It is expected that naturally occurring radon and thorium daughters will interfere with analysis, so the sample must be reanalyzed in four days. Thoron (Rn-220), if present in

significant amounts, will require up to four days to allow for the decay of its Pb-212 daughter (10.6 hour half life). The count, after four days decay, will serve to be the official measurement of Th-Alpha.

Th-232 is the most restrictive of the applicable radionuclides that may be present during Site operations. The Th-232 contribution will account for 20% of the total alpha activity, so each gross alpha count must be divided by five to determine Th-232 concentration.

Multiple concentration measurements improve both precision and detection capability. Although air samples shall be counted the following day (and again four days later), effluent releases shall be reported on a weekly basis using the following calculation:

Equation A.9 NUREG 1400

$$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$$

where C = effluent concentration in µCi/ml
T_s= duration of sample collection

Sample concentration shall be determined using the following calculation:

Equation 6.9 *NUREG 1400*

$$C = \frac{R_n}{EFKT_s Cf(5)}$$

Where: $R_n = R_g - R_b = T_g/N_g - T_b/N_b$
E = fractional filter efficiency
F = air flow rate through the air sampler, cm^3/min
Cubic feet per hour x 28.316 liters/cfh x 1000 ml/ liter
K = Counting efficiency in cpm/ µCi
T_s = duration of sample collection
Cf = collection vs. analyzed ratio: conversion factor = 0.035

** note: Cf is not part of original NUREG calculation. It has been added to account for the fact that we are only analyzing 3.5% of total filter (i.e., a 1.75 inch circle from an 8 X 10 inch filter minus the 0.3 inch border coverd by the filter holding plate).

5 = Samples are analyzed for gross alpha activity. Gross alpha concentration is to be divided by five to determine Th-232 concentration

5.2 Personal Air Monitor Sample Analysis

Personal Air Monitor (PAM) samples shall be analyzed in the same manner as the high volume perimeters samples. The only exceptions are that samples may be collected over the course of one week and that calculations are performed on a different worksheet – *Radiological Air Sample Data Form – PAM's, Form SOP 212-11.*

The action level for airborne radioactivity shall be 30% of the Derived Air Concentration (DAC) for Th-232 (DAC=5×10^{-13} µCi/ml). When PAM analysis indicates that concentrations have reached 1.5×10^{-13} µCi/ml, Level C protection may be considered. It is not anticipated that airborne concentrations will reach this level. Engineering controls, such as wetting of soils, and procedural changes shall be implemented to keep airborne concentrations ALARA.

At the conclusion of the project, data obtained from PAM's shall be used to determine a dose from airborne radionuclides for each monitored worker.

6.0 INVESTIGATIONS AND CORRECTIVE ACTIONS

The Health and Safety Coordinator will perform investigations and responses consisting of one or more of the following actions in the event that Action Levels are exceeded:

- Verification of laboratory data and calculations.
- Analyze and review probable causes.
- Evaluate need for reanalysis or additional analysis on original sample.
- Evaluate need for resampling.
- Evaluate need for sampling of other pathways.
- Evaluate need for notifications to regulators
- Dose assessments/bioassays.

7.0 ATTACHMENTS

- Table 1 *Derived Air Concentrations (DACs) and Effluent Air Concentrations of Selected Radionuclides in the Uranium and Thorium Series*
- Minimum Detectable Concentration Calculation – Area Monitors
- Minimum Detectable Concentration Calculation – PAM's
- Radiological Air Sample Data Form – Area Monitors, Form SOP 212-10
- Radiological Air Sample Data Form – PAM's, Form SOP 212-11

TABLE 1

Derived Air Concentrations (DACs) and Effluent Air Concentrations of Selected Radionuclides in the Uranium and Thorium Series

Radionuclide	Class	10 CFR 20	
		DAC (µCi/ml)	Air Effluent (µCi/ml)
^{238}U	D	$6x10^{-10}$	$30x10^{-12}$
	w	$3x10^{-10}$	$1x10^{-12}$
	Y	$2x10^{-11}$	$6x10^{-14}$
^{234}Th	w	$8x10^{-8}$	$3x10^{-10}$
	Y	$6x10^{-8}$	$2x10^{-10}$
^{234}U	D	$5x10^{-10}$	$3x10^{-12}$
	w	$3x10^{-10}$	$1x10^{-12}$
	Y	$2x10^{-11}$	$5x10^{-14}$
^{230}Th	w	$3x10^{-12}$	$2x10^{-14}$
	Y	$6x10^{-12}$	$3x10^{-14}$
^{226}Ra	w	3x10-10	$9x10^{-13}$
^{222}Rn	With Daughters Removed	$4x10^{-6}$	$1x10^{-8}$
	With Daughters Present	$3x10^{-8}$	$1x10^{-10}$
		or 0.33 of working level	
^{214}Pb	D	$3x10^{-7}$	$1x10^{-9}$
^{214}Bi	D	$3x10^{-7}$	$1x10^{-9}$
	w	$4x10^{-7}$	$1x10^{-9}$
^{210}Pb	D	$1x10^{-10}$	—
^{232}Th	w	$5x10^{-13}$	$4x10^{-15}$
	Y	$1x10^{-12}$	$6x10^{-15}$
^{228}Ra	w	$5x10^{-10}$	$2x10^{-12}$
^{228}Th	w	$4x10^{-12}$	$3x10^{-14}$
	Y	$7x10^{-12}$	$2x10^{-14}$
^{220}Rn	With Daughters Removed	$7x10^{-6}$	$2x10^{-8}$
	With Daughters Present	$9x10^{-9}$	$3x10^{-11}$
		or 1.0 working level	
^{212}Pb	D	$2x10^{-8}$	$5x10^{-11}$
^{212}Bi	D	$1x10^{-7}$	$3x10^{-10}$
	w	$1x10^{-7}$	$4x10^{-10}$
^{228}Ac	D	$4x10^{-9}$	$2x10^{-11}$
	w	$2x10^{-8}$	$8x10^{-11}$
	Y	$2x10^{-8}$	$6x10^{-11}$
^{234m}Pa	w	$3x10^{-6}$	$1X10^{-8}$
	Y	$3x10^{-6}$	$9x10^{-9}$
^{235}U	D	$6x10^{-10}$	$3x10^{-12}$
	w	$3x10^{-10}$	$1x10^{-12}$
	Y	$2x10^{-11}$	$6x10^{-14}$
^{231}Pa	w	$6x10^{-13}$	$6x10^{-15}$
	Y	$2x10^{-12}$	$8x10^{-15}$
^{227}Ac	D	$2x10^{-13}$	$1x10^{-15}$
	w	$7x10^{-13}$	$4x10^{-15}$
	Y	$2x10^{-12}$	$6x10^{-15}$
^{227}Th	Y	$1x10^{-10}$	$5x10^{-13}$
	w	$1x10^{-10}$	$5x10^{-13}$

FORM SOP 212-10

RADIOLOGICAL AIR SAMPLE DATA FORM – AREA MONITORS

Equation:

Volume (V) = (Pump ml/min.) (Total Sample Time) (count/sample conversion)
Multiply Cubic Feet by 28.316 to Obtain Liters
Ml/min = (L/min.) (1000 ml/L)

SAMPLE COLLECTION

Sample #	Per. By	Date	Sample Start Time	Sample End Time	Total Sample Time	Cubic Ft/min. (CFM)	Count vs. Sampled Conv.	Total Sample Volume (ml)

Equation: Actual Activity = Activity (A) - Background (B)

$$\text{Activity (A)} = \frac{\text{(Net CPM) (1/Eff.)}}{\text{(V) (2.2 E + 6 dpm/uCi) (filter retention factor) (5)}}$$

Sample #	Cal. By	Date	Gross Counts	Net CPM	Detector Efficiency (EFF)	Sample Volume Analyzed (ml)	Sample Concentration (A)µCi/ml	Background Activity (B)µCi/ml	Actual Concentration µCi/ml
4-day recount									

Filter retention factor/absorption correction = 0.7 for Staplex 8x10 ashless paper filter
= 1.0 for 37mm PAM membrane filters

Note: Activity is divided 5 due to the Thorium daughters that are counted with an open window (gross alpha)

Conversion factor for volume analyzed vs. volume sampled for 1.75" diameter cut-out = 0.035

30 minute background count for _____ is _____ cpm
date

30 minute background count for _____ is _____ cpm
date

FORM SOP-212-11

RADIOLOGICAL AIR SAMPLE DATA FORM – PAM'S

Equation:

Volume (V) = (Pump liters/min.) (Total Sample Time in minutes) (1000 ml/liter)

Sample Collection

Person Wearing Monitor	Pump #	Sample #	Date	Sample Start Time	Sample End Time	Total Sample Time	Cubic liters/min. LPM	Total Sample Volume (ml)

Equation: Actual Activity = Activity (A) - Background (B)

$$\text{Activity (A)} = \frac{\text{(Net CPM) (1/Eff.)}}{\text{(V) (2.2 E + 6 dpm/uCi) (filter retention factor) (5)}}$$

Sample Analysis

Sample #	Cal. By	Date	Gross Counts	Net CPM	Detector Efficiency (EFF)	Sample Volume Analyzed (ml)	Sample Concentration (A)µCi/ml	Background Activity (B)µCi/ml	Actual Concentration µCi/ml

Filter retention factor/absorption correction = 0.7 for Staplex 8x10 ashless paper filter
= 1.0 for 37mm PAM membrane filters

Note: Activity is divided 5 due to the Thorium daughters that are counted with an open window (gross alpha)

30 minute background count for _____ is _____ cpm
date

30 minute background count for _____ is _____ cpm
date

MINIMUM DETECTABLE CONCENTRATION CALCULATION – PAMS
Sensidyne Personal Air Monitor Samples analyzed on Ludlum 43-10 Alpha Counter

$$MDC = \frac{2.71}{n\,E\,F\,K\,T_g\,T_g} \qquad 3.29\,\frac{\sqrt{Rb}\left[\frac{1}{Tb}+\frac{1}{Tb}\right]}{n^{1/2}\,E\,F\,K\,T_s}$$

n = number of sampling intervals
E = fractional filter efficiency
F = airlow rate through the sampler in cm^3/min
K = counting efficiency in cpm/µCi
T_s = duration of sample collection in min
T_g = gross counting time
T_b = background counting time
R_n = net count rate in cpm
R_b = background count rate in cpm
C = concentration of radioactive material in the air in µCi/cm^3

N = 5 days of sampling minimum per week
E = 1.0 37mm 0.8 µm MCE Filters
F = 2.5×10^3 cm^3/min (or ml/min)
2.5 liters per minute x 1000 ml/l = 2500 ml/min
K = 699300
0.315 count/disintegration x 2.22 x 106 dis/µCi = 699300 cpm/µCi
T_s = 480 min
Based on a minimum of 8 hours per day
T_g = 30 min
T_b = 600 min

Rb = 0.58 cpm, based on 3000 min background count on 9/16 – 9/20/02

$$MDC = \frac{2.71}{(5)\,(1.0)\,(2500)\,(699300)\,(480)\,(30)} + 3.29\,\frac{\sqrt{(0.58)}\left[\frac{1}{(600)}+\right]\frac{1}{(30)}}{(2.24)\,(1.0)\,(2500)\,(699300)\,(480)\,(30)}$$

= 2.98×10^{-14} µCi/ml (gross alpha weekly MDC)
= 5.96×10^{-15} µCi/ml (gross alpha ÷ 5, for Th-232)

MINIMUM DETECTABLE CONCENTRATION CALCULATION
Sensidyne TFIA High Volume Air Samples analyzed on Ludlum 43-10 Alpha Counter

$$MDC = \frac{2.71}{n\,E\,F\,K\,T_g\,T_g} \qquad \frac{3.29\,\sqrt{Rb}\left[\frac{1}{Tb}+\frac{1}{Tb}\right]}{n^{1/2}\,E\,F\,K\,T_s\,cf}$$

NUREG 1400 Air Sampling in the Workplace Appendix A (eq A.17)

n = number of sampling intervals
E = fractional filter efficiency
F = airlow rate through the sampler in cm^3/min
K = counting efficiency in cpm/µCi
T_s = duration of sample collection in min
T_g = gross counting time
T_b = background counting time
R_n = net count rate in cpm
R_b = background count rate in cpm
Cf = count vs. sample conversion
(this is not part of NUREG 1400, however, analysis volume must be taken into account)

n = 5 days of sampling minimum per week
E = 0.7 (referred to as filter retention factor on air sampling form)
F = 1.13×10^6 cm^3/min (or ml/min)
40 ft^3/min x 28.316 liters/ft^3 x 1000 ml/l = 1.13×10^6 ml/min
K = 699300
0.315 count/disintegration x 2.22 x 106 dis/µCi = 699300 cpm/µCi
T_s = 480 min
Based on a minimum of 8 hours per day
T_g = 30 min
T_b = 600 min
Cf = 0.035
8" x 10" original filter size = 80 $inches^2$
0.3 inch border is covered by sampler plate and not sampled = 10.8 $inches^2$
filter cutout = $\pi r^2 = (0.875")^2\,(3.14) = 2.41$ $inches^2$
actual sample area = 80 $inches^2$ – 10.8 $inches^2$ = 69.2 $inches^2$
sample analyzed vs. sample collected ration = 2.41/69.2 = 0.035
r_b = 0.58 cpm, based on 3000 min background count on 9/16 – 9/20/02

$$MDC = \frac{2.71}{(5)\,(0.7)\,(1.13E6)\,(699300)\,(0.035)\,(480)\,(30)} + \frac{3.29\,\sqrt{(0.58)}\left[\frac{1}{(600)}+\right]\frac{1}{(30)}}{(2.24)\,(0.7)\,(1.13E6)\,(699300)\,(0.035)(480)\,(30)}$$

= 2.69×10^{-15} µCi/ml (gross alpha weekly MDC)
= 5.39×10^{-16} µCi/ml (gross alpha ÷ 5, for Th-232)

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STANDARD OPERATING PROCEDURE

Title: Soil Sampling Procedure

Document: SOP-214

Revision Number: 0

Date: July 1, 2011 Replaces: New

SOIL SAMPLING PROCEDURE

1.0 PURPOSE

The purpose of this procedure is to present protocol for collecting soil samples for the Site.

2.0 SCOPE

This procedure applies to samples collected for radiological or geotechnical analysis. Soil samples may be collected of potential backfill soils or other soils. The Field Team Leader will coordinate the sampling efforts.

3.0 REFERENCES

U.S. Nuclear Regulatory Commission, NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, June 1992.

4.0 EQUIPMENT AND MATERIALS

4.1 Equipment and Materials Management

Downhole tools and samplers are cleaned in accordance with the Decontamination Procedure (SOP-347).

Cuttings, fluids, samples, and water are placed in 55-gallons drums, labeled, properly stored on-site, and disposed of in a manner that does not violate local, state or federal rules or regulations and in a manner that does not damage public or private property.

4.2 Sampling Equipment and Materials

Equipment used for soil sampling includes the following:

- Auger or other Coring Tool
- Shovel and Trowel
- Plastic Collection Bags
- Plastic Sheets (optional)
- Sampling Tracking Form (Form SOP-214-1)
- Field Logbook (SOP-215)
- Field Sample Screening Form (Form SOP-214-2 or holding samples)
- Pin Flags (for marking sample locations)
- Container (for collecting potentially contaminated waste generated during the sampling process) (e.g., gloves, plastic sheets, etc.)
- Bucket (filled with clean rinse water)
- Bucket (for homogenizing samples)
- Stainless Steel Brush
- Moist Towelettes
- Paper Towels
- Latex Gloves
- Survey Instrument (for verifying clean sampling equipment and hands).

Other equipment may be substituted, if necessary, because of availability of the items listed or the conditions encountered at the site. Substitute equipment shall be documented in the Field Logbook and approved by the Field Team Leader.

5.0 SAMPLING PLAN

Selection of the sampling plan to characterize a soil is a function of the goals of the investigation, the variability of the parameters being measured, and the impact of the variability on the conclusions. Samples may be collected randomly or they may be collected from specific areas deliberately chosen to represent the range of conditions expected or unusual conditions of particular interest. In general, randomly chosen samples are appropriate to assess overall site conditions. However, there may be instances where the significance of an observed condition is of interest. The choice of method will, therefore, depend on the specific goals of the sampling activity.

The procedure presents sampling methods based on random sampling. For the reasons stated above, variations to the methods provided in this procedure may be requested by the Field Team Leader. Such variations shall be documented in the Field Logbook by field personnel.

6.0 ON-SITE STOCKPILE SOIL SAMPLING

The following are the steps to be followed for on-site stockpile soil sampling.

6.1. Excavated soil may be stockpiled. Samples from the stockpiles may be analyzed.

6.2. The soil may be stockpiled in piles varying from a few to several thousand cubic yards. Because of this potential variation in pile size, no single method for sampling or type of equipment can be prescribed that will work for every situation. The two basic methods that can be used for sampling stockpiles, core sampling method and lift sampling method, are described in paragraphs 7.3 and 7.4, respectively. Both methods are based on the premise that in order for a sample to be representative of the pile, every particle in the pile must have an equal probability of being included in the sample.

6.3 One of the methods, the core sampling method, assumes that the pile can be completely penetrated using a coring tool (i.e., sampling probe or drill rig). On conical shaped piles, the sample is to be taken approximately perpendicular to the surface of the pile, midway between the peak and the base, to the center of the pile. On piles with flattened tops, the sample is to be taken perpendicular to the surface from the top to the bottom of the pile.

6.4 The other stockpile sampling method, the lift sampling method, assumes that the pile can not be completely penetrated with a sampling tool, and therefore must be sampled either as the soil is placed in lifts onto the pile or before the soil is removed in lifts for use. The samples will, therefore, only be representative of the discrete layer of soil that is exposed to the sampling.

6.5. With either sampling method, to identify the areas to be sampled, the pile shall always be faced looking north. For flat topped piles, divide the stockpile into an imaginary grid with square or rectangular shaped sections approximately equal in area; the grids on flat topped piles should be numbered from left to right, top to bottom. For conical shaped piles, divide the stockpile into an imaginary grid with pie shaped sections of equal areas; the grids on conical shaped piles should be numbered in clockwise pattern.

6.6. Determine the initial number of grids and samples as follows:

Pile Size (cubic yards)	Number of Grids	Number of Lift Samples[1]	Number of Core Samples[2]
< 50	3	3	3
50 to 100	5	5	5
101 to 500	6	5	6
500 to 1,000	7	5	7
1,000 to 2,000	8	6	8

Pile Size (cubic yards)	Number of Grids	Number of Lift Samples[1]	Number of Core Samples[2]
2,000 to 4,000	9	6	9
4,000 to 6,000	10	7	10
6,000 to 8,000	11	7	11
8,000 to 10,000	13	8	13
10,000 to 20,000	16	8	16
20,000 to 40,000	20	10	20
40,000 to 70,000	30	15	30
70,000 to 100,000	36	15	36
100,000 to —[3]	36+	15+	36+

Notes:

1 Take one sample from each grid randomly chosen. In order to choose the grids to be sampled randomly, use some blank sample identification tags and number the tags from one (1) to (n), where (n) represents the number of grids in each pile. Put the tags into a sample bag, shake the bag and reach in and blindly select a tag. Continue selecting tags until the required number of grids are selected. The numbers will be chosen without replacement, that is, without returning the used number to the bag. The samples shall be taken from the grids that correspond to the randomly chosen numbers. An alternative method would be to use a computer generated random numbering system available in various spreadsheet programs (i.e., Excel).

2 From the randomly chosen grids, take one composite sample for approximately every ten (10) feet of soil depth to obtain the required number of samples. For example: If a 98 cubic yard pile is 10 feet high, according to the above table, five (5) composite samples are required (i.e., one for each grid). If an 11,000 cubic yard pile is 30 feet deep, three composite samples, one composite sample at each ten feet of depth, will be taken from 5 of the grids and one composite sample will be taken from a sixth, randomly chosen grid.

3 Add one sample for each additional 10,000 cubic yards.

6.7 Take the sample and submit it to the laboratory for analysis.

6.8. Statistically test the results of the sample analyses to determine how much uniformity the samples show and whether more samples must be taken.

6.9. If necessary, take additional samples and analyze. Continue to repeat steps 6.7 and 6.8 until there are enough samples to characterize the pile.

6.10. As directed by the Field Team Leader, identify materials suitable for backfill or other purpose for which the sampling was done.

6.11. To compare the sample data with the desired criteria, calculate the average (X bar of all the samples) in the pile using:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} xi$$

6.12 If the average satisfies the desired criteria, the results can be further evaluated to determine whether the data provide a 95 percent confidence level that the true mean (μ) meets the relevant criteria. The Field Team Leader will consult with the Project Coordinator to determine if this further evaluation is required.

7.0 IN-SITU SOIL SAMPLING

This section describes the methods for choosing sample locations and sampling methods.

7.1 Sample Location Selection

Appropriate in-situ soil sample locations are determined by the size and uniformity of the deposit being sampled. The sampling pattern depends upon the size of the area, the uniformity of the soil stratum being sampled, and the volume of soil that is being sampled.

Sampling plans for particular purposes may specify a pre-established sampling frequency in terms of the maximum volume of soil represented by a sample. If the soil being sampled is statistically homogeneous, then the locations for samples can be selected randomly over the area and thickness of the deposit. If the soil is not statistically homogeneous, then the area must be broken into sub-areas within which the soils are statistically homogeneous, and each area sampled separately. The issue of statistical homogeneity is resolved by comparing the range of variation of the property being judged to the acceptability criteria. For example, a deposit of sand and gravel may be statistically homogeneous when judged against a standard that the material not contain boulders and not be homogeneous when judged against a standard that no gravels be larger than one inch.

Clearly, also, the number of samples required to resolve the second comparison may be larger than the number required to resolve the first. The sampling frequencies given in the Sections 10.3 and 10.4 (Stockpile Sampling) may be used as a guide in estimating an initial number of samples, but the actual number required for a particular purpose depends very strongly upon the requirements and materials being sampled.

7.2 Drilling Procedures

No drilling is planned.

8.0 OPERATIONAL SUPPORT SAMPLING

Sampling may be required to support the excavation and restoration action. This sampling may be performed in instances when the Field Team Leader is interested in the significance of an observed variation or when looking for cursory information to provide operational guidance. The choice of the method will, therefore, depend on the specific goals of the sampling activity as determined by the Field Team Leader. This sampling is not a quality activity, and may be performed outside the requirements of this procedure. However, all deviations requested by the Field Team Leader must be documented in the Field Logbook by field personnel.

The sampling technique for surface sampling, subsurface sampling, and stockpile sampling, as described in this procedure, shall be used when sampling in these instances.

9.0 SAMPLE TRACKING

To establish the documentation necessary to track the sample from the time of collection, the sample identification and Sample Tracking Forms must accompany samples that are sent to the laboratory.

All potentially contaminated samples to be submitted to the laboratory will be screened for radiation in the field. Information obtained from this survey will be documented on the Sample Tracking Form (Form SOP 214-1). Samples taken from potential borrow areas generally are not screened.

10.0 SAMPLING METHODS

10.1 Surface Soil Sampling

10.1.1. If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled; assemble the sampling equipment required.

10.1.2. Enter the complete information on the Sample Tracking Form:

- Sample Number
- Sample Matrix
- Sample Location
- Purpose of Sample Collection
- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant
- Collected by (your name)

10.1.3. Mark the collection bag or prepare the identification tag for the sample.

10.1.4 Collect the soil samples that are representative of the soil in the area surveyed. Use a shovel or trowel to collect soil from the depth required.

10.1.5 Remove rocks, sticks, and foreign objects greater than approximately one-quarter (1/4) inch.

Stir and homogenize the soil in a bucket as much as practicable. Using the hand trowel, randomly scoop the soil from the bucket. Saving each of the scoops of material to collect the required sample size; return the other material to the sampling locations.

10.1.6 Attach the identification tag to the sample bag if appropriate and place the bag in the sample container.

10.1.7 Decontaminate the sampling equipment as required by Section 11.

10.1.8 Return any location markers (such as pin flags) that, were removed in order to sample. Fill in all sampling holes to eliminate a possible tripping hazard.

10.1.9 If specific data are not available, mark a pin flag with the sample identification number and place the flag at the center of the sampling location before leaving.

10.2 Subsurface Sampling (Undisturbed Soils)

10.2.1 If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled; assemble the sampling equipment required.

10.2.2 Enter the complete information on the Sample Tracking Form

- Sample Number
- Sample Matrix
- Sample Location
- Purpose of Sample Collection
- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant
- Collected by (your name)

10.2.3 Mark the collection bag or prepare the identification tag for the sample.

10.2.4 Sample the material using a hand core sampling tool or hammer driven split spoon sampler.

Alternatively, an auger method may be used.

Cut a hole, approximately six (6) inches in diameter, in the center of a plastic sheet. Center the sheet of plastic over the area to be sampled. Using an auger, drill through the hole in the plastic to the desired sampling depth; keep the auger turning until no more material comes up. The soil around the hole, on the plastic sheet, is fairly well mixed and representative of the interval just drilled.

If the soil sample is to be obtained from a particular depth (not a composite from surface to depth), and the material refuses to pass into the coring tool, the following sampling method will be performed. Drill through the hole in the plastic to the top of the desired sampling depth; keep the auger turning until no more material comes up. Remove the auger and sample the material using a hand core sampling tool or hammer driven spilt spoon sampler. The few inches of the sample obtained may constitute sidewall slough and should not be part of the desired sample. The sample(s) should be collected over six-inch intervals starting below the slough material.

NOTE: If, due to the conditions of the sampling area, this method does not work, an alternative method(s), approved by the Field Team Leader, may be used. Alternative methods, when used, will be documented by the field personnel in the Field Logbook.

10.2.5 Remove rocks, sticks, and foreign objects greater than approximately one-quarter (1/4) inch in diameter.

NOTE: The removed rocks will be collected and submitted as a separate sample.

10.2.6 Using a hand trowel, collect approximately one (1) quart of the augured soil in the plastic sample bag or jar. For core segments, place each 6-9 inch (nominally 5-7 inch) segment in the plastic sample bag or jar.

10.2.7 Label the sample container.

10.2.8 Return unused material to the sampling hole and fill in the hole to eliminate possible tripping hazard.

10.2.9 Decontaminate the sampling equipment as required by Section 11.

10.2.10 When required, mark a pin flag with the sample identification number and place the flag at the center of the sampling location before leaving.

10.3 Stockpile Sampling (Core Sampling Method)

10.3.1 If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled and assemble the sampling equipment required.

10.3.2 Enter the complete information on the Sample Tracking Form:

- Sample Number
- Sample Matrix
- Sample Location
- Purpose of Sample Collection
- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant. Identify the approximate size of the stockpile. (A 70 cubic yard pile of soil is approximately ten feet high with a base diameter of

approximately 26 feet.) Include a brief description of the equipment used to obtain the sample (i.e., sub-soil sampler, drill rig, etc.).

- Collected by (your name)

10.3.3 Before sampling, determine the number of grids and samples as described in Section 6.6. Record the information in the Field Logbook.

10.3.4 Mark the collection bag or prepare the identification tags for the samples.

10.3.5 Using an auger or other coring tool, take the required number of samples from the pile. A hollow stem auger will be used when discrete, rather than composite, samples are collected.

10.3.6 Place the sample material in the sample bag and attach the identification tags. Place the sample bag in the container.

10.3.7 Decontaminate the sampling equipment as required by Section 11.

10.4 Stockpile Sampling (Lift Sampling Method)

10.4.1 If necessary, to minimize contamination, spread a clean sheet of plastic next to the area to be sampled and assemble the sampling equipment required.

10.4.2 Enter the complete information on the Sample Tracking Form:

- Sample Number
- Sample Matrix
- Sample Location
- Purpose of Sample Collection
- Include applicable comments regarding the sample, location, weather, conditions, or other factors that may be relevant. Identify the approximate size of the stockpile. (A 70 cubic yard pile of soil is approximately ten feet high with a base diameter of approximately 26 feet.) Include a brief description of the equipment used to obtain the sample (i.e., sub-soil sampler, drill rig, etc.).
- Collected by (your name)

10.4.3 Before sampling, determine the number of grids and samples as described in Section 6.6. Record the information in the Field Logbook.

10.4.4 Mark the collection bag or prepare the identification tags for the samples.

10.4.5 Using the appropriate sampling tool, take the required number of samples from the lift approximately perpendicular to the surface of the lift at the appropriate locations. Composite the sample through the entire lift thickness.

10.4.6 Place the sample material in the sample bag and attach the identification tags. Place the sample bag in the container.

10.4.7 Decontaminate the sampling equipment as required by Section 11.

10.5 Soil Sample Size

10.5.1 Samples collected for NUTRANL analysis used for EPA confirmation shall consist of a batch of five 20 milliliter bottles of soil. If split samples are to be obtained, approximately 1.5 liters shall be collected. Sample size requirements are detailed in Sample Preparation Procedure for Gamma Spectral Analysis (SOP-364).

11.0 EQUIPMENT CLEANING

To avoid cross-contamination, the sampling equipment will be cleaned prior to and between samples. The following steps will be followed to clean equipment.

- Remove loose contamination by gently tapping/shaking the item.
- Using the stainless steel brush or paper towels, remove material that did not dislodge.
- If the item appears to be clean (i.e., no visible clinging soil), proceed to the next sampling area.
- If the item does not appear to be clean or if a survey with the appropriate instrument does not verify that it is, scrub the item with water. While holding the item over the sampling location, rinse the item with water.
- Dry the item with paper towels or repeat the scrubbing sequence as necessary.
- Rinse gloved hands. Change gloves when changing sampling areas if a self-frisking indicates that contamination is present after rinsing.
- Approximately one percent of the time, swipe the item as described in the Gamma Radiological Survey SOP (SOP-210). Submit the swipes to the laboratory for analysis to confirm the effectiveness of the decontamination protocol. (This step is necessary only when sampling soils where radiologic contamination is suspected.)
- Dispose of cleaning materials, plastic sheeting, and gloves as contaminated materials in accordance with instructions provided by the Field Team Leader.

12.0 QUALITY CONTROL

12.1 Quality Control Samples

To evaluate the variance in the soil sampling protocol, field duplicates will be collected at specified intervals. These quality control (QC) samples will be identified and noted in the Field Logbook.

To validate the sampling protocol used for surface sampling, initially one (1) area on every twenty (20) sub-grids sampled.

For surface sampling, the duplicates shall be randomly selected and identified before sampling activities begin. The duplicate sample material will be collected using the next scoop full of material each time the initial sample is saved.

For subsurface samples, one duplicate subsurface sample will be taken for every twenty (20) samples.

For subsurface sampling, the duplicate will be collected from the representative augered material.

For stockpiles, one duplicate will be taken for every twenty (20) stockpile samples, or one each day that stockpile sampling takes place, whichever is greater.

The stockpile duplicate will be taken from the node of two grids. The duplicates will be randomly selected and identified before the sampling begins.

The Field Team Leader will calculate the mean and the standard deviation for the samples analyzed. If the duplicate sample results are within three (3) standard deviations of the sample population, the sampling protocols can be considered acceptable.

If the Project Coordinator approves, the Field Team Leader can reduce the frequency of the QC duplicate sampling based on the results obtained. Changes shall be documented in the Field Logbook.

12.2 Data Review

Entries in the Field Logbook will conform to the Field Logbook Standard Operating Procedures.

Daily, the Field Team Leader will review the Field Logbook, resolve any discrepancies that were noted by field personnel, and sign the book to indicate the pages reviewed. If the Field Team Leader recorded the discrepancy, the Quality Assurance Supervisor will review the Field Logbook and resolve any discrepancies that were noted.

NOTE: Discrepancies relating to reported data will be brought to the attention of the Field Team Leader.

13.0 HEALTH AND SAFETY

Personal protective equipment and clothing, as required by the Health and Safety Plan, will be used when collecting and handling contaminated soils.

The site radiological conditions will be determined and documented before sampling begins. During the sampling process, the principles of As Low As Reasonably Achievable (ALARA) will be followed.

14.0 RECORDS

The following documents will be maintained as quality records:

- Field Logbooks
- Sampling Tracking Forms
- Results of all Calculations and Statistical Analyses Performed

FORM SOP-214-1

SAMPLE TRACKING FORM

Date: _____ Page _____ of _____

Sample Number	Matrix (S/W)	Location	Collected For	Comments	Collected By

Released by/company	All samples listed above are hereby released except for:	Date/Time
Received by/Company	All samples listed are hereby received except for:	Date/Time
Received by/Company	Data for all samples listed above are hereby received except for:	Date/Time

FORM SOP-214-2

FIELD SAMPLE SCREENING FORM

Sample Type:	Sample ID Number:
Date:	Time:
Counting Instrument:	Sample Date:
Reading Units:	
Signature of Technician:	Date:
Signature of Reviewer:	Date:

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Field Logbook Procedure

Document: SOP-215

Revision Number: 0

Date: July 1, 2011

Replaces: New

FIELD LOGBOOK PROCEDURE

1.0 PURPOSE

This procedure describes standard protocol for the use and control of the Field Logbooks used during the Site remediation.

2.0 SCOPE

This procedure applies to field activities that are associated with the Site cleanup.

3.0 REFERENCES

None

4.0 EQUIPMENT AND MATERIALS

Field Logbook.

Indelible pen or pencil.

5.0 INSTRUCTIONS

5.1 Field Logbook Format

5.1.1 Prior to entering the field, page numbers shall be assigned to the pages of the Field Logbook. Pages shall include the date. Each Field Team Leader and other field personnel taking measurements, observing tests, or performing other related work, will be issued a Field Logbook.

5.1.2 The first set of pages for a day will include the following items (in the order indicated):

- personnel on-site
- contractor personnel on-site (names of employees for the companies represented)
- others on-site (e.g., regulators, visitors)
- weather
- equipment used
- equipment calibration
- sketch of work area
- summary of work.

5.1.3 The remaining pages for a day will record the field activities and should include the following:

- meetings (meeting attendees, person who called the meeting, time, location, decisions, and decision makers)
- start and end time of activities.
- visits by others
- regulator - directed activities
- comments made by regulator, visitor, or other persons visiting Site
- weather and working conditions
- general description of work area.
- sketch work areas and show significant relative locations, etc.
- progression of work (e.g., faster or slower, reason for delays)

- description of equipment used, including general name, brand name, model number and, calibration
- description of amount of material excavated and levels of contamination observed (if known)

5.2 Quality Control

5.2.1 The Field Team Leader, or his designee, will review field logbook for completeness, proper field note correction (single line strikeout), and content.

5.2.2 Field logbooks will be audited at the discretion of the Project Quality Assurance Manager.

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Excavation Procedure

Document: SOP-217

Revision Number: 0

Date: July 1, 2011 Replaces: New

EXCAVATION PROCEDURE

1. PURPOSE

To provide a procedure for excavation for the Site.

2. SCOPE

This procedure will cover Site excavation activities, which are deemed quality critical by the Project Coordinator

3. REFERENCES

1992, NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, Draft Report.

4. EQUIPMENT AND MATERIAL

None

5. INSTRUCTIONS

5.1 Delineation of extent

5.1.1 Delineate initial areas and depths. Areas and depths will extend slightly beyond estimated extent of impacted soil. Initial areal extent will be established using previously completed walkover gamma surveys, down-hole exploration and sampling information, supplemented with gamma survey data.

5.1.2 Initial excavation limits to be within three inches of the estimated bottom limit.

5.2 Excavate delineated soil mass.

5.3 Sampling scheme

5.3.1 Re-establish survey grid.

5.3.1 Locate diagonals across grid square.

5.3.2 Survey the bottom of the excavation as described in SOP-210.

5.4 Pre-Verification or Verification Sampling

5.4.1 If all measurements within a grid are less than the cleanup criteria limit, then grid is clean. No further excavation is required in this grid.

5.4.2 If any measurements within an excavation are greater than the action criteria limit, then additional excavation is required.

5.4.2.1 Proceed through sequence 5.2 through 5.4 again.

5.4.2.2 Mark subareas around grid points that exceeded the action limit.

5.4.2.2 Contact Field Team Leader for guidance of additional excavation.

5.5 Completion

5.5.1 After grid has met criteria, give documentation of delineation, excavation, and sampling to Field Team Leader.

5.5.2 Grid is available for Pre-Verification or Verification Surveying.

6. QUALITY CONTROL

6.1 Quality control for the excavation documentation will be in accordance with applicable SOPs.

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Verification Survey

Document: SOP-223

Revision Number: 1

Date: July 1, 2011

Replaces: Revision 0

VERIFICATION SURVEY PROCEDURE

1.0 PURPOSE

The purpose of this procedure is to present protocol for conducting verification surveys at the excavations at the Site.

2.0 SCOPE

This procedure applies to all completed excavations that are done as a result of the excavation area being identified as containing soil exceeding the cleanup criteria.

3.0 REFERENCES

SOP-210 - Gamma Radiological Survey

4.0 EQUIPMENT AND MATERIALS

None

5.0 PROCEDURE

5.1 Equipment and Materials

Equipment used for verification survey may include the following:

5.1.1 Compass or theodolite

5.1.2 Cloth or steel tape

5.1.3 Stakes, survey flags, or spray paint

5.2 Grid Layout

5.2.1 A confirmation/pre-verification and verification survey may be conducted at remediated excavations.

5.2.2 The grid size (10-meter X 10-meter or less) and locations used for the confirmation/pre-verification surveys will be essentially identical to those that will be established for the verification survey.

5.2.3 The diagonals across each grid square will be located.

5.2.4 The location halfway between the grid corner and the center of the grid will be located (Basically, the center of the four individual 5-meter X 5-meter quadrants.)

5.3 Confirmation/Pre-verification Sampling

5.3.1 Gamma field measurements will be made according to the procedures described for Gamma Radiological Surveys (SOP-210).

5.3.2 When all measurements within a grid are believed to be less than the cleanup criteria limit, then grid is considered clean and a confirmation sample can be collected. If any field measurements within an excavation are greater than the action criteria limit, then the Field Team Leader shall guide additional soil removal until the excavation measures below the cleanup criteria and a confirmation sample can be collected and analyzed.

5.3.3 Sample Collection

5.3.3.1 The confirmation/pre-verification sample will be a composite sample made up of five subsamples obtained by dividing the 100 m^2 area into four equal quadrants of 5-meter X 5-meter. Four of the subsamples will be collected from the center of the individual 5-meter X 5-meter quadrants, while the fifth subsample will be collected from the center of the 10 meter x 10 meter (or less) verification unit.

5.3.3.2 The material from the five sample aliquots will sifted through a 1/4" sieve to remove rocks, sticks, and other debris greater than 1/4" in size, then combined and homogenized in a stainless steel bowl.

5.3.3.3 Following homogenization, a properly sized aliquot of the homogenized material will be placed in an appropriate sample container(s): 20ml for NUTRANL sample analysis or 500-ml for high resolution gamma spectroscopy analysis.

Note: Only one sample is being prepared for the confirmation/pre-verification NUTRANL analyses, versus the analysis of five samples for verification sample analysis.

5.3.4 Sample Analysis

5.3.4.1 This sample will then be analyzed using NUTRANL or high resolution gamma spectroscopy analysis.

5.3.4.2 If the composite sample analysis results indicate a combined Ra-226/Ra-228 concentration of less than 7.1 pCi/g, AECOM will contact the USEPA and request USEPA conduct the collection of a verification sample.

5.4 Verification Sampling

A verification sample shall be collected once gamma surveying and the confirmation/pre-verification sampling indicates that the base of excavation area is less than 7.1 pCi/g. Verification sampling will be conducted by the USEPA for each verification area not to exceed 100 m^2 (10 meter by 10 meter or less, square in shape or at least reasonably close).

5.4.1 Sample Collection

5.4.1.1 The verification sample will be comprised of a five point composite sample with individual sample aliquots collected from the diagonals and center point of the roughly 10 meter x 10 meter (or less) verification unit.

5.4.1.2 Diagonals will be established through each corner and intersecting at the center.

5.4.1.3 A total of five sample aliquots will be collected from each verification unit:

a. Four sample aliquots will be collected from the midpoint of each diagonal between a corner and the center.

b. One sample aliquot will be collected from the center of each verification unit.

c. Each sample aliquot volume should be at least 500-ml or of sufficient size to ensure there is enough material for a 500-ml sample following 1/4" screening.

5.4.1.4 The material from the five sample aliquots will sifted through a 1/4" sieve to remove rocks, sticks, and other debris greater than 1/4" in size, then combined and homogenized in a stainless steel bowl.

5.4.1.5 Following homogenization, a properly sized aliquot of the homogenized material will be placed in an appropriate sample container: 100-ml for NUTRANL analysis (20ml for each of five NUTRANL sample containers), or 500-ml for high resolution gamma spectroscopy analysis.

5.4.2 Verification Sample Analysis

5.4.2.1 The five individual verification samples will then be analyzed using NUTRANL or a single sample utilizing high resolution gamma spectroscopy analysis.

5.4.2.2 If verification sample analysis results indicate a combined Ra-226/Ra-228 concentration of less than 7.1 pCi/g, AECOM will provide to USEPA a "Notification of Successful Pre-Verification or Verification" form for the verification unit and request a final verification survey or approval to backfill.

5.4.2.3 Upon request by the USEPA, the verification sample will be shipped to the USEPA National Air and Radiation Environmental Laboratory for final high resolution gamma spectroscopy analysis.

6.0 DOCUMENTATION

6.1 A scale drawing of the survey area showing the locations and results of the gamma measurements will be created.

6.2 The drawing and gamma measurements will be delivered to the USEPA with a Notice of Successful Verification and a request for approval to backfill the excavation (Form SOP 223-1).

7.0 QUALITY CONTROL

7.1 Quality control for the verification documentation will be in accordance with applicable SOPs.

For each verification unit of 100 square meters or less (an area with dimensions of 10 meters by 10 meters or less, square in shape or at least reasonably close):

1. Once gamma surveying indicates that the base of excavations are likely less than 7.1 pCi/g, a verification sample shall be collected.
2. The verification sample will be comprised of a 5 point composite sample with individual sample aliquots collected from the diagonals and center point of the roughly 10 meter x 10 meter (or less) verification unit.
3. Diagonals will be established through each corner and intersecting at the center.
4. A total of five sample aliquots will be collected from each verification unit:
   a. Four sample aliquots will be collected from the midpoint of each diagonal between a corner and the center.
   b. One sample aliquot will be collected from the center of each verification unit.
   c. Each sample aliquot volume should be at least 500-ml or of sufficient size to ensure there is enough material for a 500-ml sample following 1/4" screening.

5. The material from the five sample aliquots will sifted through a 1/4" sieve to remove rocks, sticks, and other debris greater than 1/4" in size, then combined and homogenized in a stainless steel bowl.

6. Following homogenization, a properly sized aliquot of the homogenized material will be placed in an appropriate sample container: 100-ml for NUTRANL analysis (20ml for each of five NUTRANL sample containers), or 500-ml for high resolution gamma spectroscopy analysis.

7. This verification sample will then be analyzed by AECOM using NUTRANL or high resolution gamma spectroscopy analysis.

8. If verification sample analysis results indicate a combined Ra-226/Ra-228 concentration of less than 7.1 pCi/g, AECOM will provide to U.S. EPA a "Notification of Successful Pre-Verification or Verification" form for the verification unit and request a final verification survey or approval to backfill.

9. AECOM will then ship the verification sample to the U.S. EPA National Air and Radiation Environmental Laboratory for final high resolution gamma spectroscopy analysis.

FORM 223-1
NOTIFICATION OF SUCCESSFUL VERIFICATION SURVEY

Area Identification: _____

Date of Verification Survey: _____

Time of Verification Survey _____ am/pm

The above-described excavation was surveyed at the time and date indicated above. The survey indicated that all soils have been removed as required by the Site Removal Action Criteria.

Documents pertaining to this survey are attached for review and approval by the USEPA.

Signed: _____

Date: _____

Print Name Steve Komder _____

Print Title Senior Project Geochemist _____

AECOM

The attached Verification Survey documents were reviewed by USEPA, Region 5 on _____. The results of this survey indicate that the verification criteria as contained in the Administrative Settlement Agreement and Order on Consent.

Authorization is hereby granted to commence backfill and restoration work at this excavation.

Date _____

Print Name _____

Print Title _____

For USEPA Region 5

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Radioactively Contaminated Material Shipments

Document: SOP-320

Revision Number: 1

Date: October 24, 2013 Replaces: July 11, 2012

RADIOACTIVELY CONTAMINATED MATERIAL SHIPMENTS

1.0 SCOPE

1.1 Purpose

To establish a procedure that will insure the safe and proper shipment of non-regulated radioactively contaminated waste material in compliance with United States Environmental Protection Agency (USEPA), Nuclear Regulatory Commission (NRC), Department of Transportation (DOT) regulations as well as the Waste Acceptance Criteria of the disposal site.

1.2 Applicability

This procedure is applicable for shipments of radioactively contaminated materials destined for disposal at either U.S. Ecology Idaho, Inc. in Grand View, Idaho; Waste Control Specialists, LLC in Andrews, Texas or EnergySolutions, LLC located in Clive, Utah.

2.0 REFERENCES

- 32 Illinois Administrative Code (IAC), Parts 310 and 340, Standards for Protection Against Radiation
- 32 IAC, Part 400, Notices, Instructions and Reports to Workers; Inspections
- 10 CFR Part 71.47 and 71.87
- 10 CFR Part 71 Statements of Consideration
- 49 CFR Parts 172, 173, 174 and 177
- 32 IAC, Part 341, Transportation of Radioactive Material

3.0 DEFINITIONS

3.1 Definitions for transport are defined in 49 CFR §173

3.2 Limited Quantity of Radioactive Material

This is the quantity of radioactive material that does not exceed the materials package limits specified in 49 CFR 173.425 and which conforms with the requirements specified in 49 CFR 173.421.

4.0 REQUIREMENTS

4.1 Prerequisites

4.1.1 All shipping packages shall be inspected by the Project Coordinator or designee prior to loading to insure that the container's integrity is adequate and then inspected again after loading to insure that the packages have been loaded and closed in accordance with applicable procedures.

4.1.2 For shipments of radioactively contaminated material for disposal, compliance with disposal site facility criteria and specific state and federal license provisions applicable to the material shall be verified by Project Coordinator or designee.

4.1.3 For packages of radioactively contaminated waste material intended for disposal, the Project Coordinator or designee shall verify that the pre-shipment characterization process has been completed.

4.2 Tools, Material, Equipment include the following

4.2.1 Packaging, labels and containers as applicable.

4.3 Precautions/Limits

4.3.1 Radioactive waste material that is to be shipped for disposal must be classified according to 32 IAC 340.1052 and meet the requirements of 32 IAC 340.1055 if it is going to be shipping as a hazardous material.

4.3.2 The maximum permissible limits for removable contamination for a package are contained in 49 CFR 173.443 Table 9. Pursuant to 49 CFR 173.443(a)(1), the values in the Table below assume a wipe efficiency of 10% (i.e., are the 49 CFR 173.443 Table 9 values divided by 10).

Table 1 - Non-Fixed External Radioactive Contamination Wipe Limits for Packages

Contaminant	Bq/cm^2	µCi/cm^2	Dpm/cm^2
Beta/gamma emitting nuclides; nuclides with $T_{1/2}$ <10 days; natural uranium; natural thorium; U-235; U-238; Th-232; Th-228; and Th-230 when contained in ores or physical concentrates.	0.4	10^{-5}	22
All other alpha emitting nuclides	0.04	10^{-6}	2.2

NOTE: In cases of packages transported as exclusive use shipments by rail or highway, the non-fixed radioactive contamination must not exceed the above wipe limits at the beginning of transport, and, at any time during transport, must not exceed 10 times the above wipe limits (please refer to 49 CFR 173.443 for complete details on contamination control and exclusive use shipments).

4.3.3 The radiation levels at any point on the external surface of the package must not exceed 200 millirem per hour (mrem/hr) and the Transport Index must not exceed ten. Packages transported as exclusive use by rail or highway may exceed these limits provided that the following conditions are met:

Table 2 – External Surface Dose Rate Limits

	Open Vehicle	Closed Vehicle
Package Surface	≤ 200 mrem/hr	≤ 1000 mrem/hr
Vehicle	≤ 10 mrem/hr at 2 meters from vertical planes	≤ 200 mrem/hr at any point on the outer surface of the vehicle ≤ 10 mrem/hr at 2 meters from vertical planes ≤ 2 mrem/hr in cab

4.4 Acceptance Criteria

4.4.1 Radioactively contaminated material has been properly prepared, packaged, and loaded onto a vehicle and is in proper condition for transport.

4.4.2 All necessary forms, surveys, and manifests have been prepared and the "shipping papers" packet is complete.

4.4.3 All necessary state and local authorities and material receivers have been properly

notified of the shipment.

4.4.4 All necessary paperwork has been completed and signed, and a copy of the "shipping papers" packet has been filed for project records.

4.4.5 For radioactive waste shipments for disposal, confirmation of receipt at the disposal facility is acknowledged within 20 days of shipment, or an investigation is initiated.

5.0 PROCEDURE

5.1 Verify that the intended consignee (receiver) of the material has a valid license to accept the type and quantity of radioactively contaminated material.

NOTE

Typically, groundwater samples, surface water samples, and environmental air samples that are shipped offsite do not meet the regulatory definition of "Radioactive Material" and, therefore, do not require radioactive material shipping paperwork.

5.2 Determine the following information for inclusion on the shipping manifests for each package in the intended shipment:

5.2.1 Verify that the proper shipping name will be DOT Non-Regulated Material, Non-Hazardous Soil

5.2.2 Physical and chemical form of material.

5.2.3 For each shipment of radioactively contaminated material, emergency response information must be maintained during transportation and at facilities where hazardous materials are loaded for transportation or otherwise handled during any phase of transportation.

5.3 If the package of radioactively contaminated material is to be shipped for disposal, the following are additional required steps:

5.3.1 Verify the waste material meets the relevant disposal facility's acceptance criteria.

5.3.2 For shipments to US Ecology, use a Non-Hazardous Waste Manifest. For shipments to WCS, use a Hazardous Waste Manifest (note: material is "non-regulated" but is required, per Texas regulations, to be shipped on a Uniform Hazardous Waste Manifest). Use EnergySolutions Radioactive Waste Shipment and Disposal Record forms 540 and 541 as the manifest forms for all shipments of radioactive waste material going to EnergySolutions.

5.3.3 The disposal site operator is required to acknowledge receipt of the shipment within 7 days of arrival by returning a signed copy of the first page of the shipping manifest to the shipper.

5.3.4 Verify that the radioactive material has been properly prepared, packaged, marked, labeled, and loaded on the vehicle.

5.3.5 Ensure that package radiation and contamination surveys have been performed and documented if applicable, and that package radiation and contamination levels are within the limits specified in Section 4.3.

5.3.6 Ensure that the load on the vehicle has been properly strapped down and tarped so as to

sufficiently restrain from movement during normal transport.

5.3.7 Contact the Project Coordinator, or his designee, for final inspection of the vehicle, cargo and paperwork.

5.3.8 Insure that the carrier (vehicle operator) has all the required shipment papers, and appropriate copies have been retained for the site files.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Shipping records shall be maintained by the Project Coordinator or designee. A complete shipment record packet includes copies of all completed and signed paperwork that accompanied the shipment.

6.2 Anyone who observes a deficiency in complying with this procedure shall notify Project Coordinator or his designee.

7.0 ATTACHMENTS

Attachment 1	Emergency Procedure Form
Attachment 2	Evaluation Questionnaire Form

ATTACHMENT 1
EMERGENCY PROCEDURE

This vehicle contains _soil or debris_, which are contaminated with natural thorium. In the event of an accident involving spillage of radioactively contaminated material, the following actions are recommended, if appropriate:

1. **LIFESAVING, RESCUE AND FIREFIGHTING**

This may be done with little fear towards the hazards from the material contaminated with thorium. If possible, avoid breathing dust and avoid swallowing it. Thorium on the skin or clothing is relatively harmless and simple washing methods will remove it. If you come into contact with the debris, please wait for advice from health officials. To avoid ingestion of thorium, do not eat, drink, or smoke while near the spill.

2. **CONTACT THE LOCAL LAW ENFORCEMENT AGENCY**

Tell the police of the accident with spillage of "Non-regulated radioactively contaminated (thorium) material". Ask them to notify the state health department. Give them the location of the accident site and tell them of any injuries to persons.

3. **FILL OUT ATTACHED QUESTIONNAIRE**

Please obtain all of the information asked for on the attached form. You will need to relay this information to the carrier and the shipper.

4. Telephone the Carrier and Shipper (call collect)

   a) The Trucking Carrier is: _____
      Telephone No.: _____

   b) The Shipper is:
      Telephone No. _____

Read the completed questionnaire to whoever answers your calls. It may be necessary to read the questionnaire a second time for complete understanding.

5. When help arrives please cooperate with all Civil Authorities and Carriers and Shipper's personnel who arrive at the scene. Follow their health safety instructions for checking possible contamination of your clothing or body.

   Please be assured that your exposure to this material will be relatively harmless, particularly if you have followed these instructions. The health and safety personnel who will arrive will be glad to answer any questions you have about this matter

ATTACHMENT 2
EVALUATION QUESTIONNAIRE

1. Name of truck driver

2. Name of trucking company _____

3: Bill of lading number

4. Destination of shipment _____

5. Date and time of accident _____

6. Place of accident _____

7. Name of Police Department notified _____

8. Phone Number of Police notified _____

9. Is the driver injured? _____ Others? _____

10. Is or was there a fire? _____

11. Is the truck road worthy? _____

12. Are containers off of the truck? _____ How many? _____

13. Estimate the number of square feet of spilled material _____

14. Has the spill been covered? _____

15. Is the spill on the ground? _____ Pavement? _____
16. Is the spill in water? ☐ Yes ☐ No **Lake?** ☐ Yes ☐ No **Stream?** ☐ Yes ☐ No
17. Is the spill near a building? ☐ Yes ☐ No **Sewer?** ☐ Yes ☐ No

18. Is the accident place illuminated at night? _____

19. Other comments: _____

20. Where can you be reached by phone? _____

a) Near the accident site _____
b) Home or business phone _____
c) Your name: _____

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Operation of Ludlum Model 2221 Scaler/Ratemeter with Ludlum Model 44-10 2"x2" NaI Scintillation Probe

Document: SOP-343

Revision Number: 0

Date: July 1, 2011 Replaces: New

Operation of Ludlum Model 2221 Scaler/Ratemeter with Ludlum Model 44-10 2"x2" NaI Scintillation Probe

1.0 SCOPE

1.1 Purpose

The Ludlum Model 2221 Scaler/Ratemeter with Ludlum Model 44-10 2"x2" Scintillation Probe is used to perform gamma radiological screening surveys over soil surfaces. In addition to screening surveys, the instrument can collect integrated count rate data at fixed locations

1.2 Applicability

The Ludlum Model 2221 Scaler/Ratemeter with Ludlum Model 44-10 2"x2" Scintillation Probe is used to perform gamma radiological screening in accordance with SOP 210 "Gamma Radiological Screening Surveys".

2.0 REFERENCES

2.1 Ludlum Model 2221 Scaler/Ratemeter Operation Manual

3.0 EQUIPMENT AND MATERIALS

The following equipment may be used as part of the survey programs. Other equipment may be substituted if necessary because of availability of the items listed or the conditions encountered at the site.

- Ludlum Model 2221 Scaler/Ratemeter
- Ludlum Model 44-10 2"x2" NaI Scintillation Detector
- NIST Traceable Radiation Check Source

4.0 PROCEDURE

4.1 Check for Current Calibration Sticker

4.1.1 Survey Meter shall be calibrated within the last 12 months and be affixed with a current calibration sticker. Meter shall be calibrated according to manufacturer's instructions with appropriate NIST traceable sources.

4.2 Check Batteries

4.2.1 Press the "BAT" button

4.2.2 The digital readout should read greater than "5.0". Record result on "Daily Radiation Survey Instrument Function Check" form (see Attachment 1).

4.2.3 Replace 4 D batteries if needed before use.

4.3 Verify Background

4.3.1 Set control switch to "DIG RATE".

4.3.2 Go to an area away from Exclusion Zone or where radioactive contamination is not present. Record result on "Daily Radiation Survey Instrument Function Check" form (see Attachment 1).

4.3.3 Site Specific background count rates shall be established for each instrument prior to initiating excavation activities.

4.3.4 Compare the observed count rate to the pre-established background count rate.

4.3.5 Do not use the meter if the observed count rate varies greater than +/- 10% from the pre-established background count rate unless it can be established appropriately why background conditions have changed.

4.4 Perform Meter Operation Check

4.4.1 Set control switch to "SCALER"

4.4.2 On the calibration sticker the operation check value will be noted and the survey configuration required to perform the check.

4.4.3 Place detector probe on top of the check source holder.

4.4.4 Press "Count" to collect a one minute integrated count.

4.4.5 Record operational check reading indicated on the digital readout. Record result on "Daily Radiation Survey Instrument Function Check" form (see Attachment 1).

4.4.6 Observed reading should be within +/- 10% of recorded operational check value.

4.4.7 Do not use the meter if the operational check fall outside of the acceptable range

4.5 Performing Radiation Surveys

4.5.1 Set Control switch to "DIG RATE"

4.5.2 Hold the probe at a consistent height no further than 6 inches away from surface being surveyed

4.5.3 Move the probe slowly over the surface being surveys at a rate of no more than 0.5 meter per second.

4.5.4 Walk over survey area with spacing between passes not to exceed 1 meter.

4.5.5 Record count rates, as needed.

5.0 RECORDS/REPORTS/NOTIFICATIONS

Refer to SOP-210 for documentation required when performing Gamma Radiological Screening Surveys.

ATTACHMENT 1

LUDLUM MODEL 2221 DAILY RADIATION SURVEY INSTRUMENTATION FUNCTION CHECK

Instrument Serial Number: _____

Probe Model Number: _____

Probe Serial Number: _____

Check Source ID Number: _____

Acceptable Source Count Rate (+/- 10%): _____

Acceptable Background Count Rate (+/- 10%): _____

Date	Time	Physical Check	Battery Check	Background Counts (CPM)	Source Counts (CPM)	Performed By (Initials)

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Surveys for Surface Contamination and Release of Equipment for Unrestricted Use

Document: SOP-345

Revision Number: 0

Date: July 1, 2011 Replaces: New

SURVEYS FOR SURFACE CONTAMINATION AND RELEASE OF EQUIPMENT FOR UNRESTRICTED USE

1.0 SCOPE

1.1 Purpose

This procedure provides the methods for the detection and measurement of radioactive contamination within the site areas, it provides the methods for evaluating contamination, and establishes the criteria for releasing equipment or materials out of the Exclusion Zone. These methods are to be used to minimize the spread of radioactive contamination.

1.2 Applicability

This procedure applies to surveys that are performed on building surfaces, vehicles, equipment, materials (herein referred to as equipment) at the site and to the site personnel, who are required to monitor and release the equipment.

2.0 REFERENCES

2.1 10 CFR Part 20 Standards for Protection Against Radiation

2.2 U. S. Nuclear Regulatory Commission (USNRC) Regulatory Guide 1.86

2.3 Health and Safety Plan for radiologically impacted soil removal, Rehabilitation Institute of Chicago

2.4 NUREG CR5849 Manual for Conducting Radiological Surveys in Support of License Termination

3.0 DEFINITIONS

3.1 Beta-Gamma to Alpha Decay Ratio

A thorium-232 decay series produces about 0.5 beta-gamma decays for every one alpha decay. This ratio allows the limits for alpha contamination to be verified using beta-gamma survey instruments.

3.2 Clean Area

This term defines radiation conditions within a specified area. An area where the radiation levels and contamination levels are maintained below 2 mrem/hr and 33 dpm/100 cm^2 alpha respectively.
Contamination Surveys

An assessment that may include, as appropriate, surveys for loose and fixed contamination through the use of direct frisks, large area wipes and smears, to locate and quantify the radioactive material present.

3.4 Exclusion Zone

The area on one side of the Control Line that includes Contamination Control Areas, Radiation Areas, and Airborne Radioactivity Areas.

3.5 Large Area Wipes (LAWs)

Paper towels or muslin used to wipe large areas to identify the presence of loose contamination.

3.6 Lower Limit of Detection (LLD)

The smallest amount of a radionuclide in a sample that will be detected with a probability of non-detection (Type 1 error) while accepting a probability of erroneously detecting that radionuclide in a blank sample (Type II error). These probabilities are 0.05 (5% chance of Type I or II errors). See Attachment 5 - "LLD Calculation" sheet.

3.7 Smears

Typically 2 inch disk type paper material. Smears are normally taken to identify and quantify loose contamination.

3.8 Unrestricted Release

Release of equipment or materials from the Exclusion Zone to any destination other than a licensed facility.

4.0 REQUIREMENTS

4.1 Prerequisites

4.1.1 Health Physics personnel shall ensure that all portable survey equipment used for this procedure are properly functioning and have a valid calibration sticker.

4.1.2 The Health Physics Supervisor or designee shall ensure that all personnel who are required to perform this procedure are properly trained and understand this procedure.

4.1.3 Equipment, vehicles and areas should be free of visible dirt, mud or dust prior to performing a contamination survey.

4.2 Tools, Material, Equipment

4.2.1 The following counting equipment, or their equivalents, should be used for performing contamination surveys on equipment and materials:

- Personnel and Equipment Frisking: Ludlum Model 3 Survey Meter with attached pancake G-M probe

- Alpha Smear Counting: Ludlum 2200 Scaler with attached Model 43-10 Alpha Scintillation Counter

4.2.2 Survey Maps (or lists) should be produced for each applicable type of equipment. Sketches of building surfaces (walls, floors, etc.), identifying the surveyed grids, should be produced for each surveyed building.

4.3 Precautions, Limits

4.3.1 Direct and removable surveys should not be performed on wet surfaces for alpha contamination. Wet surfaces should be surveyed only for beta-gamma contamination. However, the Health Physics Supervisor shall make the final determination as to when a wet surface is to be surveyed.

4.4 Acceptance Criteria

4.4.1 Prior to unrestricted release from the Exclusion Zone, all vehicles, equipment and materials shall be surveyed for contamination. If contamination is found, then the vehicle, equipment, or material should be decontaminated in order to be within the applicable

surface contamination release limits per Attachment 3 and Attachment 6 (Beta-Gamma Survey of Truck Tires) shall be used as a guideline for meeting Department of Transportation (49CFR173.443) release criteria, when performing surveys on wet surfaces.

4.4.2 The release of items from clean areas within the Exclusion Zone will be controlled by specific criteria established on a case by case basis and approved by the Health Physics Supervisor.

5.0 PROCEDURE

5.1 Routine Surface Contamination Surveys

5.1.1 Routine surveys shall be performed by trained personnel (typically by Health Physics Technicians), in accordance with this procedure and as scheduled by the Health Physics Supervisor.

5.1.2 Routine contamination surveys are not required in the Exclusion Zone.

5.1.3 Support Zone and Contamination Reduction Zone shall be surveyed at least weekly to ensure that cross contamination is not occurring. The clean side of the Contamination Reduction Zone should be surveyed each work day.

5.1.4 Other surveys will be performed, as appropriate, to support Special Work Permits, the movement of equipment from radioactive material areas to clean areas, and to evaluate radiological conditions in specific work areas when directed by the Health Physics Supervisor.

5.2 *Support/ Contamination Reduction Zone- Surface Contamination Surveys*

5.2.1 Survey techniques may employ the use of large area wipes, smears, or direct frisks as appropriate to the area being surveyed.

5.2.2. Large area wipes may be used to assess floor areas for contamination. A sufficient number of large area wipes should be used to evaluate approximately 10% of the floor area being surveyed.

5.2.3 If contamination is found with the large area wipes, a more detailed smear survey should be performed.

5.2.4 Counter tops, office furniture, laboratory equipment, etc., should be included in the contamination surveys. The area immediately on the clean side of the Control Line should be included in the survey.

5.2.5 Smears shall cover approximately 100 cm^2 and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a sequential number corresponding to the Smear Number on the Radiological Survey Data Sheet (see Attachment 1).

5.2.6 The smears shall be analyzed for alpha contamination.

5.3 Equipment- Surface Contamination Surveys

5.3.1 Equipment shall be surveyed for contamination by using large area wipes, smears and by direct frisk as appropriate.

5.3.2 Take an appropriate number of smears to adequately assess the radiological conditions of the item being surveyed.

5.3.3 A large area wipe may be used as an indication of the presence of contamination.

5.3.4 Smears shall cover approximately 100 cm^2 and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a sequential number corresponding to the Smear Number on the Radiological Survey Data Sheet (see Attachment 1).

5.3.5 The smears shall be analyzed for alpha contamination.

5.4 Unrestricted Release

5.4.1 Materials, equipment and vehicles shall be surveyed for contamination prior to unrestricted release from the site, using large area wipes, smears, and by direct frisk.

5.4.2 All building surfaces, large concrete pieces, and other materials having large, smooth surfaces shall be surveyed prior to unrestricted release. A sufficient number of large area wipes and/or smears shall be taken to adequately assess any contamination present.

5.4.3 All equipment intended for unrestricted release from contaminated areas shall be surveyed for removable and fixed contamination. A sufficient number of large area wipes and/or smears shall be taken to adequately assess any contamination present. If removable contamination is within the release criteria, then perform a direct alpha frisk. Particular attention should be given to areas of the vehicle most likely to have become contaminated such as tire exterior surfaces, occupied areas, load areas, wheel wells, and the bottom of the equipment.

5.4.4 Vehicles intended for unrestricted release from contaminated areas shall be surveyed for removable contamination with large area wipes. If no contamination is found, take a confirmatory smear to document each large area wipe. If contamination is found, take an appropriate number of smears to evaluate the removable contamination present. If removable contamination is within the release criteria, then perform a direct alpha frisk. All survey results must be documented.

5.4.5 Vehicles intended for unrestricted release from clean areas in the Exclusion Zone shall be surveyed with large area wipes on accessible tire/track surfaces, with a direct frisk of tire/track surfaces, and with one smear each for two tires The results of the direct frisk and the large area wipes must indicate that the release criteria is met. The smears shall be added to the survey documentation when the results become available.

5.4.6 Large area wipes may be used as an indication of the presence of contamination.

5.4.7 If no contamination is found with a large area wipe, a confirmatory smear shall be taken for documentation.

5.4.8 If contamination is found with the large area wipe, a representative number of smears shall be taken to quantify the removable contamination present.

5.4.9 Smears shall cover approximately 100 cm' and should focus on areas with the highest potential for removable contamination. The smears should be placed in an envelope that is labeled with a sequential number corresponding to the Smear Number on the Radiological Survey Data Sheet (see Attachment 1).

5.4.10 The smears shall be transported to the Site Laboratory for analysis.

5.4.11 Perform a direct frisk on all material being surveyed for unrestricted release.

5.4.12 Personal equipment and articles (radios, pens, paper, clipboards, etc.) can be surveyed with either the large area wipes or by direct frisk, as appropriate.

NOTE
Items that have irregular surfaces, such as radios, should be wiped and frisked. Items with relatively smooth surfaces, such as paper, pens, etc., may be direct frisked only.

5.5 Documentation of Results

5.5.1 The smear counting results and data shall be documented on the Radiological Survey Data Sheet (see Attachment 1). The documentation of the release survey shall include a drawing of the item to be released.

5.5.2 The instructions for completion of the Radiological Survey Data Sheet are contained in Attachment 2.

5.5.3 A request for equipment release form (Attachment 7) shall be initiated by the equipment owner to track the decontamination process.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 The Health Physics Supervisor and the Project Coordinator shall review and approve all completed survey forms required by this procedure, to comply with reference 2.5 above.

6.2 The survey maps shall be uniquely numbered and retained by Health Physics for project filing. Single item survey maps shall be attached to the survey results.

7.0 ATTACHMENTS

7.1 Attachment 1 - Radiological Survey Data Sheet (example)

7.2 Attachment 2 - Radiological Survey Data Sheet Instructions

7.3 Attachment 3 - Surface Contamination Release Limits

7.4 Attachment 4 - Large Area Wipes on Truck Tires

7.5 Attachment 5 - LLD Calculation

7.6 Attachment 6 - Beta- Gamma survey of Truck Tires (wet surfaces)

7.7 Attachment 7 - Request For Equipment Release

Attachment 1

RADIOLOGICAL SURVEY DATA SHEET

Page ___ of ___

Item Description	00 ___ Vehicle		98 ___ Equipment		___ Building ___ Other	
Reference	YR	MO	Day	Item	No.	Performed By:
Alpha Survey Instrumentation				Beta Survey Instrumentation		

Location	Smear Number	Alpha Activity (dpm/100cm^2)		Beta Gamma Direct (CPM)
		Direct	Removable	Fixed

REMARKS

Reviewed By:	Date:

ATTACHMENT 2

RADIOLOGICAL SURVEY DATA SHEET INSTRUCTIONS

I. Select the appropriate survey category.

2. Enter the purpose of the survey in the "ITEM DESCRIPTION" section. Be specific:

- Vehicle survey for release from the site.
- Tools and equipment for use in the clean area.
- S WP support, include the S WP number.

3. Enter the survey date.

4. Enter the reference number - Year, Month, Date, Item (Use coding for categories at the top of the form) and Number.

5. Enter your signature in the "PERFORMED BY" section.

6. Enter the instrument(s), serial number(s), and background reading(s) for the survey instruments used for this survey.

7. Enter the "LOCATION OF READING." Enter descriptions such as, the location and item being surveyed, vehicle number, smear location on vehicle, etc.

8. Enter the number of the smear or large area wipe in the "SMEAR NUMBER" section.

9. All data in the "ALPHA ACTIVITY" section is recorded in dpm/100cmz, except large area wipe data.

- If equipment/material is directly frisked, the reading from the Ludlum Model 3 with pancake G-M probe is converted to dpm/100cm~ by multiplying ccpm by a factor of 4 (Gross cpm - Background cpm X 4) and enter the result in the "DIRECT" column. If the instrument response cannot be distinguished from background enter <200 dpm/l00cm^2.

- The "REMOVABLE" column may contain the result from a smear or the result from a large area wipe. Smear results that are less than the LLD shall be recorded as less than the numerical LLD value for the instrument in use. As an example, if the LLD for the 65000 is 3 dpm, then the result will should be recorded as <3 dpm/100cm^2. All results should be rounded to the nearest whole number. Results from LAWs should be recorded as dpm without regard to area, unless specific instructions are given to calculate the result per area, as in Attachment 4. Results that do not exceed background should be recorded as BKG (Background).

- Fixed contamination is the difference between the direct frisk results and the removable contamination results. If no fixed contamination is detectable, enter N/A in the "FIXED" column.

10. If a "BETA-GAMMA DIRECT" survey is performed, record the results as ccpm.

11. In the "REMARKS" section, record any identifying data on counting equipment and any other information needed for explanation or interpretation of survey data. If large area wipes are included in the removable contamination data without regard to area, note this in the "REMARKS" section.

ATTACHMENT 3

SURFACE CONTAMINATION RELEASE LIMITS

Average[a] Removable (dpm/100 cm^2)	Maximum Removable (dpm/100 cm^2)	Average[a] Fixed (dpm/100 cm^2)	Maximum Fixed (dpm/100 cm^2)
20	100	1,000	5,000
Equivalent Beta-Gamma Measurements [b,c]			
17	50	500	2,500

a The contamination levels may be averaged over one (1) square meter provided the maximum activity per any 100 cm^2 area within the one (1) square meter is less than the maximum applicable release limit.

b Beta-gamma release limits derived from the beta-gamma to alpha ratio.

c Beta-gamma surveys are not normally performed for release purposes. If alpha contamination is verified to be within specified release limits, the alpha to beta-gamma ratio indicates that the beta-gamma is also within limits.

Beta-gamma frisks may be used as appropriate to:

- Estimate contamination levels prior to performing release surveys.
- Estimate levels of contamination present on equipment, materials and work areas.

The results of direct beta-gamma frisks should be quantified on survey records as CCPM (Corrected Counts Per Minute).

Results that are less than 100 CCPM should be recorded on the survey record as <100 CCPM.

ATTACHMENT 4

LARGE AREA WIPES ON TRUCK TIRES

Large area wipes are used to wipe an area of approximately 2000 cm^2 on truck tires. The wipes are then frisked with a PAC-4G.

Assuming that 50 cpm above background is readable, it can be assumed that 100 dpm is detectable on a wipe. If the area of the wipe requires two probe areas to cover the wipe, then it can be assumed that we can assess with each measurement approximately half of the total area wiped, or 1000 cm^2 or approximately 100 dpm/1000 cm^2, which is equivalent to 10 dpm/100cm^2.

Frisk results on LAWs, from truck tires, that are nondetectable may be recorded as <10 dpm/100cm^2 in the removable column of the survey report.

ATTACHMENT 5

LLD CALCULATION

$$LLD = \frac{2.71}{T_s} + 3.29 \sqrt{\left(\frac{Cb}{Tb}\right)\left(1+\frac{Tb}{Ts}\right)}$$

Where C_b = Background Counts Per Minute
T_b = Background Counting Time in minutes
T_s = Sample Counting Time in minutes

EXAMPLE: The background count rate for a given counter is 1.56 cpm over a 50 minute counting time and samples are counted for 2 minutes. The counter has an efficiency of 40.3%.

$$LLD = \frac{2.71}{2} + 3.29 \sqrt{\left(\frac{1.56}{50}\right)\left(1+\frac{50}{2}\right)}$$

LLD = 4.32 cpm

$$LLD = \frac{4.32 \text{ cpm}}{.403} = 10.7 \text{ dpm}$$

ATTACHMENT 6

BETA-GAMMA SURVEY OF TRUCK TIRES

The Department of Transportation removable contamination limits in 49CFR 173.443 are 220 dpm alpha contamination and 2200 dpm beta contamination. The most restrictive is the alpha limit. If weather prevents surveying for alpha contamination, then beta-gamma surveys will have to be utilized. The alpha to beta ratio for the thorium chain is approximately 2:1. Using an alpha to beta ratio of 2, the beta equivalent activity for the alpha limit would equal 110 dpm. 110 dpm times the probe efficiency of 0.14 cpm/dpm equals 15.7 cpm. 15.7 cpm above background is not discernable in the field. The diameter of a truck tire is 43 inches. The tread width is 9 inches. The surface area of a truck tire equals 7843.8 cm^2. Approximately 12 inches of tread is on the ground and not surveyable. This represents 3.5% of the surface area of the tire. The remaining 96.5% equals a surface area of 7569.5 cm^2. The typical area of contact for a wipe is about 3.5 inches by 4 inches. This is equal to about 90 cm^2. If the conservative area of 100 cm^2 is used the each cm^2 of wipe is equal to 57.7 cm^2 of tread area. The manufacturer lists the surface area of the probe face as 15.5 cm^2. The tread area survey under the probe equals 894.4 cm^2. To correct the measured counts to an activity/100 cm^2 the counts indicated on the meter face must be multiplied by 8.9. If 15.7 cpm/100 cm^2 beta-gamma activity equals 220 dpm/100 cm^2 alpha contamination then the measured cpm when surveying a wipe would equal 139 cpm. The manufacturer recommends limiting the background count rate to less than 300 cpm in order to see 100 cpm above background. Due to the changing background conditions this value is being reduced to 200 cpm. Therefore, if background is 200 cpm or less and the wipe on a truck tire reads less than 100 cpm above background the truck tire has less than 220 dpm/100 cm^2 removable alpha contamination.

ATTACHMENT 7
REQUEST FOR EQUIPMENT RELEASE

From:_____ Date: _____

TO: HEALTH PHYSICS SUPERVISOR

1. Equipment Type and ID # _____

2. Usage History (locations on site)

_____
_____
_____

3. Scheduled Date to Start Decontamination _____

4. HP Check for Survey Readiness: Technician _____ Date_____

5. Equipment ready for survey ☐ YES ☐ NO

Actions required _____
_____
_____

6.Date and Time Ready for Survey_____

7. Survey Date and Time _____

Results: Pass _____ Fail_____

8. Equipment Release Date _____

9.Approved for Release: HP Supervisor: _____ Date: _____

NOTE; On large earth moving equipment, substantial cleaning may be required prior to HP checking for survey readiness. Once vehicle has been checked and is ready for release survey, it may take as much as 24 hours from the time the survey is initiated until survey results are available. If fixed or removal is located, additional decontamination and surveys are required.

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Decontamination

Document Number: SOP-347

Revision Number: 0

Date: July 1, 2011 Replaces: New

DECONTAMINATION

1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to provide instructions for the decontamination of personnel and equipment.

1.2 Applicability

This procedure is applicable for all equipment and personnel that may become contaminated at the Parkview West site.

2.0 REFERENCES

10 CFR Parts 19 and 20

U. S. Nuclear Regulatory Commission (USNRC) Regulatory Guide 1.86

Health and Safety Plan, Parcel K and Parcel 21 Radiologically Impacted Soil Removal Action, Chicago, Illinois

SOP-345 "Surveys for Surface Contamination and Release of Equipment for Unrestricted Use"

3.0 DEFINITIONS

3.1 Airborne Radioactivity Area

This term defines radiation conditions within a specified area. An area where the average concentration of airborne radioactivity could allow an individual to exceed 12 DAC-hrs over a one week period.

3.2 Clean Area

This term defines radiation conditions within a specified area. An area where the radiation levels and contamination levels are maintained below 2 mrem/hr and 33 dpm/100 cm^2 alpha respectively.

3.3 Contamination Control Area

This term defines radiation conditions within a specified area. An area that may be contaminated to a level greater than a Clean Area.

3.4 Contamination Reduction Zone

The area on one side of the Control Line where personnel can decontaminate, remove their personal protective clothing and equipment.

3.5 Control Line

The demarcation that separates a Clean Area from a Contamination Control Area. The control line is located in the personnel decon facility.

3.6 Craft Personnel

Employees and contractors who physically perform the activities described on the SWP.

3.7 Derived. Air Concentration-Hour (DAC-hour)

DAC-hour is the product of the concentration of radioactive material in air and the time of exposure to that radionuclide.

3.8 Exclusion Zone

The area on one side of the Control Line that includes Contamination Control Areas, Radiation Areas, and Airborne Radioactivity Areas.

3.9 Film Badge

Similar to the TLD, it is used to measure radiation dose.

3.10 Frisking

A personal survey of an individual's clothing and exposed body performed to determine if contamination is present.

3.11 Protective Clothing

Reusable or disposable coveralls, boots and gloves that provide a barrier between contamination and personnel.

3.12 Radiation Area

This term defines radiation conditions within a specified area. An area where the whole body radiation level is greater than 5 mrem/hr.

3.13 Special Work Permit (SWP)

A document which describes the radiological conditions of the work area or task and delineates safety and radiation protection requirements to be followed in the work area or when performing the task.

3.14 Support Zone

The area on one side of the Control Line at the entrance to the Exclusion Zone.

3.15 Optically Stimulated Luminescence Dosimeter (OSL)

A device that measures radiation dose.

4.0 REQUIREMENTS

4.1 Prerequisites

None.

4.2 Tools, Material, Equipment

4.2.1 Decontamination facility.

4.2.2 Soap, water, high pressure spray, scrub brushes and other material as necessary to decontaminate personnel and equipment.

4.3 Precautions, Limits

Decontamination of personnel with material other than soap and water will only be done when authorized by the Site Manager, Health Physics Supervisor, or a medical doctor.

4.4 Acceptance Criteria

4.4.1 Personnel shall be free of contamination after decontamination.

4.4.2 Material and equipment being decontaminated, for unrestricted release, shall meet the release limits established in Reference 2.4.

5.0 PROCEDURE

5.1 Personnel Decontamination

5.1.1 Personnel who are contaminated to greater than 100 ccpm shall notify the health physics technician (HPT) assigned to the Control Line.

5.1.2 The HPT shall resurvey the individual to determine the exact location of the contamination and document it on the Contaminated Personnel or Personal Effects Report (Attachment 1).

5.1.3 If the contamination is spotty, the HPT shall attempt to decontaminate the individual using swabs or soap and water. If the decontamination is successful, document the results on Attachment 1.

a. If contamination is determined to be in an individual's eyes, the eyes may be flushed, using an eye wash station.

b. If contamination remains in the eyes after flushing or is determined to be in an individual's nose or ears, decontamination will be performed under the direction of the Health Physics Supervisor or qualified medical personnel.

c. Cleansing methods for skin decontamination, in order of harshness are as follows:
   1. Lifting off with sticky tape
   2. Flushing with water
   3. Soap and cool water
   4. Mild abrasive soap, soft brush, and water
   5. Detergent (soap powder)
   6. Mixture 50% powdered detergent and 50% cornmeal

5.1.4 If the contamination cannot be easily removed or the contamination is wide spread, the HPT shall escort the individual to the decontamination facility and notify the Health Physics Supervisor and the Site Manager.

5.1.5 The contamination shall be removed by having the individual wash with soap and cool water several times, if necessary. The methods listed above may be used by the HPT.

5.1.6 If the decontamination is successful, document the results on Attachment 1.

5.1.7 If, after several attempts, the contamination is not successfully removed, notify the Health Physics Supervisor.

5.2 Tool Decontamination

5.2.1 All tools being removed from the Exclusion Zone shall be checked by the HPT.

5.2.2 Tools that are contaminated shall be decontaminated before they can be released from the Exclusion Zone.

5.2.3 Tools shall be decontaminated by the users under the direction of the HPT.

5.2.4 Tools can be decontaminated using scrub brushes and soap and water, wiping with damp rags or wipes, soaking in a decontamination solution, using abrasive materials ultrasonic cleaners, or any other method approved by the HPT.

5.2.5 All interior surfaces of the tools must be decontaminated as well prior to the tool being unconditionally released.

5.2.6 If the tool is decontaminated and released by the HPT, the survey results shall be documented on a Radiological Survey Data Sheet (SOP-345 - Attachment 1)

5.2.7 If the tool cannot be decontaminated after several tries, then the tool shall be painted or sprayed with yellow paint to indicate that the item is radioactive material and kept in the Exclusion Zone.

5.3 Equipment Decontamination

5.3.1 Heavy equipment, such as backhoes, bulldozers, trucks, cranes, shall be washed with high pressure water spray prior to being surveyed by the HPT.

5.3.2 The washing of heavy equipment shall be performed in an area designated by health physics.

5.3.3 Once the equipment is washed, it will be surveyed by the HPT. The HPT will identify any areas on the equipment that need further decontamination and will make recommendations on how to further decontaminate.

5.3.4 All surfaces of the equipment must be decontaminated and surveyed. This includes air intakes, air filters and any internal surface that is likely to be contaminated.

5.3.5 Once the equipment has been surveyed and released by the HPT, the survey results shall be documented on a Radiological Survey Data Sheet (SOP-345 - Attachment 1).

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Release surveys and personnel decontaminations shall be documented on the appropriate form.

6.2 Personal contaminations shall be reported to the Health Physics Supervisor and the Site Manager.

7.0 ATTACHMENTS

7.1 Attachment 1 Contaminated Personnel or Personal Effects Report

ATTACHMENT 1

CONTAMINATED PERSONNEL OR PERSONAL EFFECTS REPORT

DATE OF INCIDENT	TIME OF INCIDENT
NAME	BADGE NO.
LOCATION OF INCIDENT (SPECIFIC AREA)	
DESCRIPTION	DESCRIBE IN DETAIL ANATOMICAL LOCATION, CONTAMINANT, TYPE OF INJURY, OR CONTAMINATED ARTICLE

CONTAMINATED ARTICLE OR AREA	DECONTAMINATION AGENT USED	INSTRUMENT	SURVEY RESULTS		FINAL DISPOSITION OF ARTICLES
			BEFORE	AFTER	

WOUND COUNT /5 MIN	BKGD COUNT /5 MIN	SOURCE COUNT /5 MIN

SAFETY MEASURES	PERTINENT SAFETY MEASURES IN EFFECT ☐ YES ☐ NO	IF NO, EXPLAIN
REMARKS		

EMPLOYEE SIGNATURE	HEALTH PHYSICS SIGNATURE

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Sample Preparation Procedure for Gamma Spectral Analysis

Document: SOP-364

Revision Number: 0

Date: July 1, 2011 Replaces: None

SAMPLE PREPARATION PROCEDURE FOR NUTRANL ANALYSIS

1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to provide guidance for the preparation of samples for analysis of radioactive nuclides. This procedure applies specifically to samples prepared for NUTRANL analysis.

1.2 Applicability

This procedure applies to all soil-type environmental samples, including soil, rocks, concrete, and construction debris.

2.0 REFERENCES

2.1 10 CFR Part 20 Standards for Protection Against Radiation

3.0 DEFINITIONS

None

4.0 REQUIREMENTS

4.1 Prerequisites

NONE

4.2 Tools, Materials, Equipment

4.2.1 The following equipment is needed to perform this procedure:

- 20 ml sample vials
- Sieve of one-quarter inch mesh
- Analytical balance
- Marinelli beakers
- Zip-lock bags
- Labels
- Paper towels

4.3 Precautions, Limits

4.3.1 Samples prepared for receipt at field laboratory for NUTRANL analysis are homogenized during sample collection prior to receipt at the field laboratory for analysis. No other physical preparation is performed at the laboratory for screening samples (NUTRANL analysis). Any corrections or analysis other than NUTRANL pulse height analysis shall be performed by an outside contract laboratory. This includes U. S. Environmental Protection Agency (USEPA) verification samples and quality control (QC) samples.

4.3.2 All samples not known to be homogenous must be homogenized prior to analysis.

4.3.3 NUTRANL analysis is designed and calibrated for analysis of low activity samples, specifically for documenting closure at less than the specified cleanup criteria. High activity samples may produce anomalous results due to algorithms in the NUTRANL programming.

4.4 Acceptance Criteria

Proper preparation during sample collection ensures that the samples submitted to the laboratory are representative of the material sampled and suitable for the required analysis. Acceptable samples will be homogeneous with regard to size of material; appearance with regard to color, moisture and soil type; shall not contain materials over the specified maximum gradation; and shall be free of external adhering soil or other materials.

5.0 PROCEDURE

5.1 All Samples

5.1.1 All samples submitted for analysis must be logged in the chain of custody book. The following information shall be recorded and shall be taken directly from the field chain of custody form or a copy of the chain of custody form must be filed in the chain of custody book.

- Description or grid location
- Purpose of sample which may include:
  - Activity screening
  - Pre-verification
  - Verification
  - Overburden
  - Imported fill
  - Calibration quality control check
- Date and time of sampling
- Originator of sample
- Corresponding count rate from survey meter (optional)

5.1.2 Ensure that outside of sample container is free from potential contamination, by wiping it clean with a paper towel.

5.1.3 Place blank label on outside of container and record the sample ID, which is a unique sequential number used to identify individual samples. The unique sequential number, sample ID, is obtained from project sample log books.

5.1.4 Weigh the sample on the analytical balance. Subtract the empty (tare) weight which is recorded on the side of each vial and record the net weight in grams on the label.

5.1.5 Prepare the sample in accordance with the requirements of the analysis requested.

5.1.6 Samples will have already been homogenized and passed through a ¼ inch mesh during sampling. It should not be necessary for any samples to be re-opened in the field laboratory. This will eliminate the potential for the field laboratory area to become cross-contaminated. This will also allow for ingrowth. Note will be made on the sample label each time the vial is opened.

5.1.7 Verification samples received for the USEPA are also logged in the chain of custody book. Verification samples are prepared in the same manner as others; however, they come in batches of five 20 ml vials. When samples are to be picked up by the USEPA, place each batch of five sub-samples in its own zip-lock bag.

5.2 Quality Control Samples

5.2.1 QC Samples shall be placed into 500 ml Marinelli beakers prior to analysis.

5.2.2 The technician obtaining the sample shall obtain a split sample into a 20 ml sample vial from the Marinelli beaker. This split is performed in the exclusion zone prior to submitting the sample for analysis. The split sample shall be labeled with the same description as the QC sample. The split sample shall be homogeneous with regard to the remainder of the QC sample.

5.2.3 The net weight of the Marinelli beaker shall be noted on the sample label attached to the beaker. The net weight is obtained by subtracting the weight of the beaker (tare) from the total weight of the filled beaker. The tare (empty) weight of the Marinelli beaker is recorded on the outside of each beaker.

5.2.4 The outside laboratory performing analysis of the QC sample shall be responsible for all additional sample preparation, and requested analysis. This includes moisture correction and/or daughter nuclide ingrowth analysis.

5.2.5 Analyze the split sample (20-ml vial) using the NUTRANL System and retain records for future comparison to gamma spectroscopy results.

6.0 RECORDS/REPORTS/NOTIFICATIONS

6.1 Notify the laboratory technician when the samples are properly labeled and ready for analysis.

6.2 Samples shall be retained until all evaluations have been completed and the sample is no longer needed. Samples will not be discarded until written notice is received from USEPA. Samples may be transferred to a secure holding area off-site.

6.3 Retain a paper copy of all sample analysis reports

7.0 ATTACHMENTS

None

Appendix D

Plans

Dust Control Plan
Emergency Contingency Plan
Transportation and Logistics Plan
Verification Sampling Plan

500 NORTH LAKE SHORE DRIVE
CHICAGO, IL

Title: Dust Control Plan

Revision Number: 0

Date: July 1, 2011

Replaces: New

DUST CONTROL PLAN

1.0 PURPOSE

The Dust Control Plan (Plan) describes methods AECOM and its contractors will follow to conduct operations and maintain the work area within the subject site (Site) so as to minimize the creation and dispersion of dust. This Plan also contains corrective measures that will be used in the event visual dust is created, air monitoring shows excessive particulates, or air sampling indicates limits have been exceeded.

A primary concern during the excavation activities at the Site will be the generation of radioactive particulates from excavation and earth-moving equipment. Fugitive dust generation may be caused by a range of activities including excavation, loading, and transportation of excavated soils. Traffic on the Site also may cause resuspension of particulates.

Dust control measures will be used throughout the excavation and restoration activities at the site, especially during excavation, backfilling, and grading activities.

2.0 GUIDANCE

Dust control will be performed in accordance with the Removal Action Work Plan (Work Plan), the Health and Safety Plan (HASP), and the Air Monitoring Procedure SOP-212. AECOM will perform site perimeter air monitoring in accordance with the Air Monitoring Procedure SOP-212.

3.0 IMPLEMENTATION

AECOM will be responsible for implementing dust control procedures as required in this Plan, the HASP, and the Air Monitoring Procedure SOP-212. The Field Team Leader will be responsible for ensuring compliance with the dust control procedures at the excavation site.

4.0 PRODUCTS

Water will be used in connection with mechanical dust suppression. Chemical foams, such as fire fighter foam, may also be used if approved by USEPA. If available, water will be obtained at the Site. If water cannot be obtained at the Site, temporary sources of water can be provided for construction activities from water trucks parked adjacent to the property or from portable plastic water tanks. Small (1,800 gallon) water trucks equipped with several hundred feet of hose and a pump can be used to spray water. Also, small pumps and hose can be used with the portable tanks to provide sufficient pressure and volume for dust control. In the event that a chemical foam is utilize a Material Safety Data Sheet (MSDS) will be forwarded to US EPA.

5.0 EXECUTION

Procedures to be followed to control dust may include traffic speed control, use of stockpiles, covering vehicles transporting borrow material and waste, and wind screens around excavation areas. These procedures will be utilized during excavation, restoration, transportation and associated materials handling activities.

5.1 Traffic Speeds

Traffic speeds will be maintained in accordance with applicable County, City, State and Federal regulations. The speed limit for traffic on the site will not be in excess of 15 miles per hour.

5.2 Use of Stockpiles

Where possible, excavated contaminated materials will be loaded into the transport containers the same day they are excavated. Any radiologically-impacted material stored on-site will be either in containers or in Supersacks if there is not sufficient material to mobilize a container. Stockpiled clean material, including excavated and borrow material, will be piled to minimize dust generation. Further, slopes of stockpiled materials will be minimized in the prevailing wind direction. A 5:1 slope or flatter in the prevailing wind direction will be maintained whenever possible. Stockpiles will be constructed with their length perpendicular to the prevailing wind direction.

Stockpiled material will be covered during periods of high wind or when work on a stockpile is not actively occurring, such as the end of the work day. Stockpiles will be covered with a geomembrane cover to minimize dust generation during excavation and restoration activities. Approved geomembrane covers are Griffolyn TX 1200 manufactured by REEF Industries, Inc., and Sani-Cover SC #250 manufactured by Fluid Systems, Inc., or other equivalent.

5.3 Off-Site Transportation of Excavated Materials

Trucks used for transporting non-contaminated excavated or borrow material will be equipped with truck bed covers (tarps) to prevent the generation of dust from hauling. The tarps will be fastened down tightly to prevent materials from being blown out of the trucks. Empty trucks also will be tarped.

Roll-off containers for transporting low-level radioactive materials, will be lined with plastic or suitable leakproof liner and be equipped with full covers. The covers will be securely fastened to the containers before leaving the excavation area.

Trucks and other heavy equipment will be cleaned to remove mud, soil, and loose dust prior to leaving an excavation area. This cleaning will include the truck tires. Dirt that is tracked onto paved streets will be swept and added to stockpiles at the excavation area.

5.4 Use of Water as a Dust Suppressant

Water will be applied during the course of excavation and restoration activities as directed by the Field Team Leader to prevent, mitigate, or reduce dust resulting from excavation activities. Water will be applied when:

- wind or vehicular traffic may cause visible dust generation;
- exposed surfaces of material stockpiles are potentially dry and wind or handling activities may cause dust generation;
- dust generation is possible during excavation activities on the site;
- hauling of excavated or borrow material may cause visible dust generation in truck beds; or
- dust generation is possible during placement of materials in stockpiles or fill areas.

A water truck or pump and storage tank assembly will apply water to the exposed ground surfaces via hoses, pumps, nozzles and other appurtenances as required. The truck or pump/tank assembly also will apply water to control dust generation from exposed surfaces of material stockpiles, excavation activities, and hauling or excavation of borrow material.

Water will be applied in sufficient quantity to prevent generation of dust, but not so as to cause the movement of water beyond site boundaries, ponding, or the disruption of other project site areas. Because the soils will absorb the water, watering is not expected to generate runoff. The Field Team

Leader will monitor the excavation and restoration activities to make sure that enough water is used to adequately control dust, but that not too much water is used so as to create runoff.

5.5 Corrective Measures

If visual dust is created at a location during the excavation and restoration activities, or if air monitoring shows excessive particulates, the following corrective measures will be evaluated and applied as appropriate.

1. Increased wetting of surface areas.
2. Covering additional source areas.
3. Modifying future excavations and stockpiles to decrease the source areas.
4. Halting dust-creating activities until winds moderate.
5. Modify work activities.

If overwatering creates runoff into undisturbed areas, the water will be removed as practical, and the area radiologically surveyed. If radioactivity above the action level is found, the area will be cleaned by removing the contaminated materials, or by other appropriate means. Future occurrences will be prevented by more carefully controlling the amount of water applied by constructing earth berms around the area to retain the water, or by using a method of dust control other than water.

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Emergency Contingency Plan

Revision Number: 0

Date: July 1, 2011

Replaces: New

EMERGENCY CONTINGENCY PLAN

1.0 SCOPE OF PLAN

The purpose of the Emergency Contingency Plan (ECP) is to provide guidance and direction in the event of an unanticipated exposure of an individual to hazardous substances or hazardous conditions related to the excavation and restoration activities at the Site.

Personnel assigned to this project will be required to review thoroughly the contents of this ECP and to strictly adhere to the policies and procedures provided herein.

2.0 EMERGENCY AND EVACUATION PLAN

2.1 Emergency Coordination

The Field Team Leader will coordinate emergency response at the Site. In the event of an emergency, the Field Team Leader will immediately notify the AECOM Project Manager. The AECOM Project Manager will be responsible for notifying the proper response agencies listed in Figure 1, Emergency Phone Numbers. Emergency response procedures, instructions for emergency response to injuries and evacuation plans will be reviewed at safety briefings.

2.2 Emergency Services Contacts

Before field activities commence, the Field Team Leader will inform the appropriate emergency contacts about the nature and duration of work expected at the Site and the type of contaminants and possible health or safety effects or emergencies involving these contaminants.

All hospital treatment should be provided via the 911 Emergency Medical System, with the Chicago Fire Department providing ambulance service. Emergency services can be provided by Northwestern Memorial Hospital located within one-half mile of the Site. The location and possible route to the hospital from the Site, including narrative directions, are shown on Figure 2.

The emergency telephone numbers listed in Figure 1 will be distributed to the Field Team Leader. Emergency numbers will be reviewed every three months by the AECOM Project Manager and revised, as necessary. The AECOM Project Manager will date and sign new revisions. The Field Team Leader will record the date of the revised telephone number list in his daily log book. Upon revision, the figure will be submitted to the USEPA and the City.

2.3 Implementation

The Field Team Leader will implement the emergency action procedures whenever conditions at the Site warrant such action. The Field Team Leader will be responsible for coordinating the evacuation, emergency treatment and emergency transport of site personnel, as necessary, and informing the appropriate coordinating management staff. The following conditions may require implementation of emergency action procedures:

- Fire or explosion on-site.
- Serious personal injury.
- Release of radioactivity exceeding one Annual Limit of Intake (ALI) as defined in 32 IAC 340.1220 in a 24-hour period.
- Release of hazardous materials, including gases or vapors, at elevated levels.
- Unsafe working conditions, such as inclement weather (tornado, hail, etc.).

2.4 Fire or Explosion

If fire or explosion takes place, emergency steps shall include: 1) evacuation of work area; and 2) notification of local fire department and other appropriate emergency response groups listed on Figure 1, as necessary (e.g., if a spill occurs, the emergency spill hotline will be notified).

2.5 Personal Injury

Actions to be taken in the event of personal injury are described in the Health and Safety Plan, Section 4.3.4, Emergency Medical Treatment.

2.6 Evacuation Plan

All project personnel will evacuate the area under the direction of the Field Team Leader. Evacuation from the affected area will be initiated by sounding an alarm, such as an air-horn, megaphone or other form of notification.

A coordinated evacuation will be conducted with all project personnel using the most direct upwind route, avoiding the point of emergency.

All project personnel involved in the evacuation will immediately move to the Decontamination/Transition area and will remain there awaiting further instructions from the Field Team Leader.

Personal Protective Equipment will be used at all times by the project personnel during the evacuation procedures.

2.7 Accident and Incident Reporting

All accidents, injuries and incidents shall be reported to the Field Team Leader. An Accident/Injury Form will be completed by the Field Team Leader, as described in the HASP, Section 4.4, Accident and Incident Reporting.

FIGURE 1
EMERGENCY PHONE NUMBERS

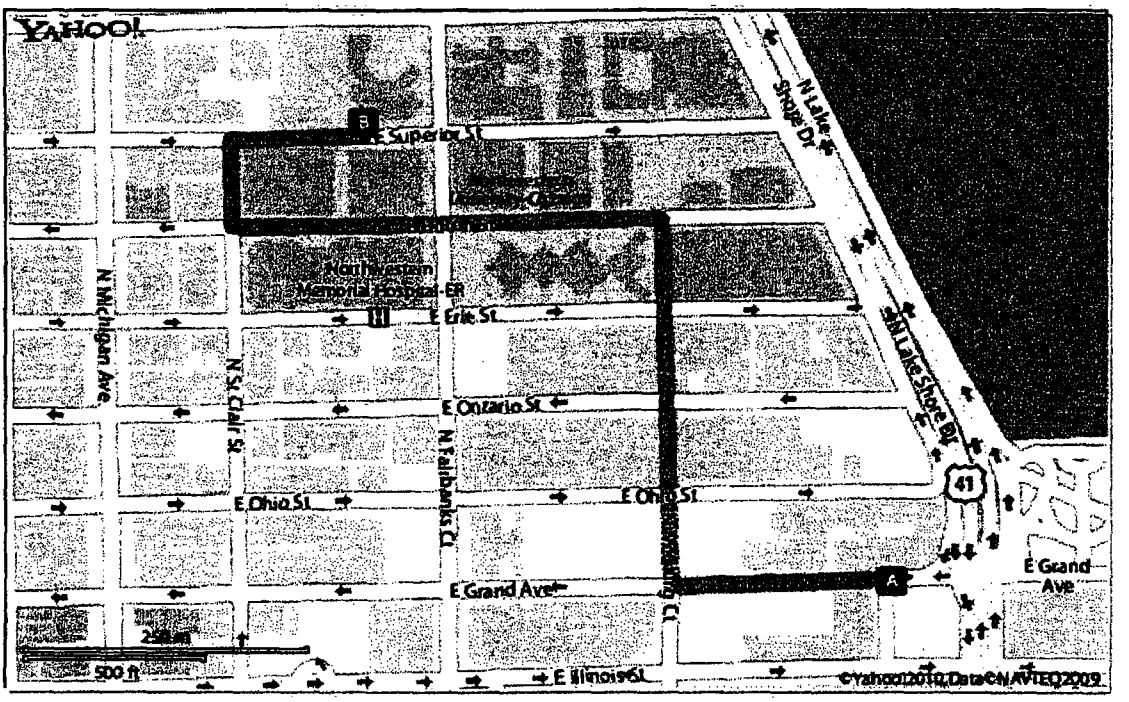
Police Department	911
Fire Department	911
Ambulance	911
Hospital Address Phone	Northwestern Memorial Hospital 250 E. Superior (312) 908-2000 (Ask for ER)
Poison Control Center	(800) 732-2200
USEPA Region 5 24-hours Emergency Number	(312) 353-2318
AECOM Project Coordinator Steven Komder	847-279-2448 (work) 847-343-6007 (mobile)
AECOM Project Manager Steven Komder	847-279-2448 (work) 847-343-6007 (mobile)
AECOM Field Team Leader Brian Schmidt	847-778-6727 (mobile)

SECONDARY EMERGENCY NUMBERS

The AECOM Project Manager will evaluate when these agencies should be notified.

National Response Hotline	(800) 424-8802
Illinois Emergency Management Agency	(217) 782-7860
Illinois Environmental Protection Agency Emergency Response Duty Officer	(217) 782-7860 or (217) 782-3657, IEPA ERU during normal working hours.
Illinois Department of Nuclear Safety (IDNS) Emergency Number	(217) 785-0600 (24 hour Radiologic Assistance)

FIGURE 2
HOSPITAL LOCATION AND DIRECTIONS
Northwestern Memorial Hospital
250 E. Superior Street
Chicago, IL 60611



Directions:

1. **Start at 500 N LAKE SHORE DR, CHICAGO going toward N MCCLURG CT** — **go 0.1 mi**
2. **Turn Right on N MCCLURG CT** — **go 0.2 mi**
3. **Turn Left on E HURON ST** — **go 0.3 mi**
4. **Turn Right on N ST CLAIR ST** — **go 0.1 mi**
5. **Turn Right on E SUPERIOR ST** — **go 0.1 mi**
4. **Arrive at 250 E SUPERIOR ST, CHICAGO, on the left**

515 NORTH PESHTIGO COURT
CHICAGO, IL

STANDARD OPERATING PROCEDURE

Title: Transportation and Logistics Plan

Revision Number: 0

Date: July 1, 2011 Replaces:

TRANSPORTATION AND LOGISTICS PLAN

Material exceeding 7.1 pCi/g will be generally be directly loaded into containers for shipment and off-site disposal. Containerized material may be stored staged on-site until such time as adequate material is accumulated for shipment. In the event that super-sacks are used, tarps and/or plastic may be placed both beneath and above the sacks as necessary to minimize water infiltration.

At present, it is anticipated that radiologically contaminated materials encountered above the USEPA cleanup value will be sent to either the US Ecology disposal facility in Grand View, Idaho or EnergySolutions located in Clive, Utah. Manifesting, shipping and placarding (if applicable) will be performed in accordance with Department of Transportation (DOT) regulations for shipping radiologically contaminated material based on the activity of the waste materials. Prior to initiating transportation, USEPA notification in writing of the shipment including: (1) the name and location of the facility to which the radiologically contaminated materials will be shipped; (2) information that notification was given to the receiving state; (3) the type and quantity of the radiologically contaminated material to be shipped; (4) the expected schedule for the shipment of the radiologically contaminated material; and (5) the method of transportation.

AECOM

500 NORTH LAKE SHORE DRIVE
CHICAGO, IL

Title: Verification Sampling Plan

Revision Number: 0

Date: July 1, 2011

Replaces: New

VERIFICATION SAMPLING PLAN

1.0 INTRODUCTION

1.1 Purpose

This Verification Sampling Plan (Plan) describes the sampling activities and analytical methods that will be used to demonstrate the subject site meets the cleanup criteria. By following the protocol included in this plan, the USEPA will demonstrate the Site meets the cleanup criteria described in Section V.2.d of the Unilateral Administrative Order (UAO).

1.2 Scope

The verification survey will be conducted as excavation activities are completed at a Site. The purpose is to demonstrate the soils have been excavated to meet the cleanup criteria described in the UAO. Averaging over areas up to 100 square meters is allowed, but only after reasonable efforts have been made to achieve levels As Low As Reasonably Achievable (ALARA). (Reference SOP-223 "Verification Survey Procedure").

1.3 Contaminants of Concern

The verification program includes testing for specific constituents which are indicative of the contaminants of concern. Constituents of concern that may be encountered on the Site are the entire U-238 and Th-232 decay series; however, measurements will only be made for total radium (Ra-226 and Ra-228).

1.4 References

The following references have been used in developing this Plan:

- Administrative Order by Consent, USEPA, 1996;
- 32 IAC 332.150(b) - Soil Radioactivity and Exposure Rate Criteria;
- DOE Order 5480.11 and 10 CFR 20 - Surface Contamination and Exposures (ALARA); and
- NUREG/CR 5849 "Manual for Conducting Radiological Surveys in Support of License Termination" Draft June 92.

Standard Operating Procedures (SOPs) used during the verification sampling are included in the Standard Operating Procedures - Appendix D.

2.0 EXCAVATION CONTROL

2.1 Gamma Survey

A gamma survey will be done after the excavation is thought to be complete. The survey will comprise verification testing of the excavation.

Gamma measurements will be made over the entirety of the excavation. The procedure and instrumentation used will be 2 x 2 NaI detectors. This procedure provides a gamma measurement survey over an area of approximately one-square-meter. The gamma measurements will be collected over the entire area of the excavation to determine the concentration of radium remaining.

If the gamma survey indicates areas where the measured radium concentration exceeds the cleanup criteria of 5 pCi/g radium (Ra-226 and Ra-228) above background, additional material will be removed

until the measured radium concentration is less than 5 pCi/g above background. Exceptions may be made to this operational criterion with USEPA concurrence.

In addition to the gamma survey, AECOM will obtain samples for laboratory testing to measure the total radium concentration of soils. Such testing may be used to resolve ambiguous gamma survey measurements, to establish or verify gamma/radium correlations, or to provide additional data to verify that the cleanup criteria have been met at the excavation. At least one composite soil sample will be taken for laboratory analysis from each excavation. The samples will be taken in accordance with the soil sampling procedure in SOP-214, and tested for radium (Ra-226 and Ra-228). Apparently clean material below the radiologically-impacted soil may be excavated to facilitate verification. This material will require sampling as overburden if it is to be managed as clean soil for backfill.

2.1.1 Gamma Survey Procedure

The gamma survey will be performed according to the Gamma Survey Standard Operating Procedure (SOP-210).

2.1.2 Documentation

The Verification Gamma Survey drawing described above will be used to document the readings obtained during the gamma survey. The drawing also will contain information pertaining to background gamma radiation levels and instrument calibration.

2.1.3 Quality Control

The gamma survey will be performed by trained individuals who have sufficient skill to obtain accurate and consistent information. All information obtained during gamma surveys will be reviewed by the Field Team Leader for accuracy and consistency.

All field equipment will be calibrated either in accordance with NUREG/CR 5849 "Manual for Conducting Radiological Surveys in Support of License Termination" Draft June 1992 or with industry-recognized protocols. Instrument response background and check source tests will be performed and recorded daily to ensure instrument operations are within the established acceptable range.

At least 5 percent of the survey area will be resurveyed. Readings from the initial survey will be compared to those readings obtained during the quality control (QC) survey to identify instrument malfunctions or reading/document errors.

3.0 DECONTAMINATION

All discarded materials, waste materials, and otter field equipment and supplies shall be handled in such a way to prevent the potential spread of contamination during excavation and restoration activities. Discarded items that have contacted contaminated materials will be containerized and stored for disposal at the approved disposal facility. Non-contaminated items to be discarded will be collected for disposal as non-hazardous waste. Personnel and sampling equipment decontamination are described in the Decontamination Procedure included as SOP 347.

Appendix E

Specifications

Section 01010	**Summary of Work**
Section 01020	**Construction Health and Safety**
Section 02010	**Demolition and Debris Removal**
Section 02200	**Contaminated Material Loadout and Earthwork**
Section 02840	**Site Utilities**

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Summary of Work

Section 01010

Revision Number: 0

Date: July 1, 2011

Replaces: New

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 Description of the Project

This project directed by the United States Environmental Protection Agency Region 5 (USEPA) is at a location designated by the USEPA as related to the Lindsay Light II Site in Chicago, Illinois. The work covered by these specifications includes the following.

A. Site Description

Radioactive materials in concentrations above background have been found within the Streeterville area in the City of Chicago. The presumptive source of these materials is the Lindsay Light Company in Chicago.

The Site is defined as the property bounded by East Grand Avenue to the north and a public alley which can be access from North St. Clair Street, Chicago, Illinois. Final definition of the limits of soil excavation and restoration will be the responsibility of the Respondents and their consultants and contractors.

B. Project Description

1. Work for the cleanup of the Site will be excavation and removal of impacted soil.

2. Site preparation includes all of the work which must be done before any excavation and restoration can begin. Some of the work, such as determining background air quality and background radiation, will be common to the entire Site. Other work, such as verifying the extent of contamination and documenting existing physical conditions, will be area-specific.

   a. Access Agreements. Discussions concerning access will begin promptly upon approval notice from the USEPA. Every effort will be made to keep the property owner and the USEPA informed of any changes to the work and to the schedule.

   b. Permits. Under Superfund, the Site developer is exempt from obtaining permits from the City of Chicago and Cook County for remediation removal activities conducted on-site, but must obtain permits for portions of the work accomplished off-site. Some permits, particularly those issued by the Department of Transportation to commercial carriers to transport the excavated soils and debris over public streets, will not be sought and, therefore, are not addressed in this Plan. The Site developer will contract only with transportation companies qualified and licensed to carry such materials.

   c. Background Air Monitoring. Unless otherwise waived by the USEPA, monitoring and analyses to be conducted prior to beginning excavation at the Site will provide adequate data to determine a background air quality which can be used for the Site. A description of the air monitoring that will be done is included in the Air Monitoring Plan for the Site including the proposed location for the background sample.

   d. Site Survey. If one is not already available, prior to work at the Site a current site survey will be prepared by a licensed surveyor.

e. Soil Sampling. Soil sampling is described in the Soil Sampling Plan (SOP-214). Background gamma values are developed in accordance with Gamma Radiological Surveys (SOP-210).

f. Utilities. For the Site, "utilities" will include, but not be limited to, natural gas, drinking water, waste water, communications, electrical power distribution, and storm water collection systems. The locations of all utilities will be determined, field located and shown on all maps and drawings for the properties. All work to replace, repair or backfill utilities shall be done as required by the appropriate utility company or agency.

g. Buildings. No buildings are present within the areas proposed to be excavated.

3. Excavation and restoration work includes removing any structures, facilities, landscaping or other appurtenances as necessary, excavating contaminated soils, cleaning contaminated buildings, facilities, structures, utilities and appurtenances, verifying that radioactivity greater than the cleanup criteria has been removed and backfilling all excavations. Site restoration is not proposed pending site development and construction.

   a. Work to remove asphalt pavements, sidewalks, foundations, retaining walls, etc., is described in Section 4.0 of the Work Plan

   b. Work to excavate contaminated soils is described in Sections 4.0 and 5.0 in the Health and Safety Plan (HASP) for the Site.

   c. The requirements for soil sampling are described in the Soil Sampling Plan.

   d. The work for properly backfilling all excavations is included in the Work Plan.

1.2 Related Work

Other Part 1 Sections of these Specifications.

1.3 Definitions

A. Access Agreement refers to a legal document between the Contractor, Property Owner and tenant authorizing the Contractor or the USEPA to complete the excavation and restoration action as described in these Specifications, the Work Plan and the HASP.

B. City refers to the City of Chicago and its representatives.

C. Contract Documents for the work consist of the drawings, these specifications and all addenda issued prior to and all modifications issued after the execution of the contract.

D. Contractor refers to AECOM and its subcontractors and consultants.

E. County refers to Cook County, Illinois and its authorized representatives.

F. USEPA refers to the Region 5 office of the United States Environmental Protection Agency and its representatives.

G. Job Set refers to a complete set of Project Record Documents used during construction activities.

H. Project refers to all activities associated with the excavation and restoration action.

I. State refers to the State of Illinois and its authorized representatives.

J. Utilities. For the project, "utilities" will include, but not be limited to, natural gas, drinking water, waste water, communications, and electrical power distribution and storm water collection systems.

K. Work Order refers to the plans, drawings, additional specifications, directions and agreements prepared for properly completing work at the Site.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 Scope of Work

A. The work to be performed includes furnishing all labor, tools, equipment, materials, transportation, services, and incidentals, and performing all operations necessary for the excavation and transportation of radiologically-impacted soils, and the monitoring of those excavations as shown and noted on the drawings and as required in these Specifications.

B. The work includes the decontamination of the Site and the management of excavation and demolition materials in accordance with the Statement of Work. The work included is further described in Article 3.2, Construction Sequence.

3.2 Construction Sequence

Except as specifically noted, the construction sequence described below is intended as guidance for this project. At the discretion of the Contractor, the work may be done simultaneously or in an order other than below, as long as it will not affect the quality, timely completion, or safety of the work.

B. Mobilization

1. Mobilize personnel, equipment, materials, and temporary facilities needed for the project. Provide for electrical, water, communications and other utilities as required for the work.

2. Provide site-specific training for workers. Discuss work with crews, including areas of special concern (construction and radiological), construction schedule and sequence, and health and safety.

3. Prepare the personnel and equipment decontamination facilities.

4. Select areas within the Site for staging soils, containers and demolition materials. Prepare areas as necessary (e.g., berms for temporary water control, or plastic sheeting if on "clean" area)

5. Set up the air monitoring system and begin monitoring.

6. Set up traffic controls, as required.

C. Contamination Excavation

1. Excavation of contaminated buildings is not anticipated.

2. Excavation of contaminated soil will occur using these steps:

a. Do construction staking or marking (additional surveying, as necessary, for horizontal and vertical limits of soil excavation). These limits will be based on the previous AECOM site investigation reports.

b. As necessary, lock-out, tag-out, and/or shut down all utilities which could affect or be affected by the work. Purge, decontaminate and otherwise properly manage utilities so they can be removed, protected from damage, or relocated, as necessary.

c. Excavate the contaminated soils on the property and transport them to the disposal facility. Stockpile soils on the Site only as necessary.

d. Do soil sampling and gamma surveying to determine if additional excavation is necessary. Excavation will not extend below groundwater.

   (i) If necessary, do construction staking. Continue excavating until surveying and sampling indicate all contaminated materials have been removed.

   (ii) Notify the USEPA that pre-verification sampling has been completed and request verification surveying and sampling, and if found to meet the closure standard, request approval to backfill.

D. Restoration

1. Restoration is not proposed for the Site. Minimal restoration may consist of flattening the slopes of the excavations. The Site will be regraded in preparation for construction and development.

3.3 Disruption

A. The contractor will, to the extent practical, use his best efforts to undertake the project in a manner that avoids unnecessary disruption of local businesses and their customers or tenants.

3.4 Work Quality Control

A. Shop and field work shall be performed by personnel thoroughly trained and experienced in their field of expertise. Work on this project shall be performed in accordance with the best practices of the various trades involved.

B. Quality control inspections will be conducted for all construction activities under these specifications. The inspector will be independent of the work activity being inspected.

C. Work will be certified as having been completed in full satisfaction of these Specifications.

D. Work will be done as required by these Specifications, the Work Plan and other documents referenced in these Specifications.

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Construction Health and Safety

Section 01020

Revision Number: 0

Date: July 1, 2011

Replaces: New

SECTION 01020

CONSTRUCTION HEALTH AND SAFETY

PART 1 - GENERAL

1.1 Scope

A formal Health and Safety Plan (HASP) has been prepared for the work described in these Specifications. This section of the Specifications summarizes the requirements of the HASP as they apply to the construction work, and references those sections of the HASP where detailed descriptions of the health and safety requirements and procedures can be found.

1.2 Related Work

A. Other Part 1Sections of the Specifications
B. Section 02010 - Demolition and Debris Removal
C. Section 02200 – Contaminated Material Loadout and Earthwork
D. Section 02840 - Site Utilities

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 Safeguards will be taken to ensure the safety of workers in and around excavations. *These will include, but not be limited to, the following:*

a. Stairways, ladders, ramps, or other safe means of egress will be located in trench excavations that are 4 feet or more in depth.

b. No persons will be permitted underneath loads handled by lifting or digging equipment. Personnel are required to stand away from any vehicles being loaded or unloaded to avoid being struck by any spillage or falling materials.

c. All trenches and excavations 6 inches or deeper will be marked and guarded for the duration of the project with barricades placed a minimum of 2 feet from the edge of the excavation to prevent persons from falling into the opening.

d. Precautions will be taken to prevent surface or runoff water from entering the excavation. Ditches, dikes, or other effective means will be installed or used to prevent water from entering the excavation and to drain the surrounding areas.

e. Any excavation that meets the definition of a confined space will be treated as such, as defined by OSHA 1910.146, and all applicable procedures detailed in Section 13 of the HASP will be followed. A crawl space or storm cellar area could fall within the definition of a confined space if it: (1) is large enough and so configured that personnel can bodily enter and perform assigned work; and (2) has limited or restricted means for entry or exit; and (3) is not designed for continuous personnel occupancy.

f. All personnel in an excavation greater than four feet in depth will be protected from cave-ins by an adequate protective system. An adequate protective system will include barrier protection (e.g., shoring or trench boxes) or sloping. Other protective measures required by 29 CFR 1926, Subpart P also will be provided.

g. The determination of the angle of repose and design of any supporting system will be based on careful evaluation of pertinent factors such as depth of cut; possible variation in water content of material while the excavation is open; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed by structures, equipment, overlying material, or stored material; and vibration from equipment, blasting, traffic, or other sources.

h. Daily inspections of excavations, the adjacent areas, and protective systems will be made and documented by a competent person. The documentation will include indications of potential cave-ins, failure of protective systems, hazardous atmospheres, or other conditions.

i. No employee or any other person will work adjacent to or enter an excavation until the work area has been inspected by the competent person. The inspection will determine if conditions exist which may expose workers to moving ground or any other unsafe conditions. Any deficiencies identified during inspections will be adequately corrected prior to work in excavation.

3.2 Training

1. All persons active in the excavation work at the Site will receive training as specified in Section 5 of the HASP for work with low-level radioactive materials. The training program in Section 5 of the HASP is in accordance with 29 CFR 1910.

2. In addition to the training above, periodic "tailgate" health and safety meetings will be held. The purpose of these meetings will be to discuss deficiencies in health and safety practices, discuss hazards specific to new properties or encountered at existing properties, discuss the results of monitoring, and generally reinforce good health and safety practices. A typical form for such meetings is found in Section 5 of the HASP.

3. Special training shall be provided or required for work such as the following.

   a. Supervisory Work. All supervisors shall have received at least the additional eight hours training required by OSHA.

   b. Truck Driver. All truck drivers shall be instructed in and knowledgeable about the routes to be used between the property and the train station, the requirements of the work (work with and transport of potentially radioactive materials), and the emergency and contingency procedures to be implemented in the event of an accident.

   c. All persons employed in the transport and handling of radioactive materials shall have received HAZMAT training.

   d. A competent person will be on-site for shoring.

3.3. Personal Protective Equipment (PPE) - Based on information obtained from monitoring observation of similar work at vicinity properties, work at this Site can be done in Level D PPE. The Health and Safety Coordinator will evaluate individual tasks and work areas and specify particular types of PPE based on this evaluation. PPE utilized in the performance of the work under these specifications will be in accordance with Sections 7 and 8 of the HASP.

3.4 Hot Work

A. Flame welding and cutting operations

1. Gas bottles shall be properly color-coded, in good condition, and stored in a secured manner in racks or carts. Bottles with corroded or damaged threads will not be used.

2. Regulators shall be in good condition, and suitable for the use.

3. Fuel gas and oxygen hose shall be easily distinguishable and shall not be interchangeable. Hoses shall be inspected at the beginning of each shift and shall be repaired or replaced if defective.

3.5 Transporting Contaminated Materials Over Uncontaminated Areas

A. Transport between the Site and the Rail Terminal

1. Haul routes between the Site and the rail terminal will be defined (see Transportation and Logistics Plan) and all operators will be instructed in the location and use of these routes. Transport of contaminated materials will be over designated routes only.

2. Rolloff containers used to transport contaminated materials over uncontaminated areas will be capable of transporting the material without spillage. Covers will be secured onto the containers prior to exiting the contaminated area. Empty trucks returning to the site will be tarped, as will trucks supplying clean backfill, topsoil, and related construction materials. Tarps will be fastened down tightly to prevent material from being blown out of the trucks.

3. Trucks and rolloff containers used to transport contaminated materials will be frisked and decontaminated if necessary in accordance with Subpart 3.8, below, prior to exiting the contaminated area.

4. Should a truck hauling contaminated material from the Site to the rail terminal accidentally spill any part of its load, the Contractor will direct site workers to assist in the cleanup. Spill cleanup, including proper notification of agencies and authorities, will be accomplished in accordance with the Emergency Contingency Plan.

B. Transport within a Property

1. Haulage routes will be established within the Site and all workers will be instructed in the location and use of these routes. Following excavation and restoration of soils and other materials, such routes will be examined, visually and with radiation detection equipment, for the presence of spilled materials. All spilled materials will be removed.

2. Practices to control spillage will be implemented during excavation and restoration. These practices will include such things as the following:

   a. Not filling haul equipment above the sides of the bed or bucket,

   b. Limiting travel speed, and

   c. Covering haul routes with clean soil or other materials. Such materials would be inspected as above, and decontaminated for reuse or properly transported to the rail terminal for eventual transfer to the approved disposal facility.

3.6 Equipment Decontamination Facilities

A. Equipment Decontamination Station – If necessary, an equipment decontamination station will be made available for the decontamination of vehicles, tools, and equipment, prior to exiting the controlled area. The equipment decontamination station will be located within the secured area, and will include the following:

1. A steam pressure washer for removing contamination from the wheels, tracks, and other surfaces of the equipment and trucks.

B. Release of Construction Vehicles and Equipment for Unrestricted Use - Prior to being released from the Exclusion Zone, all construction vehicles and equipment will be frisked, and decontaminated if necessary. Contaminated vehicles and equipment will be decontaminated using a pressurized water spray in accordance with Subpart A, above. Water generated during the decontamination activities will be evaporated, infiltrated within the Exclusion Zone, used for dust control, or collected and stored on the Site for other purposes or eventual disposal.

3.7 Dust and Water Runoff Control

A. Dust control measures used during work activities on the Site may include, but are not limited to the following:

1. Using hoses with mist or fog nozzles to spray light applications of water over the areas of excavation or demolition, staging, loadout, and dumping/storage. The Contractor will be responsible for the control of excess water.

2. Minimizing travel over soil areas. Some travel over contaminated soils (e.g., by excavation equipment and by haul trucks) may be necessary. Dust minimization procedures will include, but not be limited to, the following.

   a. Within the property, the speed limit for trucks and excavation equipment will be fifteen miles per hour.
   b. Areas which will be used extensively as travelways (e.g., entrances to and exits from equipment decontamination facilities) will be sprayed with water as necessary to control dust.

3. Storage and staging piles will be covered when not in use.

B. Runoff water control measures on the Site may include, but are not limited to the following:

1. Excavation of temporary swales, ditches, and/or retention ponds.

2. Construction of temporary diversion dikes and berms.

3. Pumping of water to runoff water control facilities. Water removed from contaminated excavations will be evaporated, used for dust control, or collected and stored on the Site.

3.8 Contingency Plans and Emergency Response Procedures

Contingency plans and emergency response procedures for Site activities are provided in the Emergency and Contingency Plan. These plans and procedures will be followed in the event of an emergency situation arising from the work activities or acts of God that may affect the environment or human health and safety.

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Demolition and Debris Removal

Section 02010

Revision Number: 0

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SECTION 02010

DEMOLITION AND DEBRIS REMOVAL

1.0 GENERAL

1.1 Scope

A. This section describes excavation requirements for existing Site features, including:

1. Salvage Disposition, Storage, and Handling of Property.
2. Demolition of Existing Site Features.
3. Sawcutting.
4. Debris Segregation, Decontamination, Haulage, Storage, and Disposal.
5. Matching and Patch Repairing.

B. Descriptions for radiological surveying are specified in the Work Plan, Appendix F (Verification Sampling Plan)

1.2 Related Work

A. Part 1 Sections of these Specifications.

B. Section 02840 - Site Utilities

1.3 Salvage Disposition. Storage and Handling of Property

A. Remove all structures, equipment, facilities, materials and other items called for in the Work Plan or that otherwise must be removed to access the work areas and store as directed. Such items shall be removed completely, including appurtenances, and shall be properly protected.

B. All non-radiologically-impacted materials, equipment, and other items permanently removed from the work area for the proper completion of the excavation work shall be properly managed and/or disposed as applicable.

1.4 Submittals

A. All submittals shall be made to the AECOM Project Manager.

B. Submit landfill tickets for all uncontaminated debris disposed offsite, no more than five days after disposal, except where dumpsters are emptied directly into collection trucks. The use of dumpsters will be recorded in the field logbook. Each ticket shall contain at least the information below.

1. Date of disposal.
2. Estimated volume or weight of load if required by the designated measurement method of the landfill.
3. Description of materials disposed.

4. Name of wastehauling subcontractor.

1.5 Health and Safety Conditions of the Work

In addition to the hazards common to demolition, radioactive materials are known to be present at this Site, and may be present in or on slabs/paving, structures, facilities and utilities.

A. Detailed health and safety requirements for work on the vicinity properties are included in Section 01020 of these Specifications and the HASP.

B. All demolition work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.

C. Based on existing information, excavation work can proceed under Level D personal protection conditions (see HASP). Air and soil monitoring and sampling will be done during the conduct of the work to determine if modifications to Level D work conditions are necessary.

   1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by the AECOM Project Manager, AECOM Field Team Leader, or their Agent.

   2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal, equipment and vehicle decontamination) with minimal delay. Additional requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing hazardous materials or levels of radiation above background are encountered are discussed in Section 01020 of these Specifications.

D. The Quality Assurance Supervisor, Field Team Leader, or Health and Safety Coordinator may bar from the Site any person or persons who shows a disregard for health and safety of themselves or others.

1.6 Permits

A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.

B. Copies of all the necessary permits shall be provided to the Project Quality Assurance Supervisor prior to beginning the work.

C. At a minimum, all work shall be done in accordance with the requirements of the permits. The requirements of these permits are included by reference in these Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 General

A. The work performed under these Specifications shall be done as indicated in this Work Plan, specified herein, and as required by the permits and the laws, rules and regulations of the City of Chicago, the State of Illinois and the USEPA.

B. The Contractor shall remove existing property features as indicated in the Work Plan and shall perform demolition in a manner to allow segregation and proper disposal of contaminated and uncontaminated material. The Contractor must use methods and operations which will minimize the potential for the spread of contamination.

C. It shall be the Contractor's responsibility:

1. To maintain adequate safety measures and working conditions (see Section 01020 of these Specifications and the HASP).

2. To take all measures necessary during the performance of the work to protect the entire project area and adjacent properties which would be affected by this work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the AECOM Project Manager, AECOM Field Team Leader, or their Agent.

3. To maintain completed areas until the entire project area is in satisfactory compliance with the Specifications.

3.2 Structure Demolition

A. General

No structures are present on the site, where excavation is proposed.

B. Foundations

1. The methods used to demolish and remove foundations shall be at the discretion of the Contractor, as long as the requirements of these Specifications, the permits, and the laws, rules and regulations of the City, County, State, OSHA or the USEPA, whichever are more stringent, are met.

2. All demolition of foundations shall be done in a manner to minimize disturbance of the surrounding and underlying soil. This could include, but not be limited to, pre-breaking or sawing the foundation elements, and the measures described in Article 3.3 of these Specifications.

3. Concrete, rock or block foundations may be demolished and reduced in size as described in the foregoing subpart.

4. Foundation walls which serve as retaining walls to support earth or adjoining structures shall not be demolished until such earth has been properly braced, or adjoining structures have been underpinned to prevent movement. Bracing and shoring shall be evaluated and, if necessary, designed by a qualified Professional Engineer.

5. Adjacent foundation walls and "party" walls to a basement, which are to serve as retaining walls against which fill or debris will be placed, shall be checked for structural strength before they are to be so used. Evaluations and, if necessary, designs of shoring and bracing shall be done by a qualified Professional Engineer.

6. Foundations and basement floor slabs will be removed to verify conditions beneath them. The concrete, if not contaminated, will be staged on-site for later removal or will be removed as clean debris. Concrete found to be impacted will be decontaminated in accordance with SOP-345. If decontamination cannot be reasonably completed, the concrete will be reduced in size sufficient to be managed as impacted and loaded for off-site shipment and disposal.

C. Retaining Walls

1. The methods used to demolish and remove retaining walls shall be at the discretion of the Contractor, as long as the requirements of these Specifications, the permits, and the laws, rules and regulations of the City, County, State, OSHA or the USEPA, whichever are more stringent, are met.

2. All demolition of retaining walls shall be done in a manner to minimize disturbance of the surrounding and underlying soil. This could include, but not be limited to, pre-breaking or sawing the pavement and slabs, and the measures described in Article 3.3 of these Specifications.

3. Shoring or bracing may be necessary during the demolition of retaining walls. Shoring or bracing shall be designed by a qualified Professional Engineer, competent in soils. Shoring and bracing designs shall be submitted to the Respondents or their Agent and the Field Team Leader prior to beginning excavation where their use may be necessary.

4. Concrete, rock or block foundations may be demolished and reduced in size as described in the foregoing subpart.

3.3 Sawcutting

A. The Contractor shall be responsible for all sawcutting necessary for the excavation of contamination whether described in the Work Plan or not. The Contractor shall sawcut concrete, masonry, asphalt paving, and other work as needed, observing the following requirements:

1. The Contractor shall provide liquid or other dust control for all sawcutting of contaminated materials or materials overlying contaminated materials.

2. Finished vertical concrete or masonry cuts shall be made using a track-mounted concrete saw. The finished cut shall be a minimum of three inches deep, in a straight and true line.

3. Finished horizontal concrete or masonry cuts shall be made using a cradle-mounted concrete saw. Make the finished cut a minimum of three inches deep, in a straight and true line.

4. Where portions of masonry will be removed and replaced, masonry excavation and restoration shall be along mortar joints so the finished wall will have the same masonry pattern as the existing.

5. Finished asphalt paving cuts shall be made using an asphalt blade in a cradle-mounted saw. The finished cut shall be a minimum of two inches deep, in a straight and true line.

6. If a clean break cannot be made where new concrete will be replaced against old concrete, provide sawcutting necessary to produce clean edges on the existing concrete.

3.4 Decontamination of Items

A. Some contaminated items such as slabs, pavement, and piping, can be decontaminated and disposed in industrial or other landfills. Decontamination of items will include removing the

contaminated dust, dirt or encrustations from the surfaces of the items. Decontamination may be accomplished by high-pressure spraying, or manually removing contaminated materials with brushes, soap and water, rags, and miscellaneous hand tools until the items are verified as radiologically suitable for the proposed disposal.

B. Decontamination of contaminated equipment, tools, materials and supplies is described in detail in SOP-347 Decontamination.

3.5 Contaminated Material Loadout and Transport

A. General Requirements

1. Before beginning contaminated material loadout operations, the Contractor shall construct temporary site drainage facilities, and if necessary, initiate dust control measures. The Contractor also shall construct all decontamination and loadout facilities and establish survey controls.

2. The Contractor shall use equipment and methods that minimize the potential for spillage of materials during loading operations.

3. At a minimum, the loadout shall be cleaned (liquid and nonliquid wastes removed) at the end of every other day. Spilled materials shall be promptly removed from the loading facility if the quantity is such that the material could be picked up and transported out of the loadout facility.

4. All decontamination of equipment shall be done as required herein and by SOP-347 Decontamination.

5. In no case shall equipment with radioactivity above the release levels be allowed to leave the Site.

B. Loadout

1. All loadout of material will be done as required by these Specifications and the Work Plan. Loading of trucks and other containers with contaminated soil or debris shall be done only in the loadout or equipment decontamination areas.

2. Contaminated soils and debris will be loaded directly into containers as they are excavated, and the container staged in a clean area for pickup and transport. Materials will be placed so they do not extend above the sides of the container. Materials protruding above the sides of the container will be pushed down or removed for placement into another container. If isolated quantities of impacted soil are encountered in volumes less than necessary to fill a container, the material will be placed in Supersacks and stored temporarily until there is sufficient material accumulated to fill a container.

3. Rolloff containers will be secured with lids.

4. Drivers shall remain inside the truck with the windows closed or shall exit the truck prior to loading.

C. Decontamination

1. Detailed requirements for the decontamination of trucks and containers are provided in SOP-347 Decontamination.

2. Following loading in the loadout area, and decontamination if such is necessary, all trucks and containers will be frisked.

3. If frisking shows such is necessary, trucks and containers will be decontaminated by wiping or spraying.

4. Trucks and containers need a final survey prior to unrestricted release from the loadout.

D. Transport

1. Trucks picking up and dropping off containers at the staging areas outside of the loadout need not be decontaminated unless a container spill has occurred.

2. Trucks shall only use the designated route(s) to transport materials from the Site to the rail terminal, and shall obey all signs, speed limits and other traffic laws. Any driver not obeying traffic laws, or the requirements of these Specifications, shall be removed from the work.

3. All trucks shall properly display decal with all information required for transport of contaminated materials.

4. Each truck shall carry the standard industry bill of lading for each shipment to the rail terminal.

5. All truck drivers shall have the training required by 29 CFR 1910.120 and shall be trained in the procedures to be used in the event of an emergency, as described in the Emergency Contingency Plan.

3.6 Storage

A. All storage or stockpiling of materials shall be done as required by Section 02200 of these Specifications and described in the Work Plan.

B. On the Subject Site

1. Non-radioactive materials, including fill, may be temporarily stockpiled (staged) on the Site in the locations noted in the Work Plan, or as approved or directed by AECOM or its Agent.

   a. As necessary, staged non-radioactive materials shall be covered or otherwise managed to control dust.

2. Radioactive materials may be staged on the Site only with written approval from the USEPA and approval by the AECOM Project Manager.

   a. Radioactive materials shall only be stored on contaminated or specially prepared areas to minimize the potential for contamination of "clean" areas.

   b. All excavated radioactive materials shall be containerized by the end of the day. If isolated quantities of impacted soil are encountered in volumes less than necessary to fill a container, the material will be placed in Supersacks and stored temporarily until there is sufficient material accumulated to fill a container.

   c. Except when work is actively in progress, the staged contaminated materials that are not containerized shall be stored temporarily in Supersacks on-site. Radiologically-impacted material that cannot be placed in containers for overnight storage will not be excavated.

C. On the Rail Terminal Site

1. If radiologically-impacted materials will be transported by rail for disposal, the loaded and tarped containers will be stored at the rail terminal temporarily until the appropriate train is loaded and dispatched to the permanent disposal facility.

3.7 Disposal

A. At a minimum, all materials shall be disposed as required by the permits, these Specifications, and the laws, rules and regulations of the State of Illinois or the USEPA, whichever are more stringent. All materials to be disposed shall be surveyed as required by SOP-345 to determine they are suitable for the intended disposal method and location.

B. If clean materials are disposed by landfilling or recycling, the Contractor shall provide the AECOM Project Manager and the Field Team Leader with the name of the landfill or recycler.

1. The landfill or recycler must be qualified to receive the waste. The landfill or recycler must provide the Contractor with qualification information.

2. The AECOM Project Manager or its Agent has the right to reject any landfill which does not meet qualification standards.

3.8 Cleanup

Upon completion of work in this section, all rubbish and debris shall be removed from the job site. Soils or fill materials that were excavated from the site and were determined not to exceed the radiological cleanup standard of 7.1 pCi/g total radium (Ra-226 + Ra-228) may be used or redeposited on the site as fill material. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition.

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Contaminated Material Loadout and Earthwork

Section 02200

Revision Number: 0

Date: July 1, 2011 Replaces: New

SECTION 02200

CONTAMINATED MATERIAL LOADOUT AND EARTHWORK

PART 1 - GENERAL

1.1 Scope

A. General

1. Descriptions of the landscaping, structures, etc. for the Site are included in the Work Plan of which these Specifications are a part.

1.2 Related Work

A. Part 1 Sections of these Specifications

B. Section 02010 - Demolition and Debris Removal

D. Section 02840 - Site Utilities

1.3 Site Investigation

A. Investigation Reports

Investigation reports included in the Appendices may be used as a guide to conditions on this project as they contain boring summaries and related information depicting surface and subsurface conditions at specific locations at the Site. Surface and soils conditions at other locations may differ from conditions occurring at the boring locations. Therefore, further investigations will be done prior to and during the excavation activities.

B. Contractor's/Subcontractor's Responsibility

The Contractor/Subcontractor shall carefully examine the Site and make all inspections necessary in order to determine the full extent of the work. The Contractor/Subcontractor shall satisfy himself as to the nature, location and conditions of the work, the conformation and condition of the existing ground surface, and the character of equipment and facilities needed prior to and during prosecution of the work. The Contractor/Subcontractor shall satisfy himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered. Any inaccuracies or discrepancies between the actual field conditions and the Work Plan, or between the Work Plan and Specifications, must be brought to the attention of the Project Coordinator in order to clarify the exact nature of the work to be performed.

1.4 Health and Safety

A. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 and Section 1.5 of this section of these Specifications.

B. All work shall be done under the supervision of personnel experienced and qualified for the work.

C. All work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.

D. Based on preliminary results, sampling and analyses of soils from the Site indicate levels of radioactivity in the soils above background levels. Based on the sampling and surveys, the work can proceed under Level D personal protection conditions. Air and soil monitoring and sampling will be done during the conduct of the work to determine if modifications to Level D work conditions are necessary (see Sections 01020 and 02010 of these Specifications). A complete description of health and safety requirements for this site is provided in the Health and Safety Plan (HASP) for this project.

1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by the Respondents or his Agent.

2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal, equipment and vehicle decontamination) with minimal delay. The requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing levels of radiation above background encountered are discussed in Section 02010 of these Specifications.

E. The Field Team Leader or Health and Safety Coordinator may bar any person from the site who, in their opinion, shows a disregard for health and safety requirements.

1.5 Environmental Safeguards and Regulations

A. The Contractor shall comply with all federal, State, and local regulations, and the requirements of these Specifications at all times to prevent pollution of air, water and soil.

B. The Contractor will preserve and protect all structures, equipment, and vegetation (such as trees, shrubs and grass) on or adjacent to the work area, which is not to be removed and which does not unreasonably interfere with the excavation or restoration work. The Contractor will only remove trees when such is required by the Work Plan and will avoid damaging vegetation that will remain in place. Limbs or branches of trees broken by the contractor will be trimmed with a clean cut, and the cut painted with a tree-pruning compound.

C. The Contractor will control air and water pollution as described in these Specifications and the Work Plan.

1.6 Permits

A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.

B. Copies of all the necessary permits shall be provided to the Project Quality Assurance Manager prior to beginning the work.

C. At a minimum, all work shall be done in accordance with the requirements of the permits. The requirements of these permits are included by reference in these Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

1.7 Submittals

A. All submittals shall be made to the Respondents or their Agent, with copies submitted to the Field Team Leader.

B. The Contractor shall maintain a log of those submittals directed by the Respondents.

C. Import Backfill Materials

1. The Contractor will submit a list showing materials expected to be imported, and the name(s) and locations of the supplier(s) of each type of material.

2. Submit analyses such as radioactivity, geotechnical, gradation, and proctor test results of backfill materials, and certification of conformance with material specifications as determined by the testing consultant for each material, in accordance with testing per Section 2.E of this specification.

3. The above information shall be submitted with the Work Plan for the Site for each source, prior to use.

D. Imported Backfill Material Truck Tickets

1. Submit imported backfill material truck tickets no less than five days prior to submittal of application for payment of the applicable items of work. Minimum required information on truck tickets includes the following.

   a. Date of delivery.
   b. Material description.
   c. Truck identification number or license number.
   d. Gross weight and tare weight or volume of load.
   e. Supplier name/source.
   f. Signatures of scale operator and truck driver.

2. Truck tickets without the above information will not be accepted for payment.

E. Soil Compaction Test Report

1. Submit soil compaction test reports indicating test results from the testing consultant. The Contractor shall be prepared to provide preliminary test results within 24 hours of the test. Final test results shall be submitted to the Contractor and available for review within seven days of testing.

2. Test results shall include time and date of test, test methodology, location of test, name of person and firm conducting the testing, and any pertinent information which may affect the test results.

1.8 Definitions

A. Excavation. Excavation is defined as reaching the lines, grades, elevations and contamination depths shown in the Work Plan or determined by in-place monitoring. Excavation of uncontaminated topsoil, silt, clay, sand, gravel, talus, soft or disintegrated rock, boulder or detached pieces of soil rock or debris shall be included, as well as excavation of contaminated material. During the excavation work, monitoring of radiological contamination of the excavated material will be done by the Respondents.

B. Contaminated Soil

1. Soil which must be excavated, transported, or disposed under special conditions. Soil from these sites may have levels of radioactivity above background. Determining the vertical and horizontal extent of contaminated soil will be the responsibility of the Respondents.

2. Soils containing concentrations of Ra-226 plus Ra-228 greater than five picoCuries per gram (5 pCi/g) of dry soil above natural background averaged over six-inch thick layer are considered radioactively contaminated.

C. Salvaged Excavation Materials Uncontaminated soil materials from designated areas of the Site suitable for use as common or structural fill which are not otherwise classified as unsatisfactory (see Part 2 of this Section). Unless otherwise directed by the Work Plan or the Respondents' Agent, salvaged excavation materials shall be used to backfill designated onsite excavations a minimum of six inches below finished grade.

D. Overexcavation. Excavation of any type of material in excess of the lines, grades or depths indicated in the Work Plan or beyond the limits defined by the Work Plan or Specifications.

E. Unsatisfactory Fill Materials Unsatisfactory materials for fill include, but are not limited to, materials containing organic matter, trash, debris, frozen materials, materials containing radioactivity or other hazardous contaminants in excess of regulatory standards, and materials not meeting the criteria of Part 2 of this section. Materials which are unsuitable due to excessive or insufficient moisture or gradation may be used if they can be brought into compliance with the requirements of Part 2 of this section by screening, manipulation, aerating, watering, or blending with other suitable materials. Unsatisfactory fill materials shall not be used.

F. Percent Maximum Density. Percent maximum density is a percentage of the maximum density at optimum moisture obtained by the appropriate test procedure.

G. Stockpile Construction. Stockpile construction is defined as construction of a stabilized fill which will serve as a temporary storage stockpile constructed of contaminated or uncontaminated materials.

H. Subgrade Preparation Subgrade preparation includes fine grading, scarification and compaction, of existing ground, upon which additional materials will be placed.

1.9 Applicable Publications.

The publications listed below form a part of these Specifications to the extent referenced. The publications are referred to in the text by the basic designations below.

1. American Society for Testing and Materials standard methods of testing. Hereinafter designated as ASTM. The letters and numbers following ASTM (e.g., D698) refer to a particular test.

2. Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation. Hereinafter referred to as State Specifications.

3. Standard Specifications for Water and Sewer Main Construction in Illinois, Fourth Edition.

4. City of Chicago Zoning Ordinances.

1.10 Quality Assurance

A. The Respondents shall make available soil-testing services, either through its own forces or through a soils-testing consultant. The Respondents shall be responsible for taking soil samples and performing moisture-density, gradation, and other tests to ascertain the completed work is in compliance with these Specifications. Samples may be taken at the place of excavation, stockpiles, or from the fill itself. The Respondents shall conduct density and other tests on the fill

as required by these Specifications. The Contractor shall assist the Respondents as necessary to enable sampling and testing.

B. The Field Team Leader shall be a person qualified and experienced in the work described in these Specifications.

C. By Contractor/Subcontractors

1. All work shall be done under the supervision and control of experienced and qualified personnel, competent in the areas of expertise required for the work described in these Specifications and other documents.

2. The Contractor, at his discretion, may have such tests and inspections as he may desire performed by other qualified personnel or independent testing services, for his guidance and control of the work. The cost for such tests and inspections shall be borne by the Contractor. The Quality Assurance Supervisor will consider the results of such testing in determining whether work has been properly done, but the approval of work shall be made by the Respondents or their Agent.

D. Applicable Criteria. Tests and Standards

1. For Excavation of Radioactive Soils. Detailed descriptions of the testing methods and equipment for radioactive soils are described in the Verification Sampling Plan. All soils containing concentrations of Ra-226 plus Ra-228 greater than five pCi/g of dry soil above background, averaged over a six inch layer, shall be removed.

2. For Disposal of Radioactive Soils. All contaminated soils will be disposed in the manner approved by the USEPA. At present, this is to transport the material to a facility licensed to accept these materials for disposal.

3. For Site Earthwork

a. Except for grading and fill under pavement, slabs or structures, surfaces shall be excavated, or filled or graded to plus or minus 0.2 feet (±0.2') of line, slope and elevation shown in the Work Plan, provided in these Specifications, or as directed by the Project Coordinator or Field Team Leader.
b. Areas under pavement, slab or structures shall be filled and/or graded to t0.1 feet.
c. The Contractor will provide survey control for establishing and maintaining excavation and fill. Cut and fill stakes will be placed as necessary, but at least on 50-foot centers, to control excavation and fill. All surveys required to meet City of Chicago earthwork permit requirements shall be performed by a licensed land surveyor. Other surveying will be done by an experienced line and grade surveyor.
d. Following completion of the work, the Site shall be surveyed to confirm all regrading and reconstruction work has been done to proper line and grade.

4. Compaction

a. Compaction of backfilled common materials shall be to at least 90 percent of maximum density (standard proctor - ASTM D698) for areas not covered by structures, paving or slabs, to at least 95% of maximum density for areas to be covered by paving or slabs, and to at least 95% for areas under structures and utilities.
b. Compaction of backfilled select or structural materials shall be to at least 92% of maximum density (standard proctor - ASTM D698) for areas not covered by structures, paving or slabs, to at least 95% of maximum density for areas to be covered by paving or slabs, and to at least 95% for areas under structures and utilities.

c. Maximum densities and optimum moisture information can be obtained from borrow area operators; if this information is not available, the Contractor shall obtain samples representative of all soils to be used for common backfill and provide them to the Respondents or their Agent for testing. Test samples will be provided before backfilling begins.

5. Compaction Testing shall be done on at least 50-foot centers or at least once per lift. Compaction will be tested and determined by competent personnel using methods such as nuclear density gauges (if proper calibration can be achieved), sand cones, or other methods. Compaction work shall be sufficiently observed and all areas of a lift shall be visually inspected by the Respondents or their Agent and the Field Team Leader so they can state their opinion that areas not tested for compaction have been compacted as tested areas.

6. Soils testing. All soils testing (gradations, liquid limits, etc.) will be done using American Society for Testing and Materials (ASTM) procedures and methods.

7. Cleanup. The Contractor shall remove all rubbish, debris, junk, temporary materials, and any surplus excavated materials from the Site, as directed by the Respondents or their Agent. Excavation and proper disposal of these materials and the restoration of staging and storage areas and temporary roads to the satisfaction of the Respondents or their Agent shall be a condition for final acceptance.

PART 2 - PRODUCTS

2.1 Backfill Materials

A. General - Fill materials shall be obtained from suitable stockpiles or borrow as defined in these Specifications. Materials containing organic (except topsoil), perishable, spongy, frozen, expansive or other deleterious materials shall not be acceptable.

B. Materials for Common Fill shall consist of any material imported or excavated from the cut or other borrow sources that, in the opinion of the Respondents or their Agent, are suitable for use in constructing fills. The material shall contain no rocks or hard lumps greater than four (4) inches in size and shall contain at least 40 percent of material smaller than 1/4-inch sieve opening in size. No material of a perishable, spongy, or otherwise improper nature shall be used in filling.

C. Imported Fill

1. Roadbase materials shall conform to State Specifications Section 704.

2. Crushed Rock or Stone for use as fill shall conform to State Specifications Section 704.01.

3. Fine Aggregate or Sand shall conform to State Specifications Section 703.04.

4. Structural Fill under building slabs, ramps, and stairs shall conform to State Specifications Section 704.04, CA-6 or CA-10.

5. Selected Granular Backfill shall conform to Section 20-2.21 C of the Standard Specifications for Water and Sewer Main Construction in Illinois, FA-1 or FA-2.

D. Material placed within 24 inches of rough grade shall be select material that contains no rocks or hard lumps greater than four (4) inches in size and that swells less than 3% when compacted as hereinafter specified for compacted fill.

E. Soils testing

1. Prior to use, all off-site soil sources shall be tested as follows:

   a. Radioactivity Material must be tested for radioactivity and found to be within background ranges (3.7 pCi/g as established by the USEPA in Tech Memo date March 15, 1995).
   b. Engineering Classification ASTM D2487
   c. Standard Proctor Compaction ASTM D698

2. Provide one series of tests for each 10,000 cubic yards of borrow soil used. At least one series of tests will be obtained from each borrow source to be used.

3. Testing of potential on-site soil backfill is described in the Field Sampling Plan.

PART 3 - EXECUTION

3.1 General

A. The work performed under these Specifications shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated in the Work Plan, specified herein, and/or directed by the Respondents or their Agent. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the work.

B. It shall be the Contractor's responsibility:

1. To maintain adequate safety measures and working conditions.

2. To take all measures necessary during the performance of the work to protect the entire project area and adjacent properties which would be affected by this work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Respondents or their Agent.

3. To maintain completed areas until the entire project area is in satisfactory compliance with the Specifications.

C. Utility lines and structures indicated in the Work Plan which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.

1. Where utility lines or structures not shown in the Work Plan are encountered, the Contractor shall report them to the Respondents or their Agent before proceeding with the work.

2. Unless their excavation is necessary to allow work to proceed or as a result of contamination, the Contractor shall bear the cost of repair or replacement of any marked utility lines or structures which are broken or damaged by his operations.

3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work. A description of the requirements may be requested to be provided to the Respondents and the Field Team Leader before any work is done.

3.2 Excavation and Restorations. Clearing and Grubbing

A. Clearing. Clearing consists of the complete excavation of objectionable materials and obstructions above and below the ground surface, including tree stumps, brush, grass, vegetative

matter and other objectionable materials within the project limits. All brush and organic material shall be removed before placing any earth fill unless the earth fill to be placed is topsoil.

B. Grubbing. Grubbing consists of the complete excavation of stumps, including tap roots or lateral roots 1-1/2 inches or more in diameter, and the excavation of brush, grass or weeds to depths below the natural ground as specified herein. Stumps shall be grubbed to a depth of 3 feet and grass or weed shall be grubbed to a depth of 12 inches below the natural ground surface, or to the depths as determined in the field by the Respondents or their Agent at the time of construction.

C. Protection. Existing items not designated to be demolished or removed shall be protected from damage. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor's expense.

D. Debris and Surplus Material. All debris and surplus material resulting from clearing, and grubbing shall be removed from the site and properly managed by the Contractor. The requirements for managing concrete and asphalt materials are described in Section 02010 of these Specifications.

3.3 Dust Control

The Contractor shall take all steps practical to control dust arising from the construction activity. Detailed discussions of the requirements and potential methods for controlling dust are described in Appendix A of the Work Plan.

3.4 Control of Drainage Water

A. The Contractor shall control drainage water in the area of construction operations, and control storm water and wastewater reaching the construction area from any source, so that no damage will be done to the work or to the environment. The Contractor shall be responsible for any damages to persons or property on or off the construction site due to such drainage water or to the interruption or diversion of such storm water or wastewater on account of his operations.

B. Surface grading shall be done as may be necessary to prevent surface water from flowing into excavations.

1. Any water accumulating therein shall be removed by pumping or by other approved methods.

2. Any water accumulating in a work area which may be contaminated will be tested prior to disposal. If contaminated, such water will be disposed as directed by the Respondents or their Agent.

3. Any water which is the result of the Contractor's failure to properly control drainage will be removed and disposed at the Contractor's expense.

3.5 Excavation

A. General

1. The locations of surveyed benchmarks and estimated depths of cut for beginning the work are shown in the Work Plan. The Contractor shall be responsible for providing additional staking and surveying, including both horizontal and vertical controls, to ensure the Work is done to the standards of these Specifications. The Project Coordinator and Field Team Leader will be available to assist and advise the Contractor.

2. The Contractor shall perform all excavation necessary or required as shown in the Work Plan, or required by these Specifications or the Respondents or their Agent. The excavation shall include the disposal or stockpiling of all materials of whatever nature encountered, which shall include both contaminated soil excavation and common soil excavation when both are present, and shall include the furnishing, placing, and maintaining of shoring and bracing necessary to safely support the sides of the excavations.

3. If the horizontal and vertical limits of excavation, as determined by radiological testing, are less than shown in the Work Plan, the Contractor shall excavate only those materials necessary to achieve compliance with the standards of these Specifications.

4. If the horizontal and vertical limits of excavation, as determined by radiological testing are greater than shown in the Work Plan, the Contractor shall extend the limits of excavation as necessary to achieve compliance with the standards of these Specifications.

5. Excavated material shall be placed a sufficient distance from the edge of the excavation to avoid cave-ins or bank slides. In no case shall excavated materials be placed closer than three feet to the edge of the excavation.

6. Shoring and bracing, if necessary, shall be designed by a qualified Professional Engineer competent in soils engineering.

7. The work also shall include all pumping, ditching and other required measures for the removal or exclusion of water.

B. Contaminated Soils

1. *Interpretation of the Work Plan*

   a. The Work Plan indicates the estimated horizontal and vertical extent of a contaminated deposit.
   b. Depths of contaminated and uncontaminated soils indicated in the Work Plan represent the total estimated depth from the ground surface to the base of the contamination. The different depths shown across a given deposit are an indication of how the actual contamination depths might be expected to change throughout a given deposit.
   c. Information in the Work Plan indicates the existing surface cover material. Unless otherwise indicated, the replacement surface cover shall match existing.
   d. All contaminated materials, including clay, silt, sand, gravel, cobbles and boulders, and rock will be excavated. The Contractor shall be prepared to conduct whatever excavation is necessary to remove contaminated materials.

2. Excavation Procedures

   a. If possible, contaminated material shall be removed from outlying areas and boundaries of contaminated areas, working toward the equipment decontamination and loadout facilities, to minimize the potential to contaminate "clean" areas.
   b. Truck or container loading shall be done only on ground contaminated and designated for cleanup or on the equipment decontamination pad or other area specially prepared for such work. Care should be taken to avoid spilling during loading.
   c. Contaminated (see Subpart 1.8, B, Definitions of this section) and uncontaminated soils shall be separated during excavation and kept separate during loading, transport and stockpiling to minimize the potential for cross-contamination.

d. Excavations shall be performed carefully to minimize the potential for mixing with underlying soils. Also, cleated or crawler-type equipment shall not be allowed without prior approval of the Respondents or their Agent.
e. Excavations will be radiologically monitored and surveyed by the radiologic technicians to determine if additional material must be removed. Detailed descriptions of the radiological monitoring requirements during excavation are provided in applicable SOPs.
f. The Contractor shall excavate contaminated and uncontaminated soil to within three inches of the design or estimated depth. From this point, excavation should proceed in no greater than six-inch lifts to the depths indicated in the Work Plan. After excavation of each lift, the Respondents will radiologically monitor the excavation and delineate additional excavation required (see the Field Sampling Plan).
g. Exceptions to these requirements must be approved in writing by the Respondents or their Agent and provided to the Field Team Leader. The Contractor will not be paid for removing extra quantities resulting from a deviation from the above requirements, unless a specific deviation has received prior written approval.

D. Other

Uncontaminated material, including clay, silt, sand, gravel, cobbles and boulders and rock, may need to be removed for slopes on excavations, to expose contaminated soils, structures or facilities, or to facilitate work to remove contaminated soils, structures or facilities. Common materials removed from such areas may be used for backfill if they meet the requirements for fill material. If unsuitable, they shall be removed, transported and disposed as surplus excavation.

3.6 Contaminated Material Loadout and Transport

A. General Requirements

1. Before beginning contaminated material loadout operations, the Contractor shall construct temporary site drainage facilities and initiate dust control measures. The Contractor also shall construct all decontamination and loadout facilities and establish survey controls.

2. The Contractor shall use equipment and methods that minimize the potential for spillage of materials during loading operations.

3. At a minimum, the truck loadout shall be cleaned (liquid and nonliquid wastes removed) at the end of every day. Spilled materials shall be promptly removed from the loading facility if the quantity is such that the material will be picked up and transported out of the loadout facility (e.g., dirt clods which could stick to tires).

4. All decontamination of equipment shall be done as required by Section 01020 and this section of these Specifications.

B. Loadout

1. All debris, such as concrete, asphalt, etc., shall be managed as described in Section 02010 of these Specifications.

2. All loadout of material will be done as required by these Specifications and the Work Plan prepared by the Contractor. Loading of trucks and other containers shall be done only in the loadout or equipment decontamination facilities.

3. Unless staging areas have been selected by the Contractor and approved by the Respondents or their Agent, soils and debris will be loaded directly into trucks or containers as they are excavated, for transport to the rail terminal. Materials will be placed so they do

not extend above the sides of the truck bed or container. Materials protruding above the sides of the truck or container will be pushed down or removed for placement into another truck or container by loading equipment or personnel.

4. Truck beds and containers will be tightly covered with tarps.

5. Truck drivers will generally not enter the Contamination Reduction Zone, but shall remain inside the truck when such entry is required.

C. Decontamination

1. After a truck or container has been loaded and tarped, it will be checked for contamination. The truck tires, body and outside of the bed and the outside of the container will be frisked to determine if contaminated soils are present. If frisking does not detect any contamination, the equipment may be released for travel.

2. If frisking does detect contamination the truck or container will be decontaminated by wiping or spraying.

3. Following decontamination, all trucks and containers shall be frisked for release. If any radioactivity above release levels (see Table 02200-1 at the end of this section) is found, decontamination of those areas will be continued. If spraying or wiping is ineffective in removing contamination, brushes or other means shall be used until release levels are achieved. In no case shall a truck or container with radioactivity above the release levels be allowed to leave the site.

4. After containers are loaded and frisked for release, they- shall be staged in a clean area on the site. The trucks used to transport the containers to the rail yard will not need to be frisked prior to leaving the site, as long as the transport trucks do not enter the Contaminant Reduction Zone.

D. Transport

1. Trucks shall use only the designated route(s) to transport containers with contaminated materials from the Site to the rail terminal, and shall obey all signs, speed limits and other traffic laws. Any driver not obeying traffic laws, or the requirements of these Specifications, shall be removed from the work.

2. All trucks shall properly display a decal with all information required for transport of contaminated materials.

3. Each truck shall carry the standard industry bill of lading for each shipment.

4. All truck drivers shall have the training required by 29 CFR 1910.120 and shall be trained in the procedures to be used in the event of an emergency (see Section 01020, Articles 3.2 and 3.7, of these Specifications, and the Emergency Contingency Plan).

3.7 Fill

A. General

1. Unless otherwise specified, fill material shall be compacted by the Contractor to a density that is not less than 90% of the maximum density, standard proctor (ASTM D698).

2. The upper 18 inches of fill material placed in lawns and other areas to be revegetated shall not be compacted beyond that density needed to provide a stable land surface.

3. In areas where contaminated materials have been removed, the Contractor shall not begin backfilling until a radiological survey has been completed and sign-off has been obtained from the USEPA.

4. All fill shall be final graded to the requirements of Part 1 of this Section. After backfilling is completed, the fill (including topsoil) shall be graded to blend with existing contours where future construction will not be done.

B. Preparing Areas to be Filled

1. All vegetable matter and coarse material which might prevent compaction shall be removed by the Contractor from the surface upon which the fill is to be placed. Any loose and porous soils shall be removed or compacted to a depth specified by the Respondents or their Agent. The surface shall then be plowed or scarified until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

2. Where fills are constructed on hillsides or slopes, the slope of the original ground on which the fill is to be placed shall be stepped or keyed by the Contractor. The steps shall extend completely through the soil mantle, if any, and into the underlying formation materials.

3. Fill shall not be placed on ground which has frozen, unless the ground can be worked (e.g., scarified and recompacted) to remove the frost.

C. Placing and Spreading Fill Material

1. The Contractor shall not commence backfilling until a radiological survey of the excavation has been completed which verifies all contaminated materials have been removed as required by these Specifications, and the Field Team Leader has provided the Contractor with verbal authorization to begin backfilling.

2. Fill shall be placed to the line, elevation and grade as required by these Specifications, shown in the Work Plan, or described or shown in the Contractor's Work Plan for this Site. Unless otherwise approved in writing by the Respondents or their Agent, the Contractor shall use fill stakes to guide backfilling.

3. Salvaged soil materials shall be used for backfilling unless determined unsuitable by the Respondents or their Agent.

4. When conditions require that contaminated soil will be left in place, backfill will be placed against contaminated soils. In this situation, a six mil polyethylene barrier will be placed to mark the separation between the soils and to minimize the potential for contaminated soils to fall into the "clean" area. Care will be taken during subsequent operations to prevent contaminated soils from mixing with "clean" soils.

5. Fill material to be compacted shall be placed by the Contractor in one foot , even, continuous layers. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

6. Uniform moisture distribution in the fill to be compacted shall be obtained by discing, blading or other approved methods prior to compaction of a layer.

a. When the moisture content of the fill material is insufficient to achieve specified density requirements, water shall be added by the Contractor until the moisture content is as specified.
b. When the moisture content of the fill material is too high to achieve specified density requirements, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is reduced.

7. Unless otherwise shown in the Work Plan, the Contractor shall maintain a minimum of 10 feet of separation between excavation of contaminated soils and placement of clean fill.

8. Fill on City of Chicago street rights-of-way shall be done as required by City of Chicago Standard Specifications.

D. Compaction

1. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the required density (see below).

2. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel, pneumatic-tired rollers or other types of acceptable compacting equipment.

   a. Selection of compaction equipment will be at the discretion of the Contractor. Equipment shall be of such design that it will be able to compact the fill to the specified density.
   b. In areas not accessible to or suitable for larger self-propelled roller or vibratory equipment (e.g., small areas, within 12 inches over the top of utilities, etc.), the maximum loose-layer thickness will be four inches.
   c. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained over the entire area.
   d. The surface of fill slopes shall be compacted so that the slopes are stable and there shall be no excessive loose soil on the slopes.

3. Roadbase backfill shall be compacted to at least 95% of maximum density (ASTM D698 - standard proctor).

4. Common backfill shall be compacted as follows:

   a. To at least 90% of maximum density (ASTM D698 - standard proctor) for all areas except as noted below.
   b. To at least 95% of maximum density (ASTM D698 - standard proctor) for all areas to be covered with paving.
   c. To at least 95% according to ASTM D698 in City of Chicago street right of-ways where asphalt will be placed, except for the upper six-inch layer which will be compacted to not less than 100%.

5. Structural fill under buildings, slabs, ramps and stair shall be compacted to at least 95% of maximum density (ASTM D698).

6. Compaction will not be required in the upper 18 inches of soil placed in lawns or other areas to be revegetated.

E. When an area has been prepared to receive concrete or asphalt, applicable moisture and density requirements shall be maintained in the upper layer until the surface construction is completed.

F. The Contractor shall provide and maintain adequate erosion and drainage control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the work is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment offsite or to adjacent water courses.

G. Backfill around Utilities. In any case where utilities are disturbed or exposed, all repair work shall be done in accordance with the requirements of the utility, or the governing agency (see Appendix G - Specification 02840 Site Utilities).

3.8 Storage(Stockpiling)

A. On the Site

1. Non-radioactive materials, including fill, may be temporarily stockpiled on the Site in the locations noted in the Contractor's approved Work Plan, or as approved or directed by the Respondents or their Agent.

   a. As necessary, staged non-radioactive materials shall be covered or otherwise managed to control dust.
   b. Non-radioactive materials shall be removed from the vicinity of the property by the end of the work.

2. Radioactive materials may be staged (temporarily stored) on the Site in locations noted in the Contractor's approved Work Plan.

   a. If not in the approved Work Plan, radioactive materials may be staged on the Site only with written approval from the Respondents or their Agent. These materials shall only be stored on contaminated or specially prepared areas to minimize the potential for contamination of "clean" areas.
   b. Except when work is actively in progress, the staged materials shall be completely covered with impermeable plastic sheeting or other approved covers.

3.9 Disposal

A. At a minimum, all materials shall be disposed as required by the permits, these Specifications, and the laws, rules and regulations of the USEPA, State of Illinois, and the State of Utah.. All materials disposed off the Site shall be surveyed as required by SOP-345 to determine they are suitable for the intended disposal.

B. If the materials are disposed by landfilling or by recycling, the Contractor shall provide the Respondents or their Agent and the Project Coordinator with the name of the landfill or recycler.

1. The landfill and recycler must be qualified to receive the waste. Qualification information must be provided for the landfill or recycler, by the Contractor.

2. The Respondents or their Agent has the right to reject any landfill or recycler which does not meet qualification standards.

3.10 Landscaping

Following completion of backfilling to proper line, elevation and grade, the Contractor shall return to the site and reinstall or replace all designated items to at least original condition, or as otherwise agreed by the Respondents and the property owner. This includes paving, slabs, fences, retaining walls, sprinkler

systems, sod, shrubs, bushes, trees and any other appurtenant landscaping, facilities and structures which were removed for or damaged by the work.

3.11 Surveying

A. A baseline will be established for the Site. This baseline will be tied to the previous USEPA survey done for the property.

B. Items including, but not limited to, the following will be located or identified in relation to the baseline.

   1. Visible property boundaries.

   2. Landscaping.

   3. Facilities.

   4. Structures.

   5. Utilities.

   6. Limits of radioactive contamination. Using the results of previous investigations and the baseline, sufficient stakes or markers will be placed to visibly mark the limits so any contaminated soil can be properly removed.

C. The baseline, as above, and the previous surveys also will be used to locate grids for verification surveying. The size of the grids will depend on the location and the extent of contamination.

D. The work for locating items such as the above can be done with equipment and materials such as the following:

   1. Theodolite.

   2. Compass.

   3. Cloth or steel measuring tape.

3.12 Cleanup

Upon completion of work in this section, all rubbish, debris and excess soils (including fill materials) shall be removed from the job site. All construction equipment and implements of service shall be removed and the entire area involved shall be left in a neat, clean and acceptable condition. Proper cleanup of the properties shall be a condition of acceptance of the work and final payment.

TABLE 02200-1
RELEASE CRITERIA

From U.S. NRC, Regulatory Guide 1.86, Table 1

Nuclide [a]	Average [b,c]	Maximum [b,d]	Removable [b,e]
U_{nat}, U_{235}, U_{238}, and associated decay products	5,000 dpm α per 100 cm^2	15,000 dpm α per 100 cm^2	1,000 dpm α per 100 cm^2
Transuranics, Ra_{226}, Ra_{228}, Th_{230}, Th_{228}, Th_{230}, Pa_{231}, Ac_{227}, I_{125} and I_{129}	100 dpm per 100 cm^2	300 dpm per 100 cm^2	20 dpm per 100 cm^2
Thnat, Th_{232}, Sr_{90}, Ra_{223}, Ra_{224}, U_{232}, I_{126}, I_{131} and I_{133}	1,000 dpm per 100 cm^2	3,000 dpm per 100 cm^2	200 dpm per 100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr_{90} and others noted above.	5,000 dpm β-γ per 100 cm^2	15,000 dpm β-γ per 100 cm^2	1,000 dpm β-γ per 100 cm^2

a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.

d The maximum contamination level applies to an area of not more than 100 cm^2.

e The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Site Utilities

Section 02840

Revision Number: 0

Date: July 1, 2011

Replaces: New

SECTION 02840

SITE UTILITIES

1.0 GENERAL

1.1 Scope

A. This section describes the general requirements for locating, protecting, removing and installing site utilities.

B. The known locations of utilities will be marked prior to start of work by utility locating contractors (DIGGER)..

1. Excavation to or below the locations of known utilities is expected as part of the work for the Site.

2. Utility lines and structures which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.

3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work.

1.2 Related Work

A. Other Part 1 Sections of these Specifications

B. Section 02010 - Demolition and Debris Removal

C. Section 02200 - Contaminated Material Loadout and Earthwork

1.3 Health and Safety

A. Detailed discussions of the potential hazards and the requirements for minimizing the potential for harm to project and offsite personnel, and to the environment, are provided in Section 01020 of these Specifications and the HASP.

B. All work shall be done under the supervision of personnel experienced and qualified for the work.

C. All work will be done as required by OSHA regulations published in 29 CFR 1910 and 1926. These regulations are included by reference in these Specifications.

D. Sampling and analyses of soils from the Site indicate levels of radioactivity in the soils above background levels. Based on the sampling and surveys, the work can proceed under Level D personal protection conditions (see HASP). Air and soil monitoring and sampling will be done during the work to determine if modifications to Level D work conditions are necessary (see Section 02010). Complete descriptions of health and safety requirements for this Site are provided in Section 01020 of these Specifications and the HASP.

1. The Contractor shall be prepared to discontinue work in an area and begin work in an alternate area if monitoring and sampling indicate changes in the work conditions may be necessary and if so directed by AECOM.

2. The Contractor shall be prepared to begin working under changed conditions (greater than or equal to Level D personal protection with appropriate personal equipment and vehicle

decontamination) with minimal delay. The requirements which may be necessary if asphalt, concrete, wood, metal or other construction materials containing hazardous materials or levels of radiation above background are encountered are discussed in Section 02010 of these Specifications.

E. The Field Team Leader or Health and Safety Coordinator may bar any person from the Site who, in their opinion, shows a disregard for health and safety requirements.

1.4 Environmental Safeguards and Regulations

The Contractor shall comply with all federal, state, and local regulations, and the requirements of these Specifications at all times to prevent pollution of air, water and soil. Detailed requirements for the protection of the environment are provided in Section 01020 and the HASP.

1.5 Permits

A. The Contractor shall be responsible for obtaining all permits required for the work and additions described in this section of these Specifications.

B. Copies of all the necessary permits shall be provided to AECOM or their Agent and to the Project Manager prior to beginning the work.

C. At a minimum, all work shall be done in accordance with the requirements of the permits or, if the work is exempted under CERCLA from any permits, in accordance with the substantive requirements which would apply if the work were not exempted from such permits. The requirements of these permits are included by reference in these Specifications. Where the requirements of the permits and these Specifications are in conflict, the more stringent requirements shall apply.

1.6 Quality Assurance

A. Contractor personnel shall be persons qualified by education and experience to perform the duties assigned.

B. The Field Team Leader shall be a person qualified and experienced in the work described in these Specifications. AECOM will provide a Quality Assurance Officer to review all project submittals.

C. All work shall be done according to the requirements of these Specifications.

1.7 Submittals

All submittals shall be made to the AECOM or its Agent.

2.0 PRODUCTS

2.1 Backfill Materials

A. General. Fill materials shall be obtained from suitable stockpiles or borrow as defined in these Specifications. Materials containing organic (except topsoil), perishable, spongy, frozen, expansive or other deleterious materials shall not be acceptable.

B. Embedment. Embedment material shall be fine aggregate or sand as defined by Part 2 of Section 02200 of these Specifications.

2.2 Utilities

Materials used to reconstruct utilities shall be as required by the utility company, the governing municipal agency, or the building code.

3.0 EXECUTION

3.1 Location

A. The known locations of utilities shall be identified prior to the start of any excavation. The Contractor shall be responsible for field verifying utility locations and for obtaining any necessary additional information to properly implement and execute the Work Plan.

   1. Known and suspected utilities are shown on the current site survey. The locations as shown may prove to be inaccurate and other obstructions not shown may be encountered. Any reliance on this information will be at the Contractor's risk. The Contractor shall arrange to have all utilities located by the utility companies or a utility location service prior to beginning work (e.g., DIGGER).

   2. Excavations in the areas of suspected underground utilities shall be done in compliance with current regulations for protection of utilities for the City of Chicago.

B. Utility lines and structures which are to remain in service shall be protected by the Contractor from any damage as a result of his operations.

   1. Where utility lines or structures not shown on the site survey are encountered, the Contractor shall report them to AECOM or its Agent before proceeding with the work.

   2. Unless their excavation is necessary to allow work to proceed or as a result of contamination, the Contractor shall bear the cost of repair or replacement of any marked utility lines or structures which are broken or damaged by his operations.

   3. All repair work, including backfilling, shall be done as required by the governing utility or agency. The Contractor shall contact the governing utility or agency and determine the requirements for properly completing the work.

3.2 Existing Utilities Designated for Excavation

A. Overhead Utilities shall be removed and replaced by the utility if such is necessary for proper completion of the work. If the utility will not or cannot remove them, procedures for excavation will be discussed with and approved by the utility. At a minimum, removal of overhead utilities shall include the following.

   1. Obtain the necessary disconnects and verify the utilities are de-energized and grounded prior to the work.

   2. Remove cables and guy-wires from the utility poles.

   3. Determine if the above- and below-grade sections of the poles are contaminated with radiological materials.

      a. If the above-grade sections are not contaminated and the lower section is, or if the potential for contamination of the below-grade section is unknown, fell above-grade sections of utility poles by sawing or other suitable methods to separate the uncontaminated above-grade sections from the potentially contaminated below-ground section.

b. If both sections are contaminated, the pole may be removed by felling the above-grade part and excavating the below-grade part, or by pulling the pole from the ground with a crane or other equipment.

4. Uncontaminated components of overhead utilities, such as cables, guy-wires, etc., shall be disposed as required by Section 02010 of these Specifications.

5. Contaminated components of overhead utilities shall be removed and processed for loadout and disposal as other contaminated debris (see Section 02010 of these Specifications).

6. Excavated materials shall be handled as required by Subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications.

B. Underground Utilities to be removed may be removed by the utility. At a minimum, the following procedures shall be used.

1. Obtain the necessary disconnects or shutoffs prior to the work and verify the utility is de-energized, drained, or purged as necessary (lock-out and tag-out procedures properly implemented).

2. Excavate and manage materials to access contaminated utilities or bedding materials as required in Subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications. Monitoring of excavations will be required both on-site and in adjacent rights-of-way.

3. Remove, decontaminate and dispose of contaminated utility materials as required in subparts 3.5, 3.6, 3.8 and 3.9 of Section 02010 of these Specifications.

4. Replace, repair, or abandon the removed utility as directed by these Specifications and the Work Plan, or the utility company or municipal agency having jurisdiction.

a. Replacement or repairs of the utilities shall be in accordance with the requirements of these Specifications or the utility or agency.

b. Abandoned utilities shall be capped as required by Article 3.3 of this section.

3.3 Underground Utilities Encountered During Excavation

A. Damage to utilities shall be repaired under the supervision of the respective utility service or municipal agency having jurisdiction.

B. Abandoned utilities shall be cleaned of all encrusted contamination. Open ends or broken pipes shall be properly capped.

1. At a minimum, capping may be done by crimping, pouring concrete around, or plugging the open end in such a way as to prevent a "least path of resistance" for any future gas leaks.

2. Capping will be done as required by the utility or municipal agency if their requirements exceed those above.

C. Active utilities shall be supported in-place, if suitable, or removed and replaced as necessary to excavate to the depths shown in the Work Plan.

1. Support or removal and replacement shall comply with the more stringent requirements of the affected utility or municipal agency or these Specifications.

2. Utility lines, whether removed or left in-place, shall be cleaned of encrusted contamination as required and described by Section 02010 of these Specifications.

3. Removed utilities shall be managed and disposed as required in Section 02010 for other demolition debris.

3.4 Underground Utility Installations

A. The Contractor shall coordinate interruptions of utility services through AECOM or its Agent.

B. If utilities are installed after backfilling is complete, all excavations shall be by open cut.

1. The banks of the trenches should be as vertical as possible. Shoring and bracing, as necessary shall be designed by a qualified Professional Engineer competent in soils engineering. The design of shoring and bracing shall be provided to AECOM or its Agent.

2. If rock is encountered, the base of the trench will be overexcavated at least six inches to allow for placement of bedding material.

C. If utilities are installed before backfilling is completed to final line, elevation and grade, the fill shall be to at least 12 inches above the top of the utility before excavation and placement of the utility is begun.

D. Trench Preparation. The bottom of the trench shall be accurately excavated to line, and graded and shaped to fit the lower one-quarter of the pipe to provide uniform bearing and support for each section; wedging and blocking will not be permitted. If the pipe has bell ends, the trench shall be overexcavated at the joints. If the common fill is granular, the base of the trench shall be scarified to a depth of six inches and recompacted to at least 95% of maximum density at ±2% of optimum moisture (standard proctor, ASTM D698). If the common backfill is not granular in nature, the base of the trench shall be overexcavated six inches and backfilled with granular (embedment) material compacted to at least 95% of maximum density at ±2% of optimum moisture.

E. Utility Embedment, All utility lines except electric lines and irrigation lines two inches or less in diameter shall be embedded in fine aggregate (see Subpart 2.1.13 of this section).

1. Embedment material shall extend a distance equivalent to the utility diameter above, below and to the sides of the utility for utilities greater than six inches in diameter. A six-inch embedment shall be provided for utilities less than or equal to six inches in diameter.

2. Care shall be taken not to disturb either the horizontal or vertical alignment of the utility; embed both sides of the utility simultaneously. If necessary, compact embedment material by hand to avoid displacement and damage to the utility.

F. All utility installations shall be inspected by AECOM, and by the utility or municipal agency if necessary, at the following times.

1. Before placing embedment material over the utility.

2. Before placing common fill over the embedment material.

G. Compaction of common material over the utility shall be by manually-operated power equipment or by hand until at least 12 inches of fill has been placed over the utility. Damage to the utility by compaction or other causes after proper installation shall be the responsibility of the Contractor.

H. Tests. Testing shall be done on all repaired or replaced systems. Testing may be done by the utility or municipal agency or Contractor. All testing will be done as required by the utility, municipal agency or applicable building code. All testing will be done in the presence of AECOM, and utility, municipal agency or building inspectors, as necessary.

Appendix F

Health and Safety Plan

515 NORTH PESHTIGO COURT
CHICAGO, IL

Title: Health and Safety Plan

Revision Number: 0

Date: July 1, 2011

Replaces: New

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EMERGENCY PHONE NUMBERS

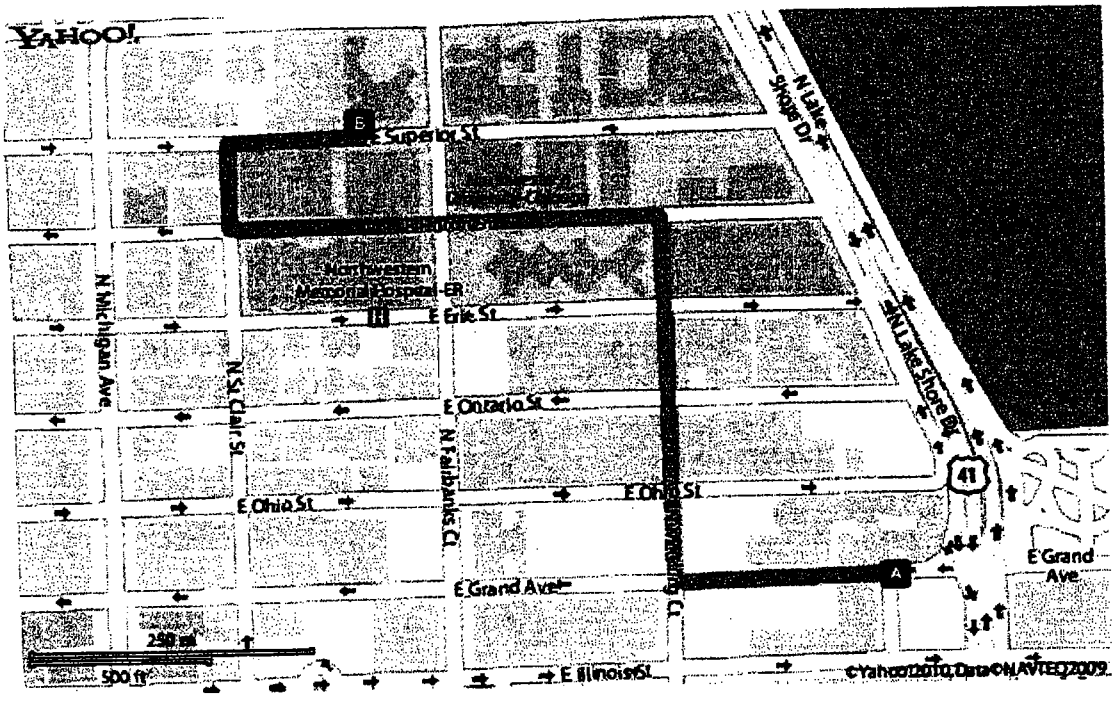
IN THE EVENT OF AN EMERGENCY DIAL 911

AMBULANCE SERVICE	911
FIRE DEPARTMENT	911
EMERGENCY RESCUE SERVICE	911
POLICE DEPARTMENT	911
NATIONAL RESPONSE CENTER	1-800-424-8802
POISON CONTROL CENTER	1-800-732-2200
NORTHWESTERN MEMORIAL HOSPITAL	(312) 908-2000
PROJECT COORDINATOR (Steve Korrder)	(847) 279-2448
	(847) 343-6007 cell
ILLINOIS EMERGENCY MANAGEMENT AGENCY	(217) 782-7860
Dept of Nuclear Safety(IDNS) Emergency Number	(217) 785-0600 [1]
USEPA REGION 5 24-HOUR EMERGENCY NUMBER	**(312) 353-2318**

[1] Primary notification should be made to USEPA Region 5. The IDNS emergency number (217-785-6000) can be used as a secondary notification number.

Hospital Location and Directions

Northwestern Memorial Hospital
250 E. Superior Street
Chicago, IL 60611



Directions:

1. **Start at 500 N LAKE SHORE DR, CHICAGO going toward N MCCLURG CT** — **go 0.1 mi**
2. **Turn Right on N MCCLURG CT** — **go 0.2 mi**
3. **Turn Left on E HURON ST** — **go 0.3 mi**
4. **Turn Right on N ST CLAIR ST** — **go 0.1 mi**
5. **Turn Right on E SUPERIOR ST** — **go 0.1 mi**
4. **Arrive at 250 E SUPERIOR ST, CHICAGO, on the left**

EMERGENCY PLAN

In the event excavation within the potentially impacted area (site specific) is required on an emergency basis, the following shall be incorporated to the extent possible, and all personnel working in the potentially impacted areas shall be given the opportunity to read this section of the Health and Safety Plan (HASP). The remainder of the attached HASP will be implemented as conditions allow.

A. PROTECT WORKERS POTENTIALLY EXPOSED TO IMPACTED SOIL

1. Notify workers that levels of radiation above background levels may be present in excavated soil.
2. Avoid ingesting soil.
   Avoid inhaling dust from contaminated areas.
   Minimize contact with the soil to the extent possible.
   Wear protective coveralls or disposable coveralls to facilitate cleanup of workers.
3. Screen excavation for gamma radiation (NaI detector).

B. AVOID SPREAD OF CONTAMINATION

1. Limit erosion transport of excavated soil through use of hay bales, sand bags, temporary berm materials to minimize uncontrolled runoff.
2. Cover any excavated soil piles until screened for potential contamination.
3. Screen soil prior to transport away from project site using NaI gamma detector.
4. Do not remove equipment which has been in contact with potential contamination until it has been checked and released.

C. MINIMIZE POTENTIAL PUBLIC CONTACT.

1. Limit access to excavated soil using barricades, temporary fencing, jersey barriers.
2. Cover excavated piles to minimize fugitive dust. Wet dusty excavations.
3. Control, to the extent possible, off-site tracking by vehicles, potentially contaminated boots or clothing by workers.

D. MONITOR CONTAMINATION

1. To the extent practicable, provide gamma radiation screening of the exposed soils in the excavation (NaI detector).
2. When possible, provide high volume air samplers immediately adjacent to potential or known exposed contaminated soil, to monitor for fugitive emissions (dust, radon gas).
3. Survey ground surface/pavement surface around potential or known contamination locations for elevated gamma radiation (NaI detector).

E. DISPOSAL

1. Any excavated material should be disposed as required by law.

F. NOTIFY AUTHORITIES

1. Notify agencies identified on the enclosed emergency notification list.

Notification should include, as a minimum, the following

1. Location of Excavation
2. Potential Contact with Thorium Containing Soil
3. Field surveys and sampling measured a maximum reading of _____ cpm (if readings have been taken) in soils remaining, although higher concentrations may be present.

1.0 SCOPE OF PLAN

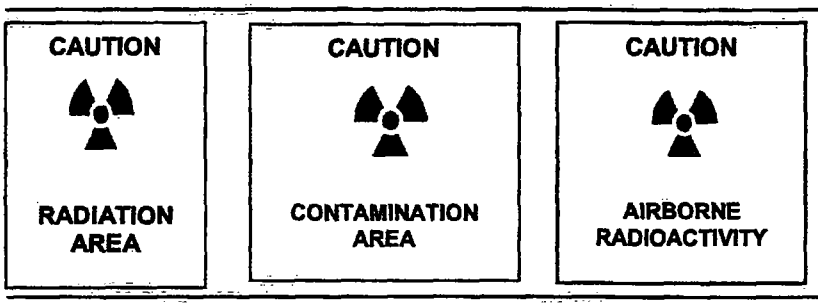
The following Health and Safety Plan (HASP) will be utilized and modified as necessary in order to minimize and prevent exposures to hazardous substances and conditions related to all excavation and restoration activities at the Site. All personnel assigned to this project will be required to review thoroughly the contents of the HASP and to strictly adhere to the policies and procedures listed herein. This HASP is for use only by AECOM as the remediation manager and by their designated contractors and consultants, and approved Site visitors. USEPA, and other agencies, are not considered visitors and will be required to conform to their own Health and Safety Plans.

This plan meets the requirements of OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and applicable subparts of OSHA 29 CFR 1926, 1910 and 10 CFR. Visitors will be required to review the health and safety plan and read and sign the visitor information sheet (Figure 1.1).

FIGURE 1.1
VISITOR INFORMATION SHEET

NOTICE TO VISITOR: ALL VISITORS MUST BE ESCORTED AT ALL TIMES WHILE ON THIS SITE.

CAUTON. Radioactive materials may be present on this site. Radioactive materials may be found throughout the site. Grounds, and equipment have low levels of contamination.



CONTROLLED AREAS: Do not enter areas with these signs unless you have an escort or health physics has given specific approval and you understand access limitations.

You must wear protective clothing in controlled areas. Health physics will provide you with instructions.

You must wear a personal radiation dosimeter if you enter an area which is controlled.

No smoking, eating, drinking or chewing in controlled areas.
NO EXCEPTIONS.

.Notify Health Physics if you do not understand these instructions.

Signature_____ Date _____

2.0 SAFETY MANAGEMENT

The following safety management structure, Figure 2.1, will be utilized for the implementation, administration, and monitoring of the HASP.

2.1 Health and Safety Coordinator

The Health and Safety Coordinator (HSC) shall assume overall responsibility for the HASP. The HSC or designee shall monitor and maintain quality assurance of the HASP until project completion. Principal duties of the HSC include:

- Review project background data,
- Approve all HASP modifications,
- Administer and enforce the HASP,
- Evaluate the adequacy of personal protective equipment (PPE) to be used by Site personnel,
- Conduct required on-site training except tailgate safety meetings that will be conducted by the Field Team Leader,
- Brief visitors on work Site conditions, and
- Administer personnel and perform ambient air monitoring procedures.

The HSC or designee has the authority to stop work in the event conditions develop which pose an unreasonable risk to Site personnel or persons in the vicinity.

PROJECT MANAGEMENT ORGANIZATION CHART

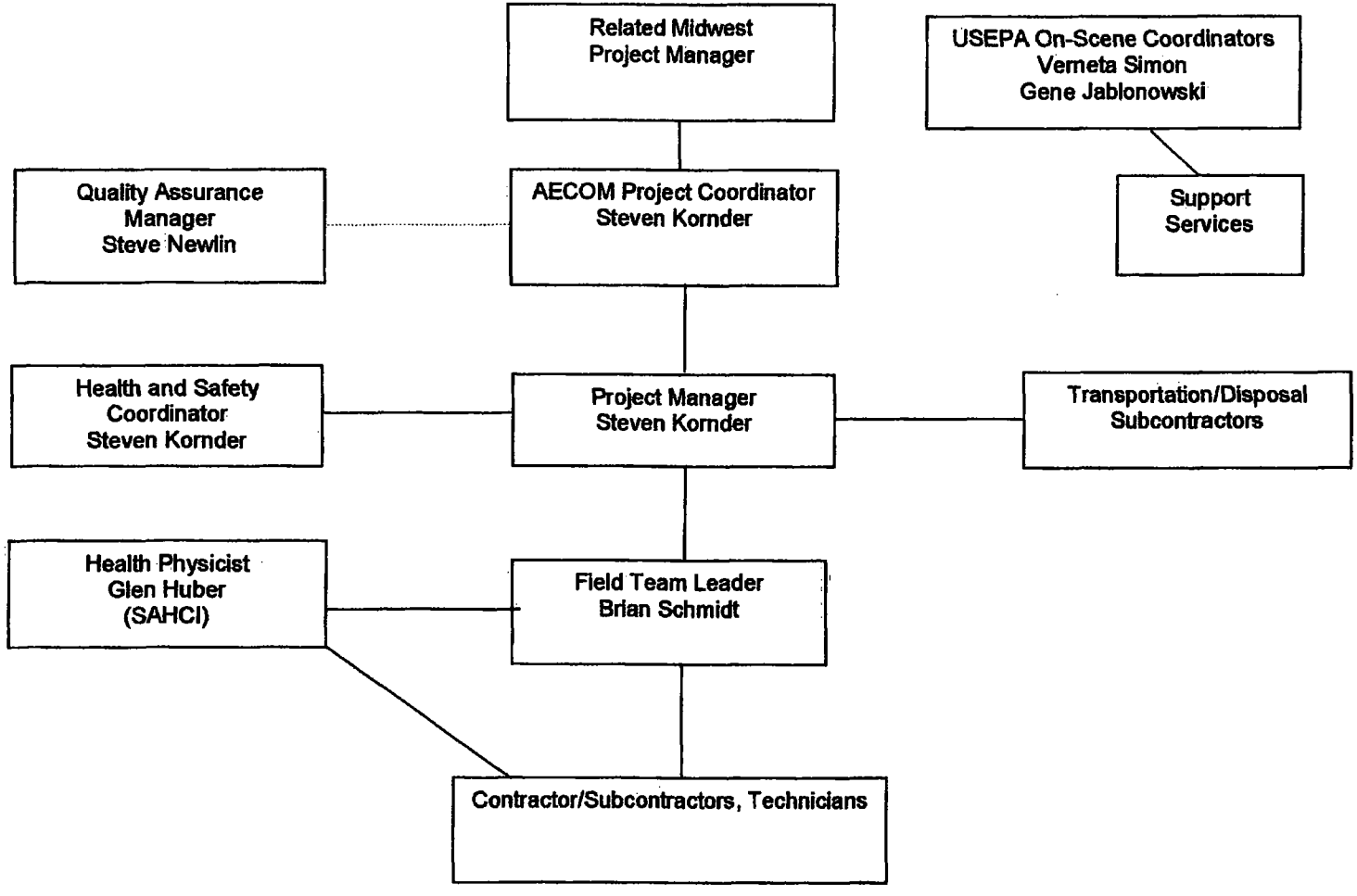


Figure 2.1

3.0 PERSONNEL RESPONSIBILITIES

The HSC or designee will administer and supervise the HASP at the work-site level. He will monitor all operations and will be the primary on-site contact for health and safety issues, and will have full authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public.

The HSC will brief all Site personnel on the contents of the HASP. Personnel will be required to review the HASP, and have the opportunity to ask questions about the planned work or hazards. The Field Team Leader will conduct tailgate safety meetings to familiarize the Site personnel with Site conditions, boundaries, and physical hazards. Site personnel will conduct their assigned tasks in accordance with the HASP at all times. As necessary, the Field Team Leader will conduct radiation training and provide briefings on radiation issues that arise during construction. These activities will take place as part of the tailgate safety meetings, or during special meetings to address more immediate concerns, dependent on the issues being addressed.

If at any time Site personnel observe unsafe conditions, faulty equipment or other conditions which could jeopardize personnel health and safety, they are required to immediately report their observations to the HSC or Field Team Leader.

Work zones will be established at the Site. These zones include clean/support zones, decontamination zones, and exclusion zones. Although the clean/support zones are anticipated to remain fixed, other zones will move about the Site as excavation work progresses.

4.0 HAZARD ASSESSMENT

The following represents potential hazards associated with this project.

4.1 Principal Contaminants (Known or Suspected)

Radioactive Contamination:

- Thorium: the entire thorium (Th-232) decay chain
- Uranium: the entire uranium (U-238) decay chain
- Actinium: the entire uranium (U-235) decay chain
- Radium: Ra-226 and Ra-228
- Radon: Rn-220 and Rn-222

The known total radium concentration present in the soil potentially exceeds 100 pCi/g for some locations within the project site. The following primary routes of entry to the body will be considered:

Route	Entry Made Via
Inhalation	Airborne dust containing heavy metal radionuclides and radon.
Ingestion	Airborne dust containing heavy metal radionuclides/contaminants. Improper or poor personal hygiene practices.
Eye and Skin	Direct contact with contaminants. Improper or poor personal hygiene practices. Airborne dust containing heavy metal/radionuclide contaminant. Cuts and abrasions.
Direct Exposure	Penetrating gamma radiation in air and soil. Exposure to X-rays.
Chemical Contamination	Polynuclear Aromatic Hydrocarbons (PAHs)

PAH contamination is present in the urban fill materials on site. These materials include coal cinders, ash and fire debris. Typical PAH concentrations are in the low part per million range.

The use of personal protective equipment, proper procedures and dust suppression activities will minimize any hazard to site personnel from either the elevated radioactivity or PAH contamination. Specific safety procedures will be covered in subsequent sections of this Site Safety Plan.

Route	Entry Made Via
Inhalation	Airborne dust
Ingestion	Airborne dust Improper or poor personal hygiene
Skin and Eye	Direct contact with contaminated soil Improper or poor personal hygiene Airborne dust Cuts and abrasions

4.2 Physical Hazards

Before field activities begin, the HSC will conduct a Site reconnaissance to identify any real or potential hazards created from Site activities. Physical hazards inherent to construction activities and power-operated equipment may exist.

4.2.1 Heat Stress

Field activities in hot weather create a potential for heat stress. The warning symptoms of heat stress include fatigue; loss of strength; reduced accuracy, comprehension and retention; and reduced alertness and mental capacity. To prevent heat stress, personnel shall receive adequate water supplies and electrolyte replacement fluids, and maintain scheduled work/rest periods.

The Field Team Leader or designee shall continuously visually monitor personnel for signs of heat stress. In addition, field personnel will be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress.

- Provision of adequate liquids to replace lost body fluids. Employees must replace body fluids lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst, 12 to 16 ounces every half-hour is recommended. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. Replacement fluids can be commercial mixes such as Gatorade.

- Establishment of a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

- Breaks should be taken in a cool and shaded rest area (77 degrees is best).

- Employees shall remove impermeable protective garments during rest periods.

- Employees shall not be assigned other tasks during rest periods.

- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

4.2.2 Cold Stress

Field activities are anticipated during cold weather during a period when temperatures average below freezing. The following guidelines will be followed.

Persons working outdoors in temperatures of 40 degrees and below may suffer from cold exposure. During prolonged outdoor periods with inadequate clothing, effects of cold exposure may even occur at temperatures well above freezing. Cold exposure may cause severe injury by freezing exposed body surfaces (frostbite) or result in profound generalized cooling, possibly causing death. Areas of the body which have high surface area-to-volume ratios such as fingers, toes and ears are the most susceptible to frostbite.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10° F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when external chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

Local injury resulting from cold is included in the generic term "frostbite". There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: Characterized by sudden blanching or whitening of skin.

- Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

- Deep frostbite: Tissues are cold, pale, and solid; extremely serious injury.

Prevention of frostbite is vital. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for symptoms of frostbite at every break. The onset is painless and gradual - you might not know you have been injured until it is too late.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas quickly in water 95° to 100°F. Give individual a warm drink - not coffee, tea, or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws; then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

4.2.3 Electrical Hazards

Overhead power lines, downed electrical wires, buried cables and improper use of electrical extension cords can pose a danger of shock or electrocution. All Site personnel should immediately report to the Field Team Leader any condition that could result in a potential electrical hazard.

The Field Team Leader will notify Site personnel during the safety meetings of the locations of known underground cables and utilities.

4.2.4 Noise Hazard

Operation of equipment may present a noise hazard to workers. Site personnel will utilize hearing protection when noise levels are determined to be in excess of 29 CFR 1910.95 requirements. Noise monitoring will be performed by the HSC as needed.

4.2.5 Overt Chemical Exposure

Typical response procedures include:

SKIN CONTACT:
Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eye wash will be provided on-site at the work zone and support zone as appropriate. If affected, eyes should be continuously flushed for a minimum of 15 minutes.

INHALATION:
Move to fresh air and transport to hospital. Decontaminate as other actions permit.

INGESTION:
Transport to emergency medical facility. Decontaminate as permitted by other requirements.

PUNCTURE WOUND OR LACERATIONS:
Transport to emergency medical facility. Field Team Leader will provide chemical safety information to medical personnel as requested. Decontaminate as permitted by other requirements.

4.2.6 Adverse Weather Conditions

In the event of adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of field workers. Some items to be considered before determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions.
- Limited visibility.
- Potential for electrical storms or high winds.

4.3 Medical Evaluation and Surveillance Program

All field project personnel shall receive a medical evaluation in accordance with 29 CFR 1910.120. Personnel who receive a medical evaluation will be notified by the medical contractor as to the outcome of their evaluation. This will be in the form of a confidential report addressed to the individual and will contain a breakdown of the clinical findings. In addition, it will indicate any areas of concern which would justify further medical consultation by the individual's personal physician. In the event that the areas of concern are of a severe nature, a follow-up notification will be made to the individual by the medical consultant to answer any questions the employee may have.

4.3.1 Dosimetry/Personnel Monitoring

Project personnel involved with remedial activities within an exclusion zone will participate in a dosimetry program administered by the HSC. (The dosimetry program shall comply with 32 IAC 340[1], i.e., dosimeters will be processed by a dosimetry processor accredited by the National Voluntary Laboratory Accreditation Program.) The HSC shall maintain records of all radiation exposures incurred by field personnel including all contractors. These records will be maintained in an up-to-date manner to comply with the requirements of 32 IAC 340.4010. The HSC shall review the results of personal exposure monitoring to determine compliance with exposure limit requirements.

4.3.2 Requirement for Dosimetry

Personal dosimetry is required for anyone who enters a radiologically controlled area in which he/she may receive in one calendar year a dose in excess of 10% of the limits in 32 IAC 340. Any person who works in a radiation area will be required to have a personal dosimeter. As a matter of policy, individuals will be required to use a dosimeter (either self-reading type, film badge, Thermoluminescence Detector (TLD) or Optically Stimulated Luminescence Dosimeter (OSL)) whenever they enter the Exclusion Zone.

4.3.3 Bioassay

Bioassay is the determination of the types and amounts of radioactive materials, which are inside the body. By analyzing the rate of deposition, the rate of excretion, and any other available information regarding placement in the body, internal exposures from radioactive materials can be estimated.

Procedures for bioassay will be consistent with the previous Lindsay Light Health and Safety Plan. Bioassays are not anticipated to be required for the excavation and removal activities proposed, based on levels documented as present.

The decision to use bioassay will be made by the Health and Safety Coordinator. In the event that a worker has an excessive intake or the potential to receive greater than 10% of the Annual Limit on Intake (ALI) , bioassay shall be ordered. Data from Lapel Air Samplers shall be used as a factor in determining

[1] The IDNS regulations are usually more restrictive than US Nuclear Regulatory Commission (NRC) regulations. However, if there is a conflict between IDNS and NRC regulations, the NRC regulations will be used to determine compliance.

whether or not bioassay is warranted. If workers are found to have been present in locations where airborne radioactivity concentrations are found to be greater than 30% of the Derived Air Concentration, bioassay will be considered.

4.3.4 Emergency Medical Treatment

Emergency first aid should be administered on-site as appropriate. The individual should be decontaminated if possible, depending on the severity of the injury, and transported to the nearest medical facility, if needed. Treatment of the injury is of primary concern and decontamination a secondary concern. Levels of radioactive contamination at the Site could be acutely hazardous if decontamination is not undertaken during an emergency situation. The Field Team Leader will complete the appropriate incident report, if warranted. See Section 4.4, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for onsite emergency first aid.

Provisions for emergency medical treatment shall be integrated with the following guidelines:

- At least one individual qualified to render first aid and Cardiopulmonary Resuscitation (CPR) will be assigned to each shift.
- At least one individual trained in radiation emergency response will be assigned to each shift
- Emergency first aid stations in the immediate work vicinity.
- Conspicuously posted phone numbers and procedures for contacting ambulance services, fire department, police, and medical facilities.
- Maps and directions to medical facilities.
- Conspicuously posted evacuation routes and gathering area locations shall be posted around the Site.

4.4 Accident and Incident Reporting

All accidents, injuries, or incidents will be reported to the HSC. This accident/incident will be reported as soon as possible to the employee's supervisor. An Accident/Incident Form will be completed by the Field Team Leader, and a copy will be forwarded to the AECOM Project Manager. A copy of the form is shown as Figure 4.1.

FIGURE 4.1
ACCIDENT/EXPOSURE INVESTIGATION REPORT

COMPANY			DATE
INVESTIGATION TEAM			
EMPLOYEE'S NAME & ID			
SEX	AGE	JOB DESCRIPTION	
DEPARTMENT & LOCATION			
ACCIDENT DATE & TIME			
DATE & TIME ACCIDENT REPORTED TO SUPERVISOR			
NATURE OF INCIDENT			
NATURE OF INJURY			
REFERRED TO MEDICAL FACILITY/DOCTOR ☐ YES ☐ NO			
EMPLOYEE RETURNED TO WORK ☐ YES DATE/TIME _____ ☐ NO			
☐ INJURED EMPLOYEE INTERVIEW/STATEMENT - ATTACHED			
WITNESSES			
☐ WITNESSES INTERVIEWS/STATEMENTS ATTACHED			
☐ PHOTOGRAPHS OF SITE - ATTACHED			
☐ DIAGRAMS OF SITE - ATTACHED			
EQUIPMENT RECORDS - ATTACHED - REVIEWED	☐ YES	☐ NO	
ACCIDENT/EXPOSURE INCIDENT DESCRIPTION			

FIGURE 4.1
ACCIDENT/EXPOSURE INVESTIGATION REPORT

ACCIDENT DESCRIPTION		
DATE & TIME	LOCATION	
EMPLOYEES INVOLVED		
PREVENTIVE ACTION RECOMMENDATIONS		
CORRECTIVE ACTIONS COMPLETED	MANAGER RESPONSIBLE	DATE COMPLETED
EMPLOYEE LOST TIME - TEMPORARY HELP - CLEANUP - REPAIR - DISCUSSION		
ACCIDENT COST ANALYSIS	INVESTIGATION	COMPLIANCE	TOTAL COST
MEDICAL			
PRODUCTION LOSS			
REPORT PREPARED BY	DATE COMPLETED		
SAFETY COMMITTEE REVIEW	☐ YES	☐ NO	
CORRECTIVE ACTION	DATE STARTED		
SAFETY COMMUNICATION NOTICE PREPARED	DATE		
SAFETY DIRECTOR SIGNATURE			

FIGURE 4.1
ACCIDENT/EXPOSURE INVESTIGATION REPORT

ACCIDENT DESCRIPTION	
DATE & TIME	LOCATION
EMPLOYEES INVOLVED	
EMPLOYEE INTERVIEW/STATEMENT - INJURED EMPLOYEE - WITNESS	
EMPLOYEE NAME	
INTERVIEWED BY	

ACCIDENT DIAGRAM/PHOTOGRAPHS

5.0 TRAINING

All Site personnel potentially in contact with impacted soil or who are involved in the excavation and/or loading for transport of radiologically-impacted soil shall be trained and certified in accordance with 29 CFR 1910.120.

5.1 Project- and Site-Specific Training

Prior to project start-up, all assigned personnel shall receive an initial project- and site-specific training session. This training shall include, but not be limited to, the following areas:

- Review of the Health and Safety Plan;
- Review of general radiation principles and compounds;
- Review of applicable radiological chemical and physical hazards;
- PPE levels to be used by Site personnel;
- Site security control;
- Emergency response and evacuation procedures;
- Project communication;
- Required decontamination procedures;
- Prohibited on-site activities;
- Instructions to workers in accordance with 10 CFR 19.12; and
- U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies (Females).

5.2 Visitor Orientation

All non-essential personnel and visitors who plan to enter the exclusion zone will be briefed on the HASP requirements and 10 CFR 19.12 requirements prior to entry with a trained Site escort. In addition, female visitors will be instructed regarding U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies.

5.3 Safety Tailgate Meetings

Before the start of the work week, on Monday morning, the Field Team Leader will assemble the Site personnel for a brief safety meeting. Additional meetings will be conducted throughout the week, as needed, to address safety concerns and precautions. The purpose of these meetings will be to discuss project status, problem areas, conditions, safety concerns, PPE levels and to reiterate HASP requirements. The Field Team Leader will complete a Safety Meeting Report (Figure 5.1) to indicate the contents of the meeting and the attendees.

5.4 First Aid

At least one (1) individual, trained and qualified to administer first aid and CPR in accordance with American Red Cross requirements, who is also trained in radiological response, will be present at the Site.

5.5 Safe Work Permit

Site workers in special work conditions such as confined space, hot work, trenching, or other physical hazards, must be skilled at such work and trained to recognize these as special work conditions. Confined space is defined by OSHA 1910.146. Section 13 of this HASP contains further information on the confined space program to be followed.

Figure 5.2 shows the Safe Work Permit to be completed by the HSC and signed by workers for special work conditions.

Figure 5.3 show the issues which will be addressed in the event soil is encountered which exhibits low level contamination. The potential low level contamination includes the presence of possible residual petroleum products from an existing or former underground storage tank or other source of fuel or polynuclear aromatics hydrocarbons (PAHs) contamination, such as tar, cinders, or coal ash.

FIGURE 5.1
SAFETY MEETING REPORT (Page 1 of 2)

DATE		DURATION OF MEETING	
		FROM: ☐ A.M. ☐ P.M.	TO: ☐ A.M. ☐ P.M.
NUMBER PRESENT	NUMBER ABSENT	MEETING CONDUCTED BY	DID MEETING INCLUDE REQUIRED TRAINING? ☐ YES (DESCRIBE BELOW) ☐ NO

HEALTH AND SAFETY COORDINATOR'S PRESENTATION	DISCUSSION OF SAFE/UNSAFE WORK PRACTICES, MATERIALS, PRECAUTIONS, HAZARDS, EQUIPMENT FAMILIARIZATION, ETC.
SITE WORKER FEEDBACK	COMMENTS, QUESTIONS, COMPLAINTS, ETC.
HEALTH AND SAFETY COORDINATOR'S CORRECTIVE ACTION PLAN	KNOWN PLANS FOR CORRECTION, PARTS ON ORDER, ITEMS TO BE DISCUSSED WITH DEPART. HEAD, AND CORRECTION OF ITEMS PREVIOUSLY SUBMITTED
PROJECT MANAGER'S COMMENTS	RESOLUTION OF QUESTIONS, ITEMS OR ISSUES RAISED IN MEETING OR WITH SUPERVISOR

HEALTH AND SAFETY COORDINATOR	PROJECT MANAGER
FIELD TEAM LEADER	HAVE SITE WORKERS ATTENDING SIGN ON REVERSE SIDE. FORWARD A COPY TO THE PROJECT COORDINATOR

FIGURE 5.1
SAFETY MEETING REPORT (Page 2 OF 2)

TO BE SIGNED BY ALL SITE WORKERS ATTENDING THE MEETING			
I HAVE RECEIVED AND UNDERSTAND THE INFORMATION AND/OR TRAINING INDICATED ON THE REVERSE SIDE.			
SIGNATURE	DATE	SIGNATURE	DATE

LIST ALL SITE WORKERS ABSENT FROM THE MEETING	

FIGURE 5.2
SAFE WORK PERMIT (Page 1 of 2)

COMPLETED PERMIT MUST BE POSTED AT THE ENTRY OR WORK SITE.

ISSUED BY	DATE	TIME (FROM) ☐ A.M. ☐ P.M.	TIME (TO) ☐ A.M. ☐ P.M.
ACCEPTED BY		RESPONSIBILITY TRANSFERRED TO (NAME)	
LIST ALL WORKS (ON BACK) OR ATTACH ROSTER			

SECTION 1 — GENERAL AREA WORK PERMIT

1. WORK LIMITED TO THE FOLLOWING: (DESCRIPTION AND AREA/EQUIPMENT)

2. SAFETY EQUIPMENT (OTHER THAN AREA REQUIREMENTS) ☐ NONE

☐ RAIN SUIT ☐ GLOVES ☐ FACE SHIELD ☐ GROUND FAULT CIRCUIT INT. ☐ AIR PACK (SCBA) ☐ FIRE RESISTANT CLOTHING
☐ CHEMICAL SUIT ☐ HEARING PROTECTION ☐ HOOD ☐ BARRICADES/WARNING SIGN ☐ SUPPLIED AIR ☐ LONG SLEEVES
☐ RUBBER BOOTS ☐ CHEMICAL GOGGLES ☐ FALL RESTRAINT DEVICE ☐ COMMUNICATIONS EQPT (EST) ☐ RESPIRATOR ☐ OTHER

3. THE PERSON RECEIVING THE PERMIT VERIFIES THAT ALL WORKERS:

A. HAVE BEEN THROUGH THE SAFETY ORIENTATION	☐ YES	E. KNOW THE LOCATION OF THE PHONE OR INTERCOM	☐ YES
B. UNDERSTAND APPLICABLE HAZCOM AND RADIATION REQUIREMENTS	☐ YES	F. KNOW THE PROCEDURES FOR SAFE JOB COMPLETION	☐ YES
C. HAVE DISCUSSED HAZARDS OF THE JOB AND AREA	☐ YES	G. HAVE INSPECTED ALL TOOLS/EQUIPMENT	☐ YES
D. KNOW THE LOCATION/USE OF SAFETY EQUIPMENT	☐ YES	H. UNDERSTAND THE CLEAN UP REQUIREMENTS	☐ YES

PERMIT RECEIVER INITIALS _____

4. POTENTIALLY AFFECTED AREA PERSONNEL AND WORKERS NOTIFIED OF WORK TO BE DONE ☐ YES ☐ N/A

5. THE FOLLOWING RESPONSIBILITIES HAVE BEEN COMMUNICATED TO THE PERSON RECEIVING THIS PERMIT:

☐ CONDITIONS FOR WORK STOPPAGE	☐ PERFORMING THE WORK SAFELY	☐ COMPLETION OF SECTION 6 AND PERMIT RETURN
☐ CREW ACCOUNTABILITY	☐ REPORTING CHANGES THAT AFFECT JOB SAFETY	

SECTION 2 — AIR TESTS

PRIOR TO ENTRY OR HOT WORK ☐ DOES NOT APPLY

TEST IN ORDER INDICATED

1. OXYGEN METER TEST PERFORMED	☐ YES ☐ N/A	READING	$\%O_2$	RANGE 19.5-23.5% O_2	TESTED BY	LOCATION OF TEST	TIME ☐ AM ☐ PM
2. COMBUSTIBLE GASES AND VAPORS TEST	☐ YES ☐ N/A	READING	%LEL	MAXIMUM 10% LEL	TESTED BY	LOCATION OF TEST	TIME ☐ AM ☐ PM
3. TESTS FOR TOXICS	☐ YES ☐ N/A	READING	☐ PPM ☐ MA/M³	PEL/TLV ☐ PPM ☐ MA/M³	TESTED BY	LOCATION OF TEST	TIME ☐ AM ☐ PM

SECTION 3 — HOT WORK

☐ DOES NOT APPLY

	YES	N/A		YES	N/A
1. FIRE EXTINGUISHER (TYPE) _____ IS IT FULL?			8. GROUND LEAD ATTACHED TO WORK		
2. SURVEY AREA FOR COMBUSTIONS AND OPENINGS, HOSES, TRENCHES, ETC.			9. PREVENTION OF HEAT EXPOSURE TO GASKET, SEALS, LINERS		
3. COMBUSTIBLE MATERIALS REMOVED OR PROTECTED			10. OTHER WORK IN AREA WHICH SHOULD BE STOPPED		
4. HEAT/SPARK CONTROL - TARPS, COVERS, WATER, ETC.			11. MATERIAL PRESENT WHICH EMITS VAPOR WHEN HEATED		
5. PRECAUTION TAKEN FOR HIDDEN COMBUSTIBLES			12. RADIANT HEAT TRANSFER CONSIDERED		
6. PURGE GAS USED. TYPE			13. EQUIPMENT OPERATING OR CONTAINS ORIGINAL CONTENTS		
7. ADJACENT AREAS SAFE/SEWERS PROTECTED			14. DUCTS OR CONVEYORS PLUGGES OR PROTECTED		

SECTION 4 — CONFINED SPACE

☐ DOES NOT APPLY

	YES	NO	N/A		YES	NO	N/A
1. CONFINED SPACE ENTRY REQUIRED?				5. HAVE AUTHORIZED ENTRANTS SIGNED OPPOSITE SIDE OF THIS FORM?			
2. SPACE TO BE ENTERED				6. HAVE DESIGNATED ATTENDANTS SIGNED OPPOSITE SIDE OF THIS FORM?			
3. PURPOSE OF ENTRY				7. HAVE ALL NECESSARY HAZARD CONTROL MEASURES BEEN TAKEN?			
4. IS SPACE A PERMIT-ENTRY SPACE? IF YES, COMPLETE OPPOSITE COLUMN				8. HAS ALL REQUIRED EQUIPMENT BEEN PROVIDED?			

SECTION 5 — TRENCHING/EXCAVATION

☐ DOES NOT APPLY

	YES	NO	N/A		YES	NO	N/A
1. HAS THE AREA BEEN INSPECTED FOR UNDERGROUND POWER LINES OR PRODUCT LINES?				4. HAVE PRECAUTIONS BEEN TAKEN IF THE TRENCH/EXCAVATION DEVELOPS INTO A CONFINED SPACE?			
2. DOES THE TRENCH REQUIRE SHORING/BRACING/SUPPORT?				5. HAVE OVERHEAD POWER/PRODUCT LINES BEEN REMOVED OR IDENTIFIED?			
3. HAS THE SOIL BEEN EVALUATED FOR STABILITY?				6. WILL LEAKING WATER OR RAIN WATER AFFECT THE STABILITY OF THE TRENCH/EXCAVATION?			

SAFE WORK PERMIT (Page 2 of 2)

SECTION 6			YES	NO	N/A		YES	NO	N/A
QUESTIONS TO BE COMPLETED ON PERMIT EXPIRATION OR JOB COMPLETION.		1. HAS THE JOB BEEN COMPLETED?				5. HAVE SAFETY DEVICES BEEN REINSTALLED?			
WORKER CLOSEOUT SIGNATURE		2. HAS THE AREA BEEN CLEANED OF WORK MATERIAL?				6. HAS HOT WORK AREA BEEN SURVEYED FOR SMOLDERING MATERIALS?			
TIME	☐ AM ☐ PM	3. HAVE MANAGEMENT PERSONNEL BEEN INFORMED JOB IS DONE?				7. SPECIAL PRECAUTIONS, CONCERNS OR REMARKS			
		4. HAVE ALL LOCKS AND/OR TAGS BEEN REMOVED?				COMMENTS:			

OBSERVERS, WATCHERS, RESCUERS

I HAVE BEEN INSTRUCTED AS A CONFINED SPACE ATTENDANT, SAFETY WATCHER OR RESCUER AND UNDERSTAND MY DUTIES.

SIGNATURE	DATE	SIGNATURE	DATE

PERSONS AUTHORIZED TO PERFORM WORK AND/OR TO ENTER CONFINED SPACE

I HAVE BEEN INSTRUCTED IN AND AM AWARE OF THE POSSIBLE HAZARDS AND CONDITIONS I MAY ENCOUNTER IN THIS ENTRY WORK

SIGNATURE	TIME		DATE	SIGNATURE	TIME		DATE
	IN	OUT			IN	OUT	

COMMENTS

AUDIT PURPOSE ONLY

CORRECTIVE ACTIONS

COMPLETED BY

NAME	TITLE	DATE

FIGURE 5.3
SITE SAFETY PLAN
LOW CONTAMINATION OF FUEL,
CHLORINATED PESTICIDES AND PNAs IN SOILS

SUMMARY INFORMATION

DATE: _____ UPDATE: _____

PROJECT NAME: _____ PROJECT NO: _____

LOCATION: _____

SITE CONTACT AND PHONE NUMBER: _____

TYPE OF FACILITY: (active or inactive - describe previous use, previous agency action, soil type, topography, surrounding community)

PLAN PREPARED BY: _____

SITE SAFETY OFFICER: _____ CPR/FIRST AID TRAINED STAFF: _____

REVIEWED BY: _____ DATE: _____

WORK SCOPE/CONSTRUCTION/INVESTIGATION
Task 1 _____
Task 2 _____
Task 3 _____

PROPOSED START DATE: _____

UNUSUAL FEATURES/SITE SECURITY (include site map): _____

UTILITIES: ☐ Marked ☐ Scheduled Meet Date _____ Time _____

ANALYTICAL DATA (to be summarized below or attached, if available)

_____

_____

CONFINED SPACE: ☐ Yes ☐ No (If yes, describe and address permitting and entry procedures in an attachment.) _____

_____

AIR MONITORING:
Monitoring equipment: HNu meter with 10.2 eV lamp or _____
Action level = 15 PID units in breathing zone for Level C upgrade. Stop work = 50 PID units in breathing zone.
☐ O_2 meter, ☐ FID, ☐ Detector tubes, ☐ L.E.L. meter, ☐ Other _____

Other action levels: _____

PERSONAL PROTECTION: Level of Protection: ☐ A ☐ B ☐ C ☐ D
Special Requirements_____

COMMUNICATION EQUIPMENT: (Mobile Phone or other phone location and number, etc.)

_____

Scheduled Safety Meetings Interval: (daily, weekly, as needed)

SPECIAL SITE EMERGENCY COMMUNICATION PROCEDURES: (Evacuation signals, routes, spill containment)

HEAT/COLD STRESS CONTROLS:

SPECIAL PHYSICAL HAZARD CONTROLS: Barricades for work area, reflective vests, other, etc.

_____

LOCAL EMERGENCY RESOURCES AND TELEPHONE NUMBERS
Emergency Eye Wash/Shower Location:
Fire Extinguisher: _____
Police: _____
Fire Department: _____
Poison Control: _____
HOSPITAL: _____
Address: _____
Telephone: _____
Directions (supply map): _____

_____

EMERGENCY CONTACTS (name and phone number)
1. Construction Manager Contact: _____
2. Owner Contact: _____
3. Contractor Contact: _____
4. Subcontractor Contact: _____
5. Subcontractor Contact: _____
6. _____
7. _____

PRE-ENTRY SAFETY BRIEFING
I have received and read the _____ Low Contamination Health and Safety Plan. I understand the plan and had the opportunity to ask questions. I understand the information and instructions in the plan. I understand that medicine can complicate the effects from exposure to toxic chemicals. If I am taking any prescription or over the counter medicine or have a current medical condition which may increase my risks, I will advise my supervisor or Site Safety Officer.

Signature	Responsibility	Date

6.0 COMMUNICATIONS

6.1 General Communications

The Field Team Leader will have available at the Site the means for telephone communications, or an equivalent means of communication, for summoning emergency assistance from the fire/ambulance and police departments in the event they are required. The telephone will also act as a direct link to technical personnel for information pertaining to all phases of the project.

6.2 Radio/Telephones

Short-range walkie-talkies or cellular telephones will be made available to designated personnel working at the Site.

6.3 Emergency Warning

In the event of an emergency condition, the Field Team Leader will notify project personnel verbally if all are within immediate hearing and via a bullhorn if the Site area is large. The Field Team Leader will also notify visitors present within the area. Site personnel will immediately proceed to a pre-designated assembly area as designated by the Field Team Leader during the daily safety meeting. Personnel will remain in the designated area until further instructions are received by the Field Team Leader.

All communication equipment will be tested at the beginning of each day to verify operational integrity.

6.4 Hand Signals

Hand signals will be used by field teams in conjunction with the buddy system. Hand signals shall be familiar to the entire field team before operations commence and should be reviewed during site-specific training.

Signal	Meaning
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; negative

6.5 Site Security

Only authorized personnel will be permitted on the Site in accordance with the requirements of this HASP. Visitors and other non-essential personnel may enter the work area only upon authorization by the Field Team Leader. This restricted access will ensure that the Field Team Leader can communicate with each person authorized to enter the work area.

7.0 PERSONNEL EXPOSURE AND AIR QUALITY MONITORING

7.1 Air Quality (Dust)

Due to the nature of the principal contaminants associated with the project (radiation and PAHs), dust suppression will be important as a means of minimizing exposure levels and off-site migration of contaminants. A key control measure to minimize exposure levels and off-site migration of contaminants will be a policy of "no visible dust". The Field Team Leader will routinely monitor the project area. Acceptable dust levels (controlling all visible dust) will result in airborne dust levels of less than 1 mg/m^3. The OSHA nuisance dust standard of 15 mg/m^3 is not acceptable at this site, because of contaminants in the dust.

7.2 Airborne Radioactivity Monitoring

Monitoring for airborne radioactivity exposure is as important as monitoring for external radiation exposure. Monitoring for airborne radioactivity exposure requires the following elements:

- Air sampling for radioactive particulates,
- Recordkeeping regarding personnel work locations and time in location,
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity areas,
- Counting and analyzing air sample filters,
- Calculating air concentrations of radioactive material, and
- Comparing air concentrations to applicable air quality criteria

By closely monitoring these elements, a continuous record of personnel exposure to airborne radioactivity is maintained.

Lapel samplers worn for personal air monitoring shall be utilized for airborne radioactivity monitoring any time a worker enters a radiological exclusion zone. The filters from the lapel samplers shall be analyzed the following day after use for comparison purposes to assess the need for procedural changes. It is expected that naturally occurring radon and thorium daughters will interfere with analyses. Additional evaluation of samples shall be performed when determined necessary based upon elevated results. If sample analysis shows concentrations greater than background levels a follow-up analysis shall be performed. The follow-up analysis shall be performed after four days to allow for the decay of the thoron daughter Pb-212 (10.6 hour half life). The "four day count" should be free from radon daughter interference and will serve as the official measurement of Th-Alpha.

High volume air samplers shall be utilized so that effluent air quality can be gathered on a daily basis. High volume air sampling allows for much shorter collection times than low volume sampling and has equivalent dust loading for needed collection durations. Both high and low volume air samplings require a sufficient volume of air to be collected in order for the Minimum Detectable Activity (MDA) to be below the most restrictive air effluent guidelines. Daily analysis of samples will allow for necessary procedural changes to be made and alert health and safety staff to potential problems on a continuous basis, rather than once per week.

Time decay of interfering nuclides generally refers to radon-222 decay and daughters but may also include thoron decay. The specific times for decay of samples are best addressed in procedures rather than in the health and safety plan.

After filters have been collected and decayed overnight, there will be a morning count of the filter that will serve to identify high gross counts for the previous day. This will alert health and safety staff of a potential problem which they can investigate more promptly. The count, after 4 days decay, will serve to be the official measurement of Th-Alpha.

7.3 Internal Monitoring

Internal monitoring to determine intakes of radioactive material will be performed as needed based upon the results of the air sampling program. Bioassay methods to be considered should include in-vivo, as well as in-vitro, assessments. Routine bioassay of workers is not anticipated based upon the low concentrations of radioactivity in soils to be excavated.

7.4 External Radiation Monitoring

External radiation monitoring of workers will be performed using film badges or thermoluminescent dosimeters. Dosimetry will be provided and processed by a service holding National Voluntary Laboratory Accreditation Program (NVLAP) certification. Pocket dosimeters may also be utilized for visitors and other infrequent personnel requiring access to the Site.

7.5 Radiological Surveys

Radiological surveys will be performed to ensure that radiation levels and contamination levels are within applicable guidelines for workers and the general public. Radiation surveys will be performed using the following instrumentation:

- Ludlum Model 2221 Portable Scaler/Ratemeter with 2"x2" NaI probe (or equivalent). This instrument will be used to conduct surface soil scans. Instrument specific action levels shall be used to determine approximate radiological soil concentrations. Any areas where the count rate is greater than the determined action level shall be considered exclusion zones and marked appropriately.

- Ludlum Model 3 Survey Meter with pancake G-M probe (or equivalent). This instrument will be used to conduct surveillance surveys of both personnel and equipment leaving exclusion zones. The action level for both equipment and personnel surveys is any count rate that exceeds background level. Decontamination procedures detailed in section 9.0 of the HSP will be used when contamination is located.

- Ludlum Model 3 Survey Meter with 1"x1" NaI probe "MicroR meter" (or equivalent) and Eberline Model RO-2 Ion Chamber (or equivalent). These instruments will be used periodically to ensure that dose rates in work areas as well as the Site perimeter are below prescribed levels. The action levels for both on and off site are detailed in Section 7.8 of the HSP in Table 7.1

Airborne radioactivity measurements will be performed as described in the Air Monitoring Procedure (Appendix E to the Removal Action Work Plan).

7.6 Contamination Monitoring

Samples shall be obtained periodically in work areas to ensure that radioactivity is present at acceptable levels and is prevented from leaving the Site. Decontamination of elevated areas will be performed to maintain contamination at levels that are ALARA.

Before leaving the exclusion zone, Site personnel shall be checked through use of a hand-held frisker to ensure that contamination is not present on skin or clothes. The frisker will be a Ludlum Model 3 survey meter with a pancake G-M probe (or equivalent). The trigger level for frisking will be any detectable counts above background in accordance with ALARA practices. The Field Team Leader will be immediately informed regarding any contamination on individuals and will initiate appropriate decontamination techniques. Proper disposition of contaminated personal effects and clothing also will be the responsibility of the Field Team Leader.

7.7 Total Organic Vapor Monitoring

In addition to the radiological contaminants, there is a very slight potential of encountering organic vapors. Thus, no routine screening for organic vapors will be conducted during the removal action. However, if organic odors are encountered during the field work screening for total organic vapors will be conducted with a photoionization detector (PID), or similar type equipment, on a daily basis. The screening will evaluate ambient photoionization volatile organic vapors and some semivolatile organic vapors.

Total organic vapors in ambient air will be obtained periodically with a PID during daily field activities. The PID provides real-time readings of exposure to volatile organics and some semi-volatile organics. Measurements will be made daily, prior to activities, to determine background levels. Monitoring measurements will be taken when:

- operations change,
- work moves to a different portion of the Site, and
- personnel observe contaminated materials.

These screening operations will be used to identify conditions requiring an upgrade to full-face respirators as described in Section 7.8.2.

7.8 Action Levels

7.8.1 Radiological Action Levels

Radiological action levels for on-site workers will be determined by performing surveillance surveys as well as airborne particulate monitoring for the presence of radioactivity. Properly trained Health Physics Technicians will perform radiological monitoring. The radioactive contamination on the Site is particulate and insoluble in water. Therefore, there will be no fixed contamination on the workers. Action levels as determined by radioactive monitoring can be found in Table 7.1.

To avoid the need for upgrade of personal protection equipment due to airborne contamination, engineering controls such as the use of water to minimize dust levels will be implemented as necessary during excavation and restoration activities.

7.8.2 Organic Vapors Action Levels

AECOM is taking a conservative approach to organic vapor monitoring at the Site. A PID will be used to periodically monitor for organic vapors or when odors indicated the possibility of organic contamination. Operations will be discontinued if the PID reads 5 ppm or greater above background and the area will be evacuated. The Site Health and Safety Officer will retest the area wearing a full-face respirator. Operations will not resume until the PID reads less than 5 ppm, and remains below 5 ppm.

TABLE 7-1
ACTION LEVELS AS DETERMINED BY RADIOACTIVITY

Note:

Personnel shall not be exposed to airborne radioactivity such that their weekly intake exceeds 12 Derived Air Concentration (DAC)-hours without prior approval of the Field Team Leader or designee.

Level of protection may be increased to Level C (full-face air purifying respirator) when airborne monitoring indicates that contamination levels have reached 30% of the DAC. All assessments shall incorporate ALARA principles. Engineering controls shall be used prior to assignment of respiratory protective equipment.

Signs shall be posted at entrances to areas where airborne radioactivity levels exceed, or have the potential to exceed, 25% of the DAC.

The most restrictive DAC of the nuclides which may be present onsite is Th-232. The DAC for Th-232 Class W is $5x10^{-13}$ uCi/ml. The air effluent limit is $4x10^{-15}$ uCi/ml. Engineering controls will be utilized so that no visible dust is present and airborne radionuclide concentrations will be kept ALARA.

Radiation Type	Action Level	Level of Respiratory Protection/Action
a. Contamination on smear samples of equipment	20 dpm/100 cm^2 gross alpha	Decontamination required prior to release for unrestricted use.
b. Contamination surveys of personnel or equipment	Count rate greater than background levels	Decontamination required prior to leaving exclusion zone.
c. Airborne Radioactivity	30% DAC[c]	Consider Level C (full-face APR) based upon ALARA evaluation. Ensure proper posting. Consider internal monitoring
d. Ambient Gamma (work areas)	5 mrem/hr[d]	Consider procedures for shielding of soils. Ensure proper posting.
e. Ambient Gamma (off-site areas)	2 mrem/hr[e]	Implement immediate controls to reduce dose equivalent rate.

Notes

(c) Potential Airborne Radioactivity Area as defined in 10 CFR 20. Workers with 1000 DAC-hours per year to date must wear modified Level C (full-face APR) until the end of the calendar year.

(d) The ambient gamma dose equivalent rate action level of 5 mrem/hr stems, from the 10 CFR 20 radiation area definition. If the ambient gamma dose equivalent rate reaches 2 mrem/hr, one or more of the following actions will be implemented: The source may be shielded; the working distance from the source may be increased; or the worker's exposure time may be limited.

(e) The ambient gamma action level for off-site is based upon the 10 CFR 20 requirements to maintain dose equivalent rates in unrestricted areas such that they do not exceed 0.002 rem in any one hour.

8.0 PERSONAL PROTECTIVE EQUIPMENT

It is anticipated that most excavation activities in designated exclusion zones can be conducted in Level D personal protective equipment (PPE), with a contingency upgrade to Level C, based on the action levels listed in Section 7. Level C will be used when required by Special Work Permits, or when directed by the Field Team Leader.

Level D personal protective clothing and equipment for excavation activities includes:

- Coveralls, disposable or washable through a contaminated clothing vendor. Coveralls are to be removed at the boundary of the exclusion zone.
- Hard hat
- Steel toed boots and chemically resistant booties (exclusion zone)
- Cotton or leather gloves (no soil contact); Nitrile gloves (Edmont 37-15 or equivalent) 0.40 mm thickness to be used if hand contact with soils is probable.
- Safety glasses
- Dust mask (optional)

Level C protective clothing and equipment includes:

- Full-face air-purifying respirator (NIOSH/MSHA approved) fitted with radionuclides/HEPA cartridges and/or organic vapor cartridges, depending on which action levels are exceeded (see Section 7 of this HASP)
- Coveralls
- Tyvek coveralls - required in areas when splashing by contaminated soils or water is a possibility
- Nitrile gloves (Edmond 37-15 or equivalent) 0.40 mm thickness
- Disposable latex inner gloves - required in areas when splashing by contaminated soils or water is a possibility
- Nitrile outer gloves (taped) - required in areas when splashing by contaminated soils or water is a possibility
- Steel toe boots with outer chemically resistant booties (taped)
- Hard hat

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 7 of this HASP.

9.0 CONTAMINATION REDUCTION PROCEDURES

9.1 Equipment

Portable equipment will be decontaminated with soap and water and rinsed with tap water. Heavy equipment will be steam-cleaned with water and, if necessary, a detergent solution.

9.2 Personnel

If levels of radioactivity show that individuals can remove coveralls and other personal protective clothing and equipment before leaving the exclusion zone and, thus complete decontamination, the individuals may leave the exclusion zone. If, however, levels of radioactivity show that individuals cannot achieve decontamination by the removal of coveralls and showering is required, they will be dressed in clean coveralls, boots and gloves and be transported to Northwestern Memorial Hospital to complete decontamination.

If substantial skin contamination occurs on an individual working with radioactive materials, the following specific procedures should be followed to prevent fixation of the material in the skin or absorption of the radioactivity through the skin.

Immediate Action: Notify the HSC or Field Team Leader, who will supervise the decontamination. If contamination is spotty, the HSC or Field Team Leader will supervise the cleaning of the individual spots with swabs, soap, or water. If the contamination is general, the HSC or Field Team Leader may recommend washing the area gently in warm or cool water (not hot) using hand soap (not detergent) for one minute. Rinse, dry, and monitor for radioactivity. This soap wash step may be repeated three times.

Evaluation: If the above procedure fails to remove all the skin contamination, the treatment should cease. An evaluation of the skin contamination should be performed by the HSC or Field Team Leader including an estimate of the dose commitment to the skin, and the quantity and identity of the nuclides contaminating the skin If additional decontamination steps are necessary, they are performed and documented by the HSC. The guidelines for Personnel Decontamination in the Radiological Health Handbook, HEW 1970, beginning on page 194, can be used as applicable. **CAUTION**: Do not use chemicals for personnel decontamination until full evaluation of the contamination is made by the HSC or Field Team Leader.

9.3 Contamination Prevention

Work practices that minimize the spread of contamination will reduce worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

- Knowing the limitations of all personal protective equipment being used;
- Avoiding walking through areas of obvious or known contamination;
- Refraining from handling or touching contaminated materials directly. Do not sit or lean on potentially contaminated surfaces;
- Ensuring personal protective equipment has no cuts or tears prior to donning;
- Fastening all closures on suits, covering with tape if necessary;
- Taking steps to protect against any skin injuries;
- Staying upwind of airborne contaminants; and
- When working in contaminated areas, refraining from eating, chewing gum, smoking, or engaging in any activity from which contaminated materials may be ingested

9.4 Disposal Procedures

All discarded materials, waste materials, or other field equipment and supplies should be handled in such a way as to preclude the spread of contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated waste materials (i.e., clothing, gloves) shall be monitored and segregated in accordance with monitoring results into either radioactive or non-radioactive waste. Appropriate labels shall be affixed to all containers of radioactive materials.

10.0 GENERAL WORK PRECAUTIONS

10.1 General Work Precautions

The following general work precautions apply to all Site personnel.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.
- Hands and face must be thoroughly washed upon leaving the work area. Wash water will be provided at the Site for this purpose.
- Whenever levels of radioactivity warrant, the entire body should be thoroughly washed, as soon as possible, after the protective coveralls and other clothing are removed as part of the decontamination process.
- No facial hair that interferes with a satisfactory fit of the mask-to-face-seal is allowed on personnel required to wear respirators.
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel on ground, lean, sit, or place equipment on drums, containers, or the ground.
- Medicine, drugs and alcohol may interfere with or impair judgment and reaction times. Therefore, usage of prescribed drugs must be specifically approved by a qualified physician and made known to the Field Team Leader prior to an individuals' presence on the work-site. Alcoholic beverage intake is strictly prohibited at the Site and prior to work.
- All personnel must be familiar with standard operating procedures and any additional instructions and information contained in the HASP.
- All personnel must adhere to the requirements of the HASP.
- Contact lenses are not permitted when respiratory protection is required or where the possibility of a splash exists.
- Personnel must be cognizant of symptoms for radiological exposure onsite, for heat stress and cold stress, and knowledgeable regarding emergency measures contained in the Emergency Contingency Plan.
- Respirators shall be cleaned and disinfected after each day's use or more often, if necessary.
- Prior to donning, respirators shall be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.
- Each employee shall be familiar with the project's Respiratory Protection Program.

10.2 Operational Precautions

The following operational precautions must be observed at all times.

- All Site personnel shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- All required respiratory protective devices and clothing shall be worn by all personnel going into areas designated for wearing protective equipment.
- All Site personnel shall use the buddy system when wearing respiratory protective equipment. At a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries.
- During continual operations, on-site workers act as a safety backup to each other. Off-site personnel provide emergency assistance.
- Personnel should practice any unfamiliar operations prior to undertaking the actual procedure.
- Entrance and exit locations shall be designated and emergency escape routes delineated. Warning signals for Site evacuation must be established.
- Personnel and equipment in the contaminated. work area should be minimized, consistent with effective Site operations.

- Work areas for various operational activities shall be established.
- Procedures for leaving a contaminated area shall be planned and implemented prior to going on-site. Work areas and decontamination procedures shall be established based on expected Site conditions.
- Frequent and regular inspection of Site operations will be conducted to ensure compliance with the HASP. If any changes in operation occur, the HASP will be modified to reflect those changes.

11.0 SANITARY FACILITIES

11.1 Potable Water

a. An adequate supply of potable drinking water shall be maintained at all times immediately outside the Site. Drinking water shall meet all federal, state and local health requirements.
b. Drinking water shall be supplied to project personnel via approved dispensing sources.
c. Paper cups shall be permitted for the drinking of potable water supplies.
d. Drinking water dispensers shall be clearly marked and shall, in no way, have the potential for contamination from non-potable supplies.
e. Site personnel must be fully decontaminated prior to approaching the drinking water supply.

11.2 Toilet Facilities

a. Adequate toilet facilities shall be provided at the Site.
b. These facilities shall be in the form of portable chemical toilets.
c. Routine servicing and cleaning of the toilets should be established with the selected contractor and shall be in accordance with federal, state, and local health regulations.
d. Site, personnel must be fully decontaminated prior to approaching the toilet facilities.

11.3 Washing Areas

a. Adequate washing areas shall be provided for personal use within the work area.
b. Washing areas shall be maintained in a sanitary condition and will be provided with adequate supplies of soap, towels for drying, and covered waste receptacles.
c. Washing areas shall be maintained and sanitized daily.
d. No eating, drinking or smoking shall be permitted in the work area. This policy will be strictly enforced by the Field Team Leader.

12.0 FIRE CONTROL EQUIPMENT

An adequate number of approved portable fire extinguishers (class rated A, B and C) shall be readily available at the Site at all times.

All Site personnel shall be trained in the use of the extinguishers. Extinguishers shall only be used on outbreak stage fires or fires of minor nature. The local fire department shall be contacted in the event of a larger fire and Site evacuation procedures should be commenced in accordance with the procedures described in the Emergency Contingency Plan.

13.0 CONFINED SPACE PROGRAM

13.1 Purpose

In the event that confined space work is a necessity, a Confined Space Program will be implemented. Training in the recognition of confined spaces is a component of the health and safety training program.

The purpose of the Confined Space Program is to establish procedures to protect personnel from this serious hazard in the course of their work; and at a minimum, to comply with 29 CFR OSHA 1910.146. This document assigns responsibilities and sets standards for personnel engaged in activities where confined spaces may be present.

13.2 Responsibilities

13.2.1 Health and Safety Coordinator

The Health and Safety Coordinator administers the Confined Space Program. The Health and Safety Coordinator's responsibilities include:

- Review of the HASP for potential confined space hazards and design alternative approaches to accomplish the confined space tasks;
- Coordinating and managing the Confined Space Program in the event one is required;
- Establishing priorities for implementation of the program;
- Assisting with recognition and implementation of the Confined Space Program;
- Advising project management on confined space issues; and
- Communicating the Confined Space Program to personnel by training related to specific Site activities.

13.2.2 Project Manager

The Project Manager directs the application of the Confined Space Program to project work. The Project Manager is responsible for:

- Working with the Health and Safety Coordinator to prepare information describing activities that might be conducted in a confined space area;
- Assuring that all personnel engaged in project activities are familiar with the definition of a confined space;
- Assuring that personnel are familiar with the Confined Space Program, and that project activities are conducted in compliance with the Confined Space Program;
- Assuming the responsibilities of the Field Team Leader if another person is not assigned these responsibilities.

13.2.3 Field Team Leader

The Field Team Leader is responsible for the implementation of the Confined Space Program on-site during field activities. The Field Team Leader is responsible for:

- Overseeing implementation of the Confined Space Program during field operations; and
- Reporting confined space work activity, and any violations of the Confined Space Program, to the Project Manager and the Health and Safety Coordinator.

13.2.4 Personnel

Personnel are responsible for:

- Familiarizing themselves with the Confined Space Program and following it;
- Becoming familiar with the criteria for determining a confined space, and with the monitoring, permitting, and other requirements of the program; and
- Reporting immediately a confined space condition to the Field Team Leader.

13.3 Definition of a Confined Space

Confined space means a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work
2. Has limited or restricted means for entry or exit (such as pits, storage bins, hoppers, crawl spaces, and storm cellar areas)
3. Is not designed for continuous employee occupancy

Any workspace meeting all of these criteria is a confined space and the Confined Space Program must be followed.

13.4 Confined Space Entry Procedures

13.4.1 Safety Work Permit Required

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. The Safe Work Permit for entry into a confined space must be completed before work begins; it verifies completion of the items necessary for confined space entry. The Permit will be kept at the Site for the duration of the confined space work. If there is an interruption of work, or the alarm conditions change, a new Permit must be obtained before work begins.

A permit is not required when the space can be maintained for safe entry by 100% fresh air mechanical ventilation. This must be documented and approved by the Health and Safety Coordinator. Mechanical ventilation systems, where applicable, shall be set at 100% fresh air.

The Field Team Leader must certify that all hazards have been eliminated on the Entry Permit. If conditions change, a new permit is required.

13.4.2 Pre-entry Testing for Potential Hazards

a. Surveillance

Personnel first will survey the surrounding area to assure the absence of hazards such as contaminated water, soil, or sediment, barrels, tanks, or piping where vapors may drift into the confined space.

b. Testing

No personnel will enter a confined space if any one. of these conditions exists during pre-entry testing. Determinations will be made for the following conditions:

1. Presence of toxic gases or dusts: Equal to or more than 5 parts per million (ppm) on the organic vapor analyzer with an alarm, above background outside the confined space area; or other action levels for specific gases, vapors, or dusts as specified in the Health and Safety Plan and the Confined Space Permit based on knowledge of Site constituents;

2. Presence of explosive/flammable gases: Equal to or greater than 10% of the Lower Explosive Limit (LEL) as measured with a combustible gas indicator or similar instrument (with an alarm); and

3. Oxygen Deficiency: A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume as measured with an oxygen meter.

Pre-entry test results will be recorded and kept at the Site for the duration of the job by the Field Team Leader. Affected personnel can review the test results.

c. Authorization

Only the Field Team Leader and the Health and Safety Coordinator can authorize any personnel to enter into a confined space. This is reflected on the Safe Work Permit for entry into a confined space. The Field Team Leader must assure that conditions in the confined space meet permit requirements before authorizing entry.,

d. Safe Work Permit

1. A Safe Work Permit for confined space entry must be filled out by the Health and Safety Coordinator or Field Team Leader. A copy of the Safe Work Permit is included as Figure 5.2.

e. Attendants

One worker will stand by outside the confined space ready to give assistance in the case of an emergency. Under no circumstances will the standby worker enter the confined space or leave the standby position. There shall be at least one other worker not in the confined space within sight or call of the standby worker.

f. Observation and Communication

Communications between standby worker and entrant(s) shall be maintained at all times. Methods of communication that may be specified in the Safe Work Permit and the HASP may include voice, voice by powered radio, tapping or rapping codes, signaling tugs on rope, and standby worker's observations that activity appears normal.

13.4.3 Rescue Procedures

Acceptable rescue procedures include entry by a team of rescuers only if the appropriate self-contained breathing apparatus (SCBA) is available; or use of public emergency services.

The standby worker must be trained in first aid, CPR, and respirator use. A first aid kit should be on hand and ready for emergency use. The standby worker must be trained in rescue procedures. Retrieval of an unconscious victim in a confined space will only be conducted by trained rescue personnel. An emergency call to 911 will be initiated to assist the victim.

13.5 Training

Personnel who will engage in field activities will be given annual training on the requirements and responsibilities in the Confined Space Program and on OSHA 1910.146. Only trained personnel can work in confined spaces. Workers should be experienced in the tasks to be performed, instructed in proper use of respirators, lifelines and other equipment, and practice emergency procedures and self-rescue.

Before each Site activity, the determination of confined space work will be part of the Site characterization process. Training in the site-specific confined space activities will be part of the site-specific health and safety training:

13.6 Safe Work Practices

- Warning signs should be posted. These include warnings for entry permits, respirator use, prohibition of hot work and emergency procedures and phone numbers.
- Cylinders containing oxygen, acetylene or other fuel such as gasoline must be removed a safe distance from the confined space work area.
- Purging and ventilating is done before work begins to remove hazardous vapors from the space. The space should be monitored to ensure that the gas used to purge the space (e.g. tank) has also been removed. Local exhaust should be used where general exhaust is not practical.
- The buddy system is used at all times. A standby person always must be posted within sight of, or in communication with, the person inside the confined space. The standby should not enter the confined space, but instead will call for help in an emergency and not leave the post. Communication should be maintained at all times with workers inside the confined space.
- Emergency planning in the HASP and a Safe Work Permit must be approved in advance and the proper rescue equipment must be immediately available.

14.0 ELECTRICAL LOCKOUT/TAGOUT

The Field Team Leader must approve all work in areas requiring lockout/tagout procedures. Specific procedures and permitting requirements will be specified in the HASP, or in a revised HASP based on the need for a worker to work around electrical equipment.

All systems must be locked out and tagged before the work begins. This includes pipes, air lines, electrical equipment and mechanical devices. The equipment must be start tested and approved for use by a worker by the Health and Safety Coordinator or the Field Team Leader by start-testing to make sure the locked-out equipment does not operate.

Appendix G

Applicable or Relevant and Appropriate Requirements

Applicable or Relevant and Appropriate Requirements
515 Peshtigo Court, Chicago Illinois

Radiologically contaminated materials were originally generated as a byproduct waste from the former Lindsay Light thorium gas mantle production facilities that had used and produced thorium nitrate in its manufacturing process. These thorium byproduct materials have been incorporated into fill materials used throughout the Streeterville area. The manufacturing operations were located at 22 West Hubbard Street, 161 East Grand Avenue and 316 East Illinois Street in Chicago, Illinois. These manufacturing operations were conducted from the early 1900s through the mid 1930s. The radiological contamination typically consists of elevated concentrations of thorium and associated decay products in the fill soils in the vicinity of the former Lindsay Light sites. Cleanup of radiologically-contaminated fill soil has been performed at a number of Streeterville properties under the direction of the U. S. Environmental Protection Agency (USEPA).

Due to the proximity of this property to the manufacturing site and documented cleanups at other properties in the Streeterville area, screening for thorium-contaminated fill soil is warranted where invasive work is planned. Furthermore, the USEPA, which has oversight authority for radiologically-contaminated sites, requests that radiological surveys be completed prior to and during site development within the moratorium area commonly referred to as the Streeterville thorium investigation area.

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that removal actions for cleanup of hazardous substances must comply to the extent practicable with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances of particular circumstances at a site. The removal actions may incorporate environmental policies or proposals that are not applicable or relevant and appropriate, but do address site-specific concerns. Such to-be-considered (TBC) standards may be used in determining the cleanup levels necessary for protection of human health and the environment.

Inherent in the interpretation of applicable or relevant and appropriate requirements (ARARs) is the assumption that protection of human health and the environment is provided. ARARs apply to those federal and state regulations that are designed to protect the environment and do not generally apply to occupational safety regulations. Therefore, the Occupational Safety and Health Administration (OSHA) regulations are not addressed as ARARs unless they specifically apply to removal action goals.

The purpose of this document is to provide the approved contaminant- and location-specific ARARs for the thorium remediation projects in the Streeterville area of Chicago, Illinois. The process of ARAR identification is an iterative one that is continually changing as the removal action progresses. Additional ARARs may be added as site-specific contamination at a project site is further characterized.

The radiological surveillance and remedial actions being implemented are due to the presence of radionuclides of concern including thorium-232 and the products in the decay chain (i.e., radium-226 and radium-228). These radiological contaminants primarily occur within the near surface fill materials (upper 8-12 feet). Although no other remedial efforts are currently planned, other contaminants in fill materials could be present depending on site-specific conditions and historical site use. These contaminants could include metals (arsenic, lead, etc.), volatile organics (fuels) and polynuclear aromatic hydrocarbons (PNAs). Additional ARARs to address these contaminants may be added if conditions warrant remediation efforts to address these constituents.

Contaminant-Specific ARARs

Contaminant-specific requirements set health-based or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, pollutants, or contaminants. These requirements generally set protective cleanup levels for the contaminants of concern in the designated media, or indicate a safe level of discharge that may be incorporated when considering a specific removal activity.

Action-Specific ARARs for Remediation and Radiation Protection Standards

Tronox (aka Kerr-McGee Chemical Corporation) was a successor of the Lindsay Light II Site. A Unilateral Administrative Order (UAO) for the removal activities at the Site, was issued by the USEPA on June 6, 1996 (VW-96-C-353). As defined in the UAO, the cleanup criterion is set at 5 picocuries per gram (pCi/g) total radium (radium-226 plus radium 228) over background. The UAO required the development of a background total radium activity for Streeterville. A background value of 2.1 pCi/g was approved by the USEPA. Thus, the cleanup criterion for Streeterville approved by the USEPA is 7.1 pCi/g.

Table 1 summarizes the contaminant-specific requirements, a description of the requirements, explanatory comments and the resulting action level.

TABLE 1
CONTAMINANT-SPECIFIC REQUIREMENTS FOR STREETERVILLE SITES

Potential ARAR	Requirements	Comments	Action Level
Protective standard for uranium and thorium mill tailings (40 CFR 192)	Specifies that concentrations of radium-226 and radium-228 in soil averaged over a 100 m^2 area may not exceed background by more than 5 pCi/g in each 15 cm (6-inch) layer of soil.	Standard originally applied to sites specifically designated under the Uranium Mill Tailings Radiation Control Act of 1978, but have been used at uranium, thorium and radium sites because of similarity. Criterion was included in the original 1996 UAO. A background value of 2.1 pCi/g was developed by Kerr McGee (and approved by USEPA) for Streeterville.	7.1 pCi/g

USEPA has developed a Health and Safety Plan (HASP) for Streeterville area construction projects that provide action levels to minimize and/or prevent exposures. Radiological action levels for on-site workers conducting remediation efforts will be determined by performing surveillance surveys as well as airborne particulate monitoring for the presence of radioactivity. Properly trained Health Physics Technicians will perform radiological monitoring. The radioactive contamination on the site is particulate and insoluble in water. Action levels approved by USEPA previously for other Streeterville projects as determined by radioactive monitoring can be found in Table 2.

TABLE 2
ACTION LEVELS AS DETERMINED BY RADIOACTIVITY

Radiation Type	Action Level	Level of Respiratory Protection/Action
Contamination on smear samples of equipment	20 dpm/100 cm^2 gross alpha	Decontamination required prior to release for unrestricted use.
Contamination surveys of personnel or equipment	Count rate greater than background levels	Decontamination required prior to leaving exclusion zone.
Airborne Radioactivity	30% DAC[a]	Consider Level C (full-face APR) based upon ALARA evaluation. Ensure proper posting. Consider internal monitoring
Ambient Gamma (work areas)	5 mrem/hr[b]	Consider procedures for shielding of soils. Ensure proper posting.
Ambient Gamma (off-site areas)	2 mrem/hr[c]	Implement immediate controls to reduce dose equivalent rate.

Notes:

Personnel shall not be exposed to airborne radioactivity such that their weekly intake exceeds 12 Derived Air Concentration (DAC)-hours without prior approval of the Field Team Leader or designee.

Level of protection may be increased to Level C (full-face air purifying respirator) when airborne monitoring indicates that contamination levels have reached 30% of the DAC. All assessments shall incorporate ALARA principles. Engineering controls shall be used prior to assignment of respiratory protective equipment.

Signs shall be posted at entrances to areas where airborne radioactivity levels exceed, or have the potential to exceed, 25% of the DAC.

The most restrictive DAC of the nuclides which may be present onsite is Th-232. The DAC for Th-232 Class W is $5x10^{-13}$ uCi/ml. The air effluent limit is $4x10^{-15}$ uCi/ml. Engineering controls will be utilized so that no visible dust is present and airborne radionuclide concentrations will be kept ALARA.

(a) -Potential Airborne Radioactivity Area as defined in 10 CFR 20. Workers with 1000 DAC-hours per year to date must wear modified Level C (full-face APR) until the end of the calendar year.

(b) - The ambient gamma dose equivalent rate action level of 5 mrem/hr stems, from the 10 CFR 20 radiation area definition. If the ambient gamma dose equivalent rate reaches 2 mrem/hr, one or more of the following actions will be implemented: The source may be shielded; the working distance from the source may be increased; or the worker's exposure time may be limited.

(c) - The ambient gamma action level for off-site is based upon the 10 CFR 20 requirements to maintain dose equivalent rates in unrestricted areas such that they do not exceed 0.002 rem in any one hour.

U.S. EPA-Identified ARARS For Streeterville Superfund Removal Sites and 515 Peshtigo

1. Sources of Primary ARARS

The U.S. EPA has identified the following major sources of Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) guidance for the cleanup actions at the Streeterville Superfund Removal Sites including 515 Peshtigo:

Title 40. Part 192 of the Code of Federal Regulations (40 CFR 192), entitled "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings." 40 CFR 192 contains U.S. EPA's standards for cleanup of lands contaminated by uranium and thorium mill wastes. The standards apply only to the sites specifically designated under the Uranium Mill Tailings Radiation Control Act of 1978, but they often have been used as criteria at uranium, thorium and radium sites because of the similarity of the problems. They are not applicable to the Streeterville Superfund Removal Sites, but U.S. EPA considers portions to be relevant and appropriate.

Title 29, Part 1910.1096 of the Code of Federal Regulations (29 CFR 1910.1096), entitled "Ionizing Radiation." 29 CFR 1910.1096 contains Occupational Safety & Health Administration (OSHA) standards for protection of workers from ionizing radiation and the controls necessary to limit exposure (e.g., warning signs, engineering controls). Except in cases where Nuclear Regulatory Commission or Agreement State standards apply to a licensee, 29 CFR 1910.1096 are considered applicable to the Streeterville Superfund Removal Sites.

Title 32. Chapter II. Subchapter b. Part 332 of the Illinois Administrative Code, entitled "Licensing Requirements for Source Material Milling Facilities." These regulations deal with licensing requirements for source material milling facilities in Illinois. They are not applicable to the Streeterville Superfund Removal Sites, but U.S. EPA considers portions to be relevant and appropriate and portions to be TBCs.

Title 32. Chapter II. Subchapter b. Part 340 of the Illinois Administrative Code, entitled "Standards for Protection Against Radiation." These regulations establish standards for protection against radiation hazards, primarily in an occupational setting; they control the possession, use and transfer of sources of radiation by "licensees and registrants" so that the total dose to an individual does not exceed specified standards. They also contain decontamination guides for the release of equipment for unrestricted use. These regulations are not applicable to the Streeterville Superfund Removal Sites, but U.S. EPA considers portions to be relevant and appropriate.

Department of Energy Order 458.1 "Radiation Protection of the Public and the Environment," paragraph 4d on ALARA., entitled "Radiation Protection of the Public and the Environment." This Order establishes standards and requirements for Department of Energy (DOE) operations with respect to protection of members of the public against undue risk from radiation, and contains a discussion of DOE'S "ALARA" (As Low As Reasonably Achievable) approach. The Order is not a promulgated Federal or State regulation, and thus cannot be an ARAR, but U.S. EPA considers portions of the Order to be TBCs.

Title 10. Part 20 of the Code of Federal Regulations (10 CFR 20), entitled "Standards for Protection Against Radiation." These regulations contain the Nuclear Regulatory Commission's standards for protection against radiation, and contain an "ALARA" approach. They are not applicable or relevant and appropriate to the Streeterville Superfund Removal Sites, but U.S. EPA considers portions to be TBCs.

U.S. Nuclear Regulatory Commission's Regulatory Guide 8.37. This regulatory guide contains, among other things, a discussion of the NRC's "ALARA" approach. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86. This regulatory guide contains, among other things, decontamination guides for the release of equipment for unrestricted use. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

2. Streeterville Superfund Removal Sites Implementation of Outdoor Soil Concentration Cleanup Criterion

Soil standards for mill tailings of the type present at the Streeterville Superfund Removal Sites are found in 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," and at Section 332.150(b) of the Illinois Administrative Code. None of the standards are applicable to the Streeterville Superfund Removal Sites, but portions are relevant and appropriate. Because the State standard is more stringent than the Federal standard (by specifying that the concentration limit is for dry soil), the State regulation is considered as the ARAR.

The State regulation at Section 332.150(b) of the Illinois Administrative Code specifies that the licensed site shall be decontaminated to the following limits prior to termination of the license:

"Concentrations of radionuclides in soil above background concentrations for total radium, averaged over areas 100 square meters, shall not exceed:

A) 5 picocuries per gram of dry soil, averaged over the first 15 centimeters below the surface; and
B) 15 picocuries per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface."

The State requirements in Section 332.150(b) of the Illinois Administrative Code were based on the federal standards in 40 CFR192.12(a). When the federal standards in 40 CFR 192 were developed, the 5 picocuries per gram (pCi/g) standard was a health based standard, but the 15 pCi/g standard for subsurface soil was technology based, reflecting instrument limitations in locating subsurface deposits. The 15 pCi/g limit is not a health-based standard, and should not be applied to situations in which a health-based standard is appropriate, or to situations that differ substantively from those for which it was derived.

The 15 pCi/g limit was developed as a practical measurement tool for use in locating discrete caches of high activity tailings (typically 300- 1000 pCi/g) that were deposited in subsurface locations at mill sites or at nearby properties. The subsurface soil standard in 40 CFR 192 was originally proposed as 5 pCi/g. The final standard was changed, not because the health basis was relaxed, but rather in order to reduce the cost to DOE of locating buried tailings - under the assumption that this would result in essentially the same degree of cleanup at the DOE sites as originally proposed under the 5pCi/g criterion. The use of a 15 pCi/g subsurface criterion allowed the DOE to use field measurements rather than laboratory analysis to determine when buried tailings had been detected. It is only appropriate for use as a cost-effective tool to locate radioactive waste in situations where contaminated subsurface materials are of high activity and are not expected to be significantly admixed with clean soil. The 15pCi/g subsurface criterion was not developed for situations where significant quantities of moderate or low activity materials are involved, such as at the Streeterville Superfund Removal Sites. Therefore, the 15 pCi/g subsurface criterion is not appropriate for use at the Streeterville Superfund Removal Sites, and thus is not an ARAR. The 5 pCi/g standard, on the other hand, was developed as a health-based standard and is appropriate for use at the Residential Areas site.

Although the soil concentration standard in the regulation is written in terms of an average over an area of 100 square meters area, averaging will not be conducted during investigation and removal. All soils that exceed 5 picocuries per gram total radium (radium-226 plus radium-228) must be removed. This approach is conservative and should minimize the chances of not identifying or removing contamination. The cleanup verification criterion for outdoor soil concentrations will be soil concentrations that do not exceed 5 picocuries per gram total radium (radium-226 plus radium-228), dry soil, above background, averaged over areas *up* to 100 square meters, in any 15 centimeter depth based upon Section 332.150(b) of the Illinois Administrative Code.

3. Streeterville Superfund Removal Sites Implementation of "As Low As Reasonably Achievable" (ALARA) To Be Considered Guidance

As discussed above, NRC's regulations at 10 CFR 20, DOE Order 458.1 and NRC Regulatory Guide 8.37 all contain an ALARA approach which sets forth the objective to attain dose levels as far below the dose limits as practicable. These requirements are TBCs for the removal actions at the Streeterville Superfund Removal Sites.

In addition, Section 340.1000(b) of the Illinois Administrative Code is a TBC for the removal actions at the Residential Areas. Section 340.1000(b), which applies to "licensees and registrants," states,

"In addition to complying with the requirements set forth in this Part, every reasonable effort should be made to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable. The term 'as low as is reasonably achievable' means as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of ionizing radiation in the public interest."

The NRC regulations at 10 CFR 20 contain similar language. As a result, the following ALARA approach will be used for the Streeterville Superfund Removal Sites:

> *Every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as is reasonably achievable.*

EXHIBIT D

Completion Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 3 0 2013

REPLY TO THE ATTENTION OF
SE-5J

Mr. Donald Biernacki
Related Midwest
350 W Hubbard St.
Suite 300
Chicago, IL 60654

Dr. Steven Kornder
AECOM
750 Corporate Woods Parkway
Vernon Hills, Illinois 60061

RE: Completion of Work Under ASAOC Docket # V-W-11-C-976 (AKA 515 North Peshtigo Court, Chicago, Illinois AKA 500 North Lake Shore Drive/Lindsay Light Site Site ID # 05YT OU18)

Dear Mr. Biernacki and Dr. Kornder:

On September 2, 2011, the United States Environmental Protection Agency (U.S. EPA) entered into an Administrative Settlement Agreement on Consent (ASAOC) Docket # V-W-11-C-976 with Related BIT 500 Lake Shore Owner LLC (Related BIT LLC), in which Related BIT LLC agreed to perform specified activities including soil screening, removal and other activities ("the Work") at 515 North Peshtigo Court, Chicago, Illinois (Site) and to reimburse U.S. EPA response costs associated with this Site. U.S. EPA and Related BIT LLC entered into an ASAOC because an Action Memorandum documented U.S. EPA's determination that radioactive materials present at the Site posed an imminent and substantial threat to the public health and the environment and explained the need for a time-critical removal action based on the impending development of the Site.

The terms of the ASAOC required that Related BIT LLC, remove, transport and dispose of off-site all soils investigated that exceeded U.S. EPA's cleanup standard of 7.1 picoCuries per gram total radium (Ra226 and Ra228) established for Lindsay Light II. The ASAOC also provided that if Related BIT LLC did not radiologically investigate the entire Site or remediate thorium from the entire Site, then Related BIT LLC would establish U.S. EPA-approved institutional controls to prevent exposure to and release of thorium contamination. Those institutional

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controls will consist of an U.S. EPA approved Environmental Covenant pursuant to the Uniform Environmental Covenants Act (765 ILCS Ch. 122), which will be recorded against the title to the Site. Pursuant to the ASAOC, Related BIT submitted a work plan that U.S. EPA approved on February 24, 2012. Related BIT initiated the Work on September 12, 2011.

While performing the Work, Related BIT identified several areas of potential and confirmed contamination at 515 Peshtigo and in the adjacent Chicago-owned rights-of-ways. Those rights-of-ways are depicted in a previously submitted ROW report dated July 3, 2013 and titled "Corner of East Illinois and Peshtigo Court." Related BIT LLC completed its construction activities at 515 Peshtigo. If Related BIT LLC, its successors, assigns or trustee(s), conducts additional Work in the right-of-ways, then Related BIT LLC, its successors, assigns or trustee(s), will submit the documentation that the Work in the rights-of-ways has been completed. To be clear, this letter is to document the completion of the remediation work within the boundaries of the Related BIT LLC-owned property.

On September 24 2013, AECOM, Related BIT's environmental consultant, submitted a Final Report meeting the requirements of Paragraph 20 of the ASAOC and documenting completion of the Work as required on 515 North Peshtigo. The Final Report included documentation that Related BIT LLC shipped 188 tons of thorium contaminated soil to U.S. Ecology, Grand View, Idaho, a disposal facility licensed to accept radioactive wastes, in accordance with Paragraphs 20 and 21of the ASAOC. The Final Report also noted that Related BIT LLC did not screen the entirety of the fill materials at the Site in 18-inch lifts. Although, Related BIT must append its Final Report to include the confirmatory sampling results from U.S. EPA's National Analytical Radiation Environmental Laboratory, based upon the Related BIT LLC Final Report and U.S. EPA's inspection of the Site and past oversight of the Work, U.S. EPA concludes that Related BIT excavated and shipped off-site all investigated materials that exceeded U.S. EPA's clean-up standard of 7.1 picoCuries per gram and completed the Work required by ASAOC Section VIII within the boundaries of the Related BIT LLC-owned property.

However, further radiological investigation will be required if excavation is conducted in any of the 515 Peshtigo rights-of-ways, including the Peshtigo Court and East Illinois Street rights-of-ways. If subsurface soils are exposed or intruded upon and if radiological contamination is identified, that contaminated material must be properly managed and disposed of. As stated above, this letter reflects U.S. EPA's determination in accordance with Paragraph 74 of the ASAOC that Related BIT LLC has completed the Work on its property required by the ASAOC, with the exception of certain continuing obligations required by the ASAOC. Related BIT LLC has completed the removal of all radioactive materials that exceeded U.S. EPA's cleanup standard in the portions of the Related BIT LLC-owned property that were radiologically investigated. Also, as noted in the preceding paragraph, Related BIT LLC did not radiologically investigate the entire Site. Accordingly, as one of the continuing obligations required by the

ASAOC, Related BIT LLC is required to establish U.S. EPA-approved institutional controls to control exposure to and release of thorium contamination that may be present at the portions of the Site that were not radiologically investigated. U.S. EPA, therefore, anticipates no need to take additional investigatory or cleanup action at this property unless new information warranting further Superfund consideration or conditions not previously known to U.S. EPA regarding the property are discovered. This notice of completion in no way releases Related BIT from any potential future obligations to perform additional work to address the same, or other, conditions at the Site should such work be the subject of a future U.S. EPA Administrative Order. Similarly, this notice of completion does not release Related BIT LLC from any recordkeeping, payment (including payment of certain response costs in accordance with Paragraph 40 of the ASAOC), or other obligations under the ASAOC that extend beyond the date of this notice.

Please contact me at (312) 886-3601, or Eugene Jablonowski, Superfund Health Physicist at (312) 886-4591, and direct legal inquiries to Mary Fulghum, Associate Regional Counsel at (312) 886-4683 or Cathleen Martwick, Associate Regional Counsel at (312) 886-7166, if have questions concerning this letter.

Sincerely,

Verneta Simon

Verneta Simon, P.E.
On-Scene Coordinator

cc: Mort Ames, City of Chicago Department of Law
Thomas Baughman, Illinois Department of Public Health
John Kim, Illinois EPA
Adnan Khayyat, IEMA
Leo Dombrowski, Sanchez Daniels & Hoffman LLP
Terry Sheahan, City of Chicago Department of Health
Kimberly Worthington, City of Chicago Department of Fleet & Facility Management

bcc: Mary Fulghum, C-14J
Charlie Gebien, SE-5J
Eugene Jablonowski, SMF-5J
Debbie Keating, SE-5J
Cathleen Martwick, C-14J
Susan Pastor, SI-7J

EXHIBIT E

Map of Uninvestigated Site Area

LEGEND:

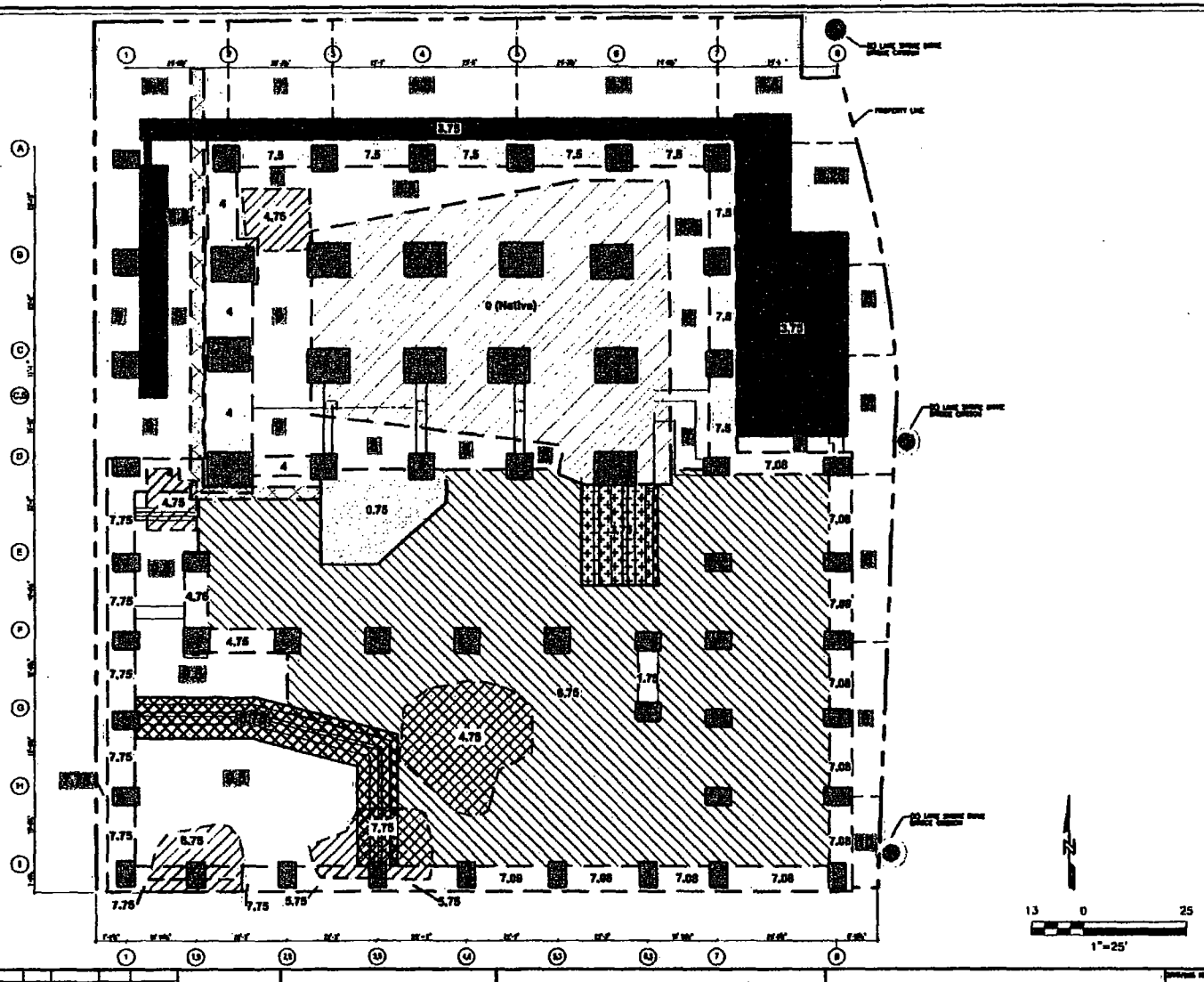
- PARKING GARAGE AREA GRADED TO 6.75 FT–C.C.D.
- TOWER CORE EXCAVATION SCREENED TO 0 FT–C.C.D.
- ELECTRICAL TRENCH FOR CRANE SCREENED TO 6.75 FT–C.C.D.
- CRANE PAD INSTALLATION SCREENED TO 0.75 FT–C.C.D.
- FOOTING RAMP SCREENED TO 3.75 FT–C.C.D.
- STORM WATER RETENTION SCREENED TO 3.75 FT–C.C.D.
- CAISSON EXCAVATIONS SCREENED TO 0 FT–C.C.D.
- GRADE BEAM EXCAVATIONS SCREENED TO VARYING DEPTHS FT–C.C.D.
- RETAINING WALL EXCAVATION SCREENED TO 5.75 FT–C.C.D.
- 7.75 LOCATIONS OF RADIOACTIVE SOIL REMOVAL WITH DEPTH OF REMEDIATION
- 7.75 EXCAVATION DEPTH (FT–C.C.D)
- AREA SURVEYED DURING GENERAL SITE GRADING (FT–C.C.D.)
- CAISSON

NOTE:

DEPTH TO NATIVE SAND ABOUT 12–FT BGS (0 C.C.D.)

PROJECT ELEVATION +11.75' FT–C.C.D.

C.C.D. – CHICAGO CITY DATUM



NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
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0	JG	08/13/13	Excavation Boundary Update	BRS	08/13/13	SLK	08/13/13

AECOM

Radiologically Contaminated Soil Investigation – Maximum Depth of Remediation and Gamma Screening

PROJ. NUMBER: 60219374.4 DATE: 08/13/13

515 N Peshtgo Ct.
(AKA 500 N. Lake Shore Drive)
Chicago, Illinois

DRAWING NUMBER 1

SHEET NUMBER

REVISION 1

EXHIBIT F

Title Policy

OWNER'S POLICY OF TITLE INSURANCE

Policy Number **OX08082496**

Issued by Old Republic National Title Insurance Company

Any notice of claim and any other notice or statement in writing required to be given to the Company under this Policy must be given to the Company at the address shown in Section 18 of the Conditions.

COVERED RISKS

SUBJECT TO THE EXCLUSIONS FROM COVERAGE, THE EXCEPTIONS FROM COVERAGE CONTAINED IN SCHEDULE B, AND THE CONDITIONS, OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, a Minnesota corporation (the "Company") insures, as of Date of Policy and, to the extent stated in Covered Risks 9 and 10, after Date of Policy, against loss or damage, not exceeding the Amount of Insurance, sustained or incurred by the Insured by reason of:

1. Title being vested other than as stated in Schedule A.
2. Any defect in or lien or encumbrance on the Title. This Covered Risk includes but is not limited to insurance against loss from:
   (a) A defect in the Title caused by
      (i) forgery, fraud, undue influence, duress, incompetency, incapacity, or impersonation;
      (ii) failure of any person or Entity to have authorized a transfer or conveyance;
      (iii) a document affecting Title not properly created, executed, witnessed, sealed, acknowledged, notarized, or delivered;
      (iv) failure to perform those acts necessary to create a document by electronic means authorized by law;
      (v) a document executed under a falsified, expired, or otherwise invalid power of attorney;
      (vi) a document not properly filed, recorded, or indexed in the Public Records including failure to perform those acts by electronic means authorized by law; or
      (vii) a defective judicial or administrative proceeding.
   (b) The lien of real estate taxes or assessments imposed on the Title by a governmental authority due or payable, but unpaid.
   (c) Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
3. Unmarketable Title.
4. No right of access to and from the Land.
5. The violation or enforcement of any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (a) the occupancy, use, or enjoyment of the Land;
   (b) the character, dimensions, or location of any improvement erected on the Land;
   (c) the subdivision of land; or
   (d) environmental protection

   if a notice, describing any part of the Land, is recorded in the Public Records setting forth the violation or intention to enforce, but only to the extent of the violation or enforcement referred to in that notice.

Issued through the Office of:
Old Republic National Title Insurance
20 South Clark Street, Suite 2000
Chicago, IL 60603
Phone: 866-969-5010

Authorized Signature

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
A Stock Company
400 Second Avenue South, Minneapolis, Minnesota 55401
(612) 371-1111

By _____ President

Attest _____ Secretary

6. An enforcement action based on the exercise of a governmental police power not covered by Covered Risk 5 if a notice of the enforcement action, describing any part of the Land, is recorded in the Public Records, but only to the extent of the enforcement referred to in that notice.
7. The exercise of the rights of eminent domain if a notice of the exercise, describing any part of the Land, is recorded in the Public Records.
8. Any taking by a governmental body that has occurred and is binding on the rights of a purchaser for value without Knowledge.
9. Title being vested other than as stated in Schedule A or being defective

   (a) as a result of the avoidance in whole or in part, or from a court order providing an alternative remedy, of a transfer of all or any part of the title to or any interest in the Land occurring prior to the transaction vesting Title as shown in Schedule A because that prior transfer constituted a fraudulent or preferential transfer under federal bankruptcy, state insolvency, or similar creditors' rights laws; or

   (b) because the instrument of transfer vesting Title as shown in Schedule A constitutes a preferential transfer under federal bankruptcy, state insolvency, or similar creditors' rights laws by reason of the failure of its recording in the Public Records
      (i) to be timely, or
      (ii) to impart notice of its existence to a purchaser for value or to a judgment or lien creditor.
10. Any defect in or lien or encumbrance on the Title or other matter included in Covered Risks 1 through 9 that has been created or attached or has been filed or recorded in the Public Records subsequent to Date of Policy and prior to the recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

The Company will also pay the costs, attorneys' fees, and expenses incurred in defense of any matter insured against by this Policy, but only to the extent provided in the Conditions.

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions, or location of any improvement erected on the Land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.

2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.

3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed, or agreed to by the Insured Claimant;
   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 and 10); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.

4. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction vesting the Title as shown in Schedule A, is
   (a) a fraudulent conveyance or fraudulent transfer; or
   (b) a preferential transfer for any reason not stated in Covered Risk 9 of this policy.

5. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

CONDITIONS AND STIPULATIONS

1. **DEFINITION OF TERMS**

The following terms when used in this policy mean:

(a) "Amount of Insurance": The amount stated in Schedule A, as may be increased or decreased by endorsement to this policy, increased by Section 8(b), or decreased by Sections 10 and 11 of these Conditions.

(b) "Date of Policy": The date designated as "Date of Policy" in Schedule A.

(c) "Entity": A corporation, partnership, trust, limited liability company, or other similar legal entity.

(d) "Insured": The Insured named in Schedule A.

(i) The term "Insured" also includes

(A) successors to the Title of the Insured by operation of law as distinguished from purchase, including heirs, devisees, survivors, personal representatives, or next of kin;

(B) successors to an Insured by dissolution, merger, consolidation, distribution, or reorganization;

(C) successors to an Insured by its conversion to another kind of Entity;

(D) a grantee of an Insured under a deed delivered without payment of actual valuable consideration conveying the Title

(1) if the stock, shares, memberships, or other equity interests of the grantee are wholly-owned by the named Insured,

(2) if the grantee wholly owns the named Insured,

(3) if the grantee is wholly-owned by an affiliated Entity of the named Insured, provided the affiliated Entity and the named Insured are both wholly-owned by the same person or Entity, or

(4) if the grantee is a trustee or beneficiary of a trust created by a written instrument established by the Insured named in Schedule A for estate planning purposes.

(ii) With regard to (A), (B), (C), and (D) reserving, however, all rights and defenses as to any successor that the Company would have had against any predecessor Insured.

(e) "Insured Claimant": An Insured claiming loss or damage.

(f) "Knowledge" or "Known": Actual knowledge, not constructive knowledge or notice that may be imputed to an Insured by reason of the Public Records or any other records that impart constructive notice of matters affecting the Title.

(g) "Land": The land described in Schedule A, and affixed improvements that by law constitute real property. The term "Land" does not include any property beyond the lines of the area described in Schedule A, nor any right, title, interest, estate, or easement in abutting streets, roads, avenues, alleys, lanes, ways, or waterways, but this does not modify or limit the extent that a right of access to and from the Land is insured by this policy.

(h) "Mortgage": Mortgage, deed of trust, trust deed, or other security instrument, including one evidenced by electronic means authorized by law.

(i) "Public Records": Records established under state statutes at Date of Policy for the purpose of imparting constructive notice of matters relating to real property to purchasers for value and without Knowledge. With respect to Covered Risk 5(d), "Public Records" shall also include environmental protection liens filed in the records of the clerk of the United States District Court for the district where the Land is located.

(j) "Title": The estate or interest described in Schedule A.

(k) "Unmarketable Title": Title affected by an alleged or apparent matter that would permit a prospective purchaser or lessee of the Title or lender on the Title to be released from the obligation to purchase, lease, or lend if there is a contractual condition requiring the delivery of marketable title.

2. **CONTINUATION OF INSURANCE**

(a) The coverage of this policy shall continue in force as of Date of Policy in favor of an Insured, but only so long as the Insured retains an estate or interest in the Land, or holds an obligation secured by a purchase money Mortgage given by a purchaser from the Insured, or only so long as the Insured shall have liability by reason of warranties in any transfer or conveyance of the Title. This policy shall not continue in force in favor of any purchaser from the Insured of either (i) an estate or interest in the Land, or (ii) an obligation secured by a purchase money Mortgage given to the Insured.

3. **NOTICE OF CLAIM TO BE GIVEN BY INSURED CLAIMANT**

The Insured shall notify the Company promptly in writing (i) in case of any litigation as set forth in Section 5(a) of these Conditions, (ii) in case Knowledge shall come to an Insured hereunder of any claim of title or interest that is adverse to the Title, as insured, and that might cause loss or damage for which the Company may be liable by virtue of this policy, or (iii) if the Title, as insured, is rejected as Unmarketable Title. If the Company is prejudiced by the failure of the Insured Claimant to provide prompt notice, the Company's liability to the Insured Claimant under the policy shall be reduced to the extent of the prejudice.

4. **PROOF OF LOSS**

In the event the Company is unable to determine the amount of loss or damage, the Company may, at its option, require as a condition of payment that the Insured Claimant furnish a signed proof of loss. The proof of loss must describe the defect, lien, encumbrance, or other matter insured against by this policy that constitutes the basis of loss or damage and shall state,

to the extent possible, the basis of calculating the amount of the loss or damage.

5. **DEFENSE AND PROSECUTION OF ACTIONS**

(a) Upon written request by the Insured, and subject to the options contained in Section 7 of these Conditions, the Company, at its own cost and without unreasonable delay, shall provide for the defense of an Insured in litigation in which any third party asserts a claim covered by this policy adverse to the Insured. This obligation is limited to only those stated causes of action alleging matters insured against by this policy. The Company shall have the right to select counsel of its choice (subject to the right of the Insured to object for reasonable cause) to represent the Insured as to those stated causes of action. It shall not be liable for and will not pay the fees of any other counsel. The Company will not pay any fees, costs, or expenses incurred by the Insured in the defense of those causes of action that allege matters not insured against by this policy.

(b) The Company shall have the right, in addition to the options contained in Section 7 of these Conditions, at its own cost, to institute and prosecute any action or proceeding or to do any other act that in its opinion may be necessary or desirable to establish the Title, as insured, or to prevent or reduce loss or damage to the Insured. The Company may take any appropriate action under the terms of this policy, whether or not it shall be liable to the Insured. The exercise of these rights shall not be an admission of liability or waiver of any provision of this policy. If the Company exercises its rights under this subsection, it must do so diligently.

(c) Whenever the Company brings an action or asserts a defense as required or permitted by this policy, the Company may pursue the litigation to a final determination by a court of competent jurisdiction, and it expressly reserves the right, in its sole discretion, to appeal any adverse judgment or order.

6. **DUTY OF INSURED CLAIMANT TO COOPERATE**

(a) In all cases where this policy permits or requires the Company to prosecute or provide for the defense of any action or proceeding and any appeals, the Insured shall secure to the Company the right to so prosecute or provide defense in the action or proceeding, including the right to use, at its option, the name of the Insured for this purpose. Whenever requested by the Company, the Insured, at the Company's expense, shall give the Company all reasonable aid (i) in securing evidence, obtaining witnesses, prosecuting or defending the action or proceeding, or effecting settlement, and (ii) in any other lawful act that in the opinion of the Company may be necessary or desirable to establish the Title or any other matter as insured. If the Company is prejudiced by the failure of the Insured to furnish the required cooperation, the Company's obligations to the Insured under the policy shall terminate, including any liability or obligation to defend, prosecute, or continue any litigation, with regard to the matter or matters requiring such cooperation.

(b) The Company may reasonably require the Insured Claimant to submit to examination under oath by any authorized representative of the Company and to produce for examination, inspection, and copying, at such reasonable times and places as may be designated by the authorized representative of the Company, all records, in whatever medium maintained, including books, ledgers, checks, memoranda, correspondence, reports, e-mails, disks, tapes, and videos whether bearing a date before or after Date of Policy, that reasonably pertain to the loss or damage. Further, if requested by any authorized representative of the Company, the Insured Claimant shall grant its permission, in writing, for any authorized representative of the Company to examine, inspect, and copy all of these records in the custody or control of a third party that reasonably pertain to the loss or damage. All information designated as confidential by the Insured Claimant provided to the Company pursuant to this Section shall not be disclosed to others unless, in the reasonable judgment of the Company, it is necessary in the administration of the claim. Failure of the Insured Claimant to submit for examination under oath, produce any reasonably requested information, or grant permission to secure reasonably necessary information from third parties as required in this subsection, unless prohibited by law or governmental regulation, shall terminate any liability of the Company under this policy as to that claim.

7. **OPTIONS TO PAY OR OTHERWISE SETTLE CLAIMS; TERMINATION OF LIABILITY**

In case of a claim under this policy, the Company shall have the following additional options:

(a) To Pay or Tender Payment of the Amount of Insurance.

To pay or tender payment of the Amount of Insurance under this policy together with any costs, attorneys' fees, and expenses incurred by the Insured Claimant that were authorized by the Company up to the time of payment or tender of payment and that the Company is obligated to pay.

Upon the exercise by the Company of this option, all liability and obligations of the Company to the Insured under this policy, other than to make the payment required in this subsection, shall terminate, including any liability or obligation to defend, prosecute, or continue any litigation.

(b) To Pay or Otherwise Settle With Parties Other Than the Insured or With the Insured Claimant.

(i) To pay or otherwise settle with other parties for or in the name of an Insured Claimant any claim insured against under this policy. In addition, the Company will pay any costs, attorneys' fees, and expenses incurred by the Insured Claimant that were authorized by the Company up to the time of payment and that the Company is obligated to pay; or

(ii) To pay or otherwise settle with the Insured Claimant the loss or damage provided for under this policy, together with any costs, attorneys' fees, and expenses incurred by the Insured Claimant that were authorized by the

Company up to the time of payment and that the Company is obligated to pay.

Upon the exercise by the Company of either of the options provided for in subsections (b)(i) or (ii), the Company's obligations to the Insured under this policy for the claimed loss or damage, other than the payments required to be made, shall terminate, including any liability or obligation to defend, prosecute, or continue any litigation.

8. **DETERMINATION AND EXTENT OF LIABILITY**

This policy is a contract of indemnity against actual monetary loss or damage sustained or incurred by the Insured Claimant who has suffered loss or damage by reason of matters insured against by this policy.

(a) The extent of liability of the Company for loss or damage under this policy shall not exceed the lesser of
   (i) the Amount of Insurance; or
   (ii) the difference between the value of the Title as insured and the value of the Title subject to the risk insured against by this policy.

(b) If the Company pursues its rights under Section 5 of these Conditions and is unsuccessful in establishing the Title, as insured,
   (i) the Amount of Insurance shall be increased by 10%, and
   (ii) the Insured Claimant shall have the right to have the loss or damage determined either as of the date the claim was made by the Insured Claimant or as of the date it is settled and paid.

(c) In addition to the extent of liability under (a) and (b), the Company will also pay those costs, attorneys' fees, and expenses incurred in accordance with Sections 5 and 7 of these Conditions.

9. **LIMITATION OF LIABILITY**

(a) If the Company establishes the Title, or removes the alleged defect, lien, or encumbrance, or cures the lack of a right of access to or from the Land, or cures the claim of Unmarketable Title, all as insured, in a reasonably diligent manner by any method, including litigation and the completion of any appeals, it shall have fully performed its obligations with respect to that matter and shall not be liable for any loss or damage caused to the Insured.

(b) In the event of any litigation, including litigation by the Company or with the Company's consent, the Company shall have no liability for loss or damage until there has been a final determination by a court of competent jurisdiction, and disposition of all appeals, adverse to the Title, as insured.

(c) The Company shall not be liable for loss or damage to the Insured for liability voluntarily assumed by the Insured in settling any claim or suit without the prior written consent of the Company.

10. **REDUCTION OF INSURANCE; REDUCTION OR TERMINATION OF LIABILITY**

All payments under this policy, except payments made for costs, attorneys' fees, and expenses, shall reduce the Amount of Insurance by the amount of the payment.

11. **LIABILITY NONCUMULATIVE**

The Amount of Insurance shall be reduced by any amount the Company pays under any policy insuring a Mortgage to which exception is taken in Schedule B or to which the Insured has agreed, assumed, or taken subject, or which is executed by an Insured after Date of Policy and which is a charge or lien on the Title, and the amount so paid shall be deemed a payment to the Insured under this policy.

12. **PAYMENT OF LOSS**

When liability and the extent of loss or damage have been definitely fixed in accordance with these Conditions, the payment shall be made within 30 days.

13. **RIGHTS OF RECOVERY UPON PAYMENT OR SETTLEMENT**

(a) Whenever the Company shall have settled and paid a claim under this policy, it shall be subrogated and entitled to the rights of the Insured Claimant in the Title and all other rights and remedies in respect to the claim that the Insured Claimant has against any person or property, to the extent of the amount of any loss, costs, attorneys' fees, and expenses paid by the Company. If requested by the Company, the Insured Claimant shall execute documents to evidence the transfer to the Company of these rights and remedies. The Insured Claimant shall permit the Company to sue, compromise, or settle in the name of the Insured Claimant and to use the name of the Insured Claimant in any transaction or litigation involving these rights and remedies.

If a payment on account of a claim does not fully cover the loss of the Insured Claimant, the Company shall defer the exercise of its right to recover until after the Insured Claimant shall have recovered its loss.

(b) The Company's right of subrogation includes the rights of the Insured to indemnities, guaranties, other policies of insurance, or bonds, notwithstanding any terms or conditions contained in those instruments that address subrogation rights.

14. **ARBITRATION**

Either the Company or the Insured may demand that the claim or controversy shall be submitted to arbitration pursuant

to the Title Insurance Arbitration Rules of the American Land Title Association ("Rules"). Except as provided in the Rules, there shall be no joinder or consolidation with claims or controversies of other persons. Arbitrable matters may include, but are not limited to, any controversy or claim between the Company and the Insured arising out of or relating to this policy, any service in connection with its issuance or the breach of a policy provision, or to any other controversy or claim arising out of the transaction giving rise to this policy. All arbitrable matters when the Amount of Insurance is $2,000,000 or less shall be arbitrated at the option of either the Company or the Insured. All arbitrable matters when the Amount of Insurance is in excess of $2,000,000 shall be arbitrated only when agreed to by both the Company and the Insured. Arbitration pursuant to this policy and under the Rules shall be binding upon the parties. Judgment upon the award rendered by the Arbitrator(s) may be entered in any court of competent jurisdiction.

15. LIABILITY LIMITED TO THIS POLICY; POLICY ENTIRE CONTRACT

(a) This policy together with all endorsements, if any, attached to it by the Company is the entire policy and contract between the Insured and the Company. In interpreting any provision of this policy, this policy shall be construed as a whole.

(b) Any claim of loss or damage that arises out of the status of the Title or by any action asserting such claim shall be restricted to this policy.

(c) Any amendment of or endorsement to this policy must be in writing and authenticated by an authorized person, or expressly incorporated by Schedule A of this policy.

(d) Each endorsement to this policy issued at any time is made a part of this policy and is subject to all of its terms and provisions. Except as the endorsement expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsement, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance.

16. SEVERABILITY

In the event any provision of this policy, in whole or in part, is held invalid or unenforceable under applicable law, the policy shall be deemed not to include that provision or such part held to be invalid, but all other provisions shall remain in full force and effect.

17. CHOICE OF LAW; FORUM

(a) Choice of Law: The Insured acknowledges the Company has underwritten the risks covered by this policy and determined the premium charged therefor in reliance upon the law affecting interests in real property and applicable to the interpretation, rights, remedies, or enforcement of policies of title insurance of the jurisdiction where the Land is located.

Therefore, the court or an arbitrator shall apply the law of the jurisdiction where the Land is located to determine the validity of claims against the Title that are adverse to the Insured and to interpret and enforce the terms of this policy. In neither case shall the court or arbitrator apply its conflicts of law principles to determine the applicable law.

(b) Choice of Forum: Any litigation or other proceeding brought by the Insured against the Company must be filed only in a state or federal court within the United States of America or its territories having appropriate jurisdiction.

18. NOTICES, WHERE SENT

Any notice of claim and any other notice or statement in writing required to be given to the Company under this policy must be given to the Company at 400 Second Avenue South, Minneapolis, Minnesota 55401-2499.

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
20 SOUTH CLARK STREET, SUITE 2000
CHICAGO, IL 60603

OWNER'S FORM

SCHEDULE A

Number: **N01110139**

Property: **500 N. Lake Shore Drive, IL**

Underwriter No.: **OX08082496**

Date of Policy: **August 19, 2011**

Amount of Insurance: **$156,340,695.00**

1. Name of Insured:

   Related BIT 500 Lake Shore Owner LLC, a Delaware limited liability company

2. The estate or interest in the Land that is insured by this policy is:

   Fee Simple

3. Title is vested in the Insured.

   Related BIT 500 Lake Shore Owner LLC, an Illinois limited liability company

4. The land referred to in this policy is described as follows:

   Parcel 1:

   Block 4 in Cityfront Center, being a resubdivision in the North Fraction of Section 10, Township 39 North, Range 14, East of the Third Principal Meridian, according to the plat thereof recorded February 24, 1987 as document 87106320, in Cook County, Illinois.

   Parcel 2:

   Easement appurtenant for the benefit of Parcel 1 for a Sky Bridge created by the Mutual Grant of Easements in Respect to City Front Center, Chicago, Illinois dated December 18, 1986 recorded February 24,1987 as document 87106321.

This policy valid only if Schedule B is attached.

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

OWNER'S FORM

SCHEDULE B

Number: N01110139

This policy does not insure against loss or damage by reason of the following:

A. STANDARD EXCEPTIONS:

1. Rights or claims of parties in possession not shown by the public records.
2. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land. The term "encroachment" includes encroachments of existing improvements located on the Land onto adjoining land, and encroachments onto the Land of existing improvements located on adjoining land.
3. Easements, or claims of easements, not shown by the public records.
4. Any lien, or right to a lien, for services, labor, or material heretofore or hereafter furnished, imposed by law and not shown by public records.
5. Taxes, or special assessments which are not shown as existing liens by the public records.

B. SPECIAL EXCEPTIONS:

1. GENERAL REAL ESTATE TAXES FOR THE YEARS 2010 AND 2011. TAX NUMBERS:
   17-10-218-007-0000 AND
   17-10-218-008-0000.

   NOTE: THE FIRST INSTALLMENT OF TAXES FOR THE YEAR 2010 ARE PAID IN THE AMOUNT OF $109,854.76 (-007) AND $5,021.83 (-008).

   NOTE: THE SECOND INSTALLMENT OF THE 2010 TAXES AND TAXES FOR THE YEAR 2011 ARE NOT YET DUE OR PAYABLE.

2. MORTGAGE, SECURITY AGREEMENT, ASSIGNMENT OF RENTS AND LEASES AND FIXTURE FILING DATED AUGUST 19, 2011 AND RECORDED AUGUST 19, 2011 AS DOCUMENT 1123131040 MADE BY RELATED BIT 500 LAKE SHORE OWNER LLC, A DELAWARE LIMITED LIABILITY COMPANY, TO BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT, TO SECURE A NOTE FOR $100,000,000.00.

3. FIXTURE FILING DATED AUGUST 19, 2011 AND RECORDED AUGUST 19, 2011 AS DOCUMENT1123131041 ENTERED INTO BY RELATED BIT 500 LAKE SHORE OWNER LLC, A DELAWARE LIMITED LIABILITY COMPANY, DEBTOR, AND BANK OF AMERICA N.A., AS ADMINISTRATIVE AGENT, SECURED PARTY.

OWNER'S FORM

SCHEDULE B
(continued)

4. THE LAND LIES WITHIN THE BOUNDARIES OF A SPECIAL SERVICE AREA 12 AS DISCLOSED BY ORDINANCE RECORDED AS DOCUMENT 91075841, AND IS SUBJECT TO ADDITIONAL TAXES UNDER THE TERMS OF SAID ORDINANCE AND SUBSEQUENT RELATED ORDINANCES.

   NOTE: AS OF THE DATE OF POLICY ANY AND ALL ADDITIONAL TAXES ARISING HEREUNDER ARE PAID CURRENT.

5. TERMS AND PROVISIONS CONTAINED IN THE DEVELOPMENT RIGHTS ALLOCATION AGREEMENT MADE BY AND BETWEEN WESTWACKER P21/P24 LLC AND WESTWACKER K-PARCEL LLC DATED FEBRUARY 26, 2004 AND RECORDED MARCH 4, 2004 AS DOCUMENT NO. 0406432160.

6. TERMS, PROVISIONS AND CONDITIONS CONTAINED IN THE PLANNED DEVELOPMENT ORDINANCE NUMBER 368 ADOPTED NOVEMBER 6, 1995, ANY AMENDMENTS SUBSEQUENT THERETO AND ALL AGREEMENTS AND CONDITIONS REQUIRED THEREBY INCLUDING, BUT NOT LIMITED TO CHICAGO PLAN COMMISSION APPROVAL PROVIDED FOR UNDER THE LAKEFRONT PROTECTION ORDINANCE; AND THE CITY OF CHICAGO DEPARTMENT OF PLANNING GUIDELINES ISSUED SEPTEMBER, 1985.

7. MUTUAL GRANT OF EASEMENTS DATED DECEMBER 24, 1986 AND RECORDED FEBRUARY 24, 1987 AS DOCUMENT 87106321 MADE BY AND BETWEEN CHICAGO DOCK AND CANAL TRUST, THE EQUITABLE LIFE ASSURANCE SOCIETY OF THE UNITED STATES AND THE CITY OF CHICAGO MADE IN ACCORDANCE WITH THE PLANNED DEVELOPMENT ORDINANCE ENACTED BY THE CITY COUNCIL ON NOVEMBER 6, 1985, WHICH GRANT OF EASEMENTS REGARDS, INTER ALIA, PEDESTRIAN ACCESS, CONSTRUCTION, MAINTENANCE, REPAIR AND REPLACEMENT OF EASEMENT, AND PUBLIC WAYS. THIS DOCUMENT INCLUDES THE TERMS FOR CONSTRUCTION AND USE OF THE "SKY BRIDGE" EASEMENT DESCRIBED AS PARCEL 2.

   AMENDED BY RELEASE RECORDED APRIL 22, 2008 AS DOCUMENT 0811345103 WHEREIN THE CITY OF CHICAGO RELEASES ALL OF ITS RIGHTS.

8. TERMS, PROVISIONS, CONDITIONS AND LIMITATIONS SET FORTH IN THE DECLARATION OF PROTECTIVE COVENANTS, CONDITIONS AND RESTRICTIONS FOR CITYFRONT CENTER EAST, CHICAGO, ILLINOIS RECORDED AS DOCUMENT 89410218 AND AS CONSENTED TO BY AMERICAN NATIONAL BANK AND TRUST COMPANY OF CHICAGO AS TRUSTEE UNDER TRUST AGREEMENT DATED AUGUST 25, 1986 KNOWN AS TRUST NUMBER 66928204 BY INSTRUMENT RECORDED AS DOCUMENT 89441980.

   FIRST AMENDMENT RECORDED DECEMBER 20, 1989 AS DOCUMENT NUMBER 89608952.

   NOTE: ASSESSMENTS IN FAVOR OF CITY FRONT CENTER EAST MAINTENANCE ASSOCIATION, AS DISCLOSED BY THE DECLARATION. ALL ASSESSMENTS HAVE BEEN PAID THROUGH THE END OF JULY 2011.

OWNER'S FORM

SCHEDULE B
(continued)

9. TERMS AND PROVISIONS CONTAINED IN VACATION ORDINANCE DATED NOVEMBER 26, 1986 AND RECORDED AS DOCUMENT 87106319 SETTING FORTH, BUT NOT LIMITED TO, THE FOLLOWING:
RESTRICTION THAT NO BUILDINGS OR OTHER STRUCTURES SHALL BE ERECTED ON THE RIGHTS OF WAY AND EASEMENTS RESERVED WHICH WOULD INTERFERE WITH THE USE, MAINTENANCE, RENEWAL OR RECONSTRUCTION OF TUNNEL STRUCTURES;

AGREEMENT TO CONSTRUCT BULKHEADS AND CAP ACCESS AND VENTILATION SHAFTS.

RESERVATION OF EASEMENT TO THE CITY OF CHICAGO AND THE PUBLIC AND QUASI–PUBLIC UTILITIES TO MAINTAIN EXISTING MUNICIPALLY OWNED SERVICE FACILITIES AND TO REPAIR AND OPERATE SUCH FACILITIES AND UTILITIES; AND

RESERVATION OF THE RIGHT AND INTEREST TO THE CITY OF CHICAGO FOR ALL EXISTING CHICAGO FREIGHT TUNNEL STRUCTURES AND THE RIGHT FOR THE MAINTENANCE, RENEWAL AND RECONTRUCTION OF SAID TUNNEL STRUCTURES.

AMENDED BY RELEASE RECORDED APRIL 22, 2008 AS DOCUMENT 0811345103 WHEREIN THE CITY OF CHICAGO RELEASES ALL OF ITS RIGHTS.

NOTE: VACATED AREA IS AS SHOWN ON SURVEY BY HOMER L. CHASTAIN & ASSOCIATES, LLP DATED MAY 12, 2011, LAST REVISED JULY 20, 2011 JOB NUMBER 5681-ALTA.

(Affects Parcel 1 of the Land)

10. TERMS AND PROVISIONS CONTAINED IN THE MANAGEMENT AGREEMENT DATED MARCH 1, 2004 MADE BY AND BETWEEN JER RV 2, LLC AND SYSTEM PARKING, INC.

RIGHT, TITLE AND INTEREST OF SYSTEM PARKING, INC. IN AND TO THE LAND, AS DISCLOSED BY MANAGEMENT AGREEMENT, AND OF ALL PARTIES CLAIMING THEREUNDER.

(Affects Parcel 1 of the Land)

11. TERMS AND PROVISIONS CONTAINED IN THE RESTRICTIONS AGREEMENT RECORDED SEPTEMBER 29, 1999 AS DOCUMENT NUMBER 99924679 AS AMENDED BY THAT FIRST AMENDMENT TO RESTRICTIVE COVENANT RECORDED APRIL 1, 2003 AS DOCUMENT NO. 0030440641 RELATING TO RESTRICTIONS ON THE USE OF ANY PART OF THE LAND FOR A THEATER OTHER THAN AMERICAN MULTI-CINEMA, INC..

NOTE: THE PARKING RESTRICTION CONTAINED IN SAID DOCUMENT DOES NOT AFFECT THE INSURED LAND.

OWNER'S FORM

SCHEDULE B
(continued)

12. ENCROACHMENT OF A CURB AND GUARD RAIL ONTO PUBLIC PROPERTY LOCATED AT THE NORTHEAST CORNER OF THE LAND AS DISCLOSED BY SURVEY BY HOMER L. CHASTAIN & ASSOCIATES, LLP DATED MAY 12, 2011, LAST REVISED JULY 20, 2011 JOB NUMBER 5681-ALTA.

    (AFFECTS PARCEL 1 OF THE LAND.)

13. NOTE: IF ANY DOCUMENT REFERENCED HEREIN CONTAINS A COVENANT, CONDITION OR RESTRICTION VIOLATIVE OF 42USC 3604(C), SUCH COVENANT, CONDITION OR RESTRICTION TO THE EXTENT OF SUCH VIOLATION IS HEREBY DELETED.

14. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR OR MATERIAL FURNISHED TO THE LAND UNDER CONTRACTS LET BY OWNER OR BY PARTIES SHOWN ON THE OWNER'S SWORN STATEMENT OR ANY ONE CLAIMING BY THROUGH OR UNDER THEM WHICH IS PERFECTED BY A RECORDED LIEN CLAIM OR SUIT TO FORECLOSE FILED AFTER AUGUST 19, 2011 (INITIAL DATE OF POLICY).

15. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR OR MATERIAL FURNISHED BY CONTRACTORS UNDER CONTRACTS LET BY LENDLEASE (US) CONSTRUCTION INC. (GENERAL CONTRACTOR) OR ANY ONE CLAIMING BY THROUGH OR UNDER THEM WHICH IS PERFECTED BY A RECORDED LIEN CLAIM OR SUIT TO FORECLOSE FILED AFTER AUGUST 19, 2011 (INITIAL DATE OF POLICY).

16. NOTE FOR INFORMATION: THE PROPERTY INCLUDED IN CITYFRONT SUBDIVISION RECORDED FEBRUARY 24, 1987 AS DOCUMENT NUMBER 87106320 IS WITHIN 500 FEET OF A WATER COURSE OR SURFACE DRAIN SERVING A TRIBUTARY AREA OF 640 ACRES OR MORE AS SHOWN ON PLAT OF SAID SUBDIVISION.

ISSUING AGENT FOR OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

BY: _____
AUTHORIZED SIGNATORY

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
20 South Clark Street, Suite 2000
Chicago, Il 60603

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

ALTA ENDORSEMENT 15.1 (NONIMPUTATION-ADDITIONAL INSURED)

For purposes of the coverage provided by this endorsement,

BIT Investment Fifty-One, LLC, a Delaware limited liability company

("Additional Insured") is added as an Insured under the policy. By execution below, the Insured named in Schedule A acknowledges that any payment made under this endorsement shall reduce the Amount of Insurance as provided in Section 10 of the Conditions.

The Company agrees that it will not assert the provisions of Exclusions from Coverage 3(a), (b), or (e) to deny liability for loss or damage otherwise insured against under the terms of the policy solely by reason of the action or inaction or Knowledge, as of Date of Policy, of

members of River East P24 LLC, a Delaware limited liability company and Related 500 Lake Shore LLC, an Illinois limited liability company

whether or not imputed to the Additional Insured by operation of law, to the extent of the percentage interest in the Insured acquired by Additional Insured as a purchaser for value without Knowledge of the asserted defect, lien, encumbrance, adverse claim, or other matter insured against by the policy.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

AGREED TO AND CONSENTED TO:

_____
INSURED
RELATED BIT 500 LAKE SHORE OWNER LLC,
a Delaware limited liability company

By: Related BIT 500 Lake Shore Company LLC,
a Delaware limited liability company, its Sole Member
By: Related 500 Lake Shore LLC, an Illinois limited liability company,
its Managing Member
By: Deborah Walters
Name: Deborah Walters
Title: Treasurer / Secretary

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AMERICAN LAND TITLE ASSOCIATION

ENDORSEMENT
ALTA ENDORSEMENT 15.1 (NONIMPUTATION-ADDITIONAL INSURED)

Old Republic National Title Insurance Company,
as issuing agent

Dated: August 19, 2011

By: _____

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AMERICAN LAND TITLE ASSOCIATION

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

ZONING (MODIFIED FOR PLANS AND SPECIFICATIONS)

1. The Company insures against loss or damage sustained by the Insured in the event that, at Date of Policy,

   a. according to applicable zoning ordinances and amendments, the Land is not classified Residential Business Planned Development Number 368;

   b. the following use or uses are not allowed under that classification: dwelling units above the ground floor, business equipment sales and service, eating and drinking establishments, offices and general retail

   c. There shall be no liability under this paragraph 1.b. if the use or uses are not allowed as the result of any lack of compliance with any conditions, restrictions, or requirements contained in the zoning ordinances and amendments, including but not limited to the failure to secure necessary consents or authorizations as a prerequisite to the use or uses. This paragraph 1.c. does not modify or limit the coverage provided in Covered Risk 5.

2. The Company further insures against loss or damage sustained by the Insured by reason of a final decree of a court of competent jurisdiction

   a. prohibiting the use of the Land, with any existing Structure or with any contemplated improvement completed thereon in accordance with the building plans entitled 500 Lake Shore Drive Tower prepared by Solomon Cordwell Buenz, Project Number 2010033 dated May 24, 2011, (together, the "Structure"), in each case as insured in paragraph 1.b.; or

   b. requiring the removal or alteration of the Structure on the basis that, at Date of Policy, the zoning ordinances and amendments have been violated with respect to any of the following matters:

      i. Area, width, or depth of the Land as a building site for the Structure
      ii. Floor space area of the Structure
      iii. Setback of the Structure from the property lines of the Land
      iv. Height of the Structure, or
      v. Number of parking spaces.

3. There shall be no liability under this endorsement based on

   a. the invalidity of the zoning ordinances and amendments until after a final decree of a court of competent jurisdiction adjudicating the invalidity, the effect of which is to prohibit the use or uses;

   b. the refusal of any person to purchase, lease or lend money on the estate or interest covered by this policy.

ENDORSEMENT
ZONING (MODIFIED FOR PLANS AND SPECIFICATIONS)
(Page 2 of 2)

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
as issuing agent

Dated: **August 19, 2011**

By:

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082466

RESTRICTIONS, ENCROACHMENTS, MINERALS - OWNER'S POLICY (MODIFIED FOR PLANS AND SPECIFICATIONS)

The Company insures against loss or damage sustained by the Insured by reason of:

1. The existence, at Date of Policy, of any of the following unless expressly excepted in Schedule B:

   a. Present violations on the Land of any enforceable covenants, conditions, or restrictions, or any existing improvements on the Land that violate any building setback lines shown on a plat of subdivision recorded or filed in the Public Records.

   b. Future violations of any existing enforceable covenants, conditions, restrictions and building setback lines referred to in Schedule B which would be caused by future improvements on the Land completed in accordance with plans entitled 500 Lake Shore Drive Tower prepared by Solomon Cordwell Buenz, Project Number 2010033 dated May 24, 2011.

   c. Any instrument referred to in Schedule B as containing covenants, conditions, or restrictions on the Land that, in addition, (i) establishes an easement on the Land; (ii) provides for an option to purchase, a right of first refusal, or the prior approval of a future purchaser or occupant; or (iii) provides a right of reentry, possibility of reverter, or right of forfeiture because of violations on the Land of any enforceable covenants, conditions, or restrictions.

   d. Any encroachment of existing improvements located on the Land onto adjoining land, and any future encroachment onto adjoining land by future improvements on the Land completed in accordance with such plans, or any encroachment onto the Land of existing improvements located on adjoining land.

   e. Any encroachment of existing improvements located on the Land onto that portion of the Land subject to any easement excepted in Schedule B, and any future encroachment onto any such easement by future improvements on the Land completed in accordance with such plans.

   f. Any notices of violation of covenants, conditions, or restrictions relating to environmental protection recorded or filed in the Public Records.

2. Damage to existing improvements or any future improvements completed in accordance with such plans

   a. that are located on or encroach upon that portion of the Land subject to any easement excepted in Schedule B, which damage results from the exercise of the right to maintain the easement for the purpose for which it was granted or reserved;

   b. resulting from the future exercise of any right to use the surface of the Land for the extraction or development of minerals excepted from the description of the Land or excepted in Schedule B.

ENDORSEMENT
RESTRICTIONS, ENCROACHMENTS, MINERALS - OWNER'S POLICY (MODIFIED FOR PLANS AND SPECIFICATIONS)

3. Any final court order or judgment requiring the removal from any land adjoining the Land of any encroachment excepted in Schedule B, or any such encroachment caused by future improvements on the Land completed in accordance with such plans.

4. Any final court order or judgment denying the right to maintain any existing improvements on the Land because of any violation of covenants, conditions, or restrictions, or building setback lines shown on a plat of subdivision recorded or filed in the Public Records, or any future improvements on the Land completed in accordance with such plans because of any violation of existing covenants, conditions or restrictions or building setback lines excepted in Schedule B.

Wherever in this endorsement the words "covenants, conditions, or restrictions" appear, they do not include the terms, covenants, conditions, or limitations contained in an instrument creating a lease.

As used in paragraphs 1.a. and 5, the words "covenants, conditions, or restrictions" do not include any covenants, conditions, or restrictions (a) relating to obligations of any type to perform maintenance, repair, or remediation on the Land, or (b) pertaining to environmental protection of any kind or nature, including hazardous or toxic matters, conditions, or substances, except to the extent that a notice of a violation or alleged violation affecting the Land has been recorded or filed in the Public Records at Date of Policy and is not excepted in Schedule B.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
as issuing agent

Dated: August 19, 2011

By:

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

ALTA ENDORSEMENT 17.2 (UTILITY ACCESS)

The Company insures against loss or damage sustained by the Insured by reason of the lack of a right of access to the following utilities or services: **[CHECK ALL THAT APPLY]**

☑ Water service ☑ Natural gas service ☑ Telephone service

☑ Electrical power service ☑ Sanitary sewer ☑ Storm water drainage

☐ _____

either over, under or upon rights-of-way or easements for the benefit of the Land because of:

(1) a gap or gore between the boundaries of the Land and the rights-of-way or easements;

(2) a gap between the boundaries of the rights-of-way or easements; or

(3) a termination by a grantor, or its successor, of the rights-of-way or easements.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
as issuing agent

Dated: **August 19, 2011**

By: _____

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AMERICAN LAND TITLE ASSOCIATION

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX09082496

ALTA ENDORSEMENT 18.1 (MULTIPLE TAX PARCEL)

The Company insures against loss or damage sustained by the Insured by reason of:

1. those portions of the Land identified below not being assessed for real estate taxes under the listed tax identification numbers or those tax identification numbers including any additional land:

Parcel:	Tax Identification Numbers:
Parcel 1 of the Land	17-10-218-007-0000 17-10-218-008-0000

2. the easements, if any, described in Schedule A being cut off or disturbed by the nonpayment of real estate taxes, assessments or other charges imposed on the servient estate by a governmental authority.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
as issuing agent

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Underwriter Policy No. OX08082496

ALTA ENDORSEMENT 26 (SUBDIVISION)

The Company insures against loss or damage sustained by the Insured by reason of the failure of the Land to constitute a lawfully created parcel according to the subdivision statutes and local subdivision ordinances applicable to the Land.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

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Underwriter Policy No. OX08082496

ALTA ENDORSEMENT 5.1 (PLANNED UNIT DEVELOPMENT)

The Company insures against loss or damage sustained by the Insured by reason of:

1. Present violations of any restrictive covenants referred to in Schedule B that restrict the use of the Land or the forfeiture or reversion of Title by reason of any provision contained in the restrictive covenants. As used in this paragraph 1, the words "restrictive covenants" do not refer to or include any covenant, condition, or restriction (a) relating to obligations of any type to perform maintenance, repair, or remediation on the Land, or (b) pertaining to environmental protection of any kind or nature, including hazardous or toxic matters, conditions, or substances, except to the extent that a notice of a violation or alleged violation affecting the Land has been recorded in the Public Records at Date of Policy and is not excepted in Schedule B.

2. Any charges or assessments in favor of any association of homeowners, that are provided for in any document referred to in Schedule B, due and unpaid at Date of Policy.

3. The enforced removal of any existing structure on the Land (other than a boundary wall or fence) because it encroaches onto adjoining land or onto any easements.

4. The failure of the Title by reason of a right of first refusal to purchase the Land that was exercised or could have been exercised at Date of Policy.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

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Underwriter Policy No. OX08082496

ALTA ENDORSEMENT 8.2 (COMMERCIAL ENVIRONMENTAL LIEN)

The Company insures against loss or damage sustained by the Insured by reason of an environmental protection lien that, at Date of Policy, is recorded in the Public Records or filed in the records of the clerk of the United States district court for the district in which the Land is located, unless the environmental protection lien is set forth as an exception in Schedule B.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy, or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

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Underwriter Policy No. OX08082496

ARBITRATION ENDORSEMENT (OWNER'S)

The provisions of paragraph 14, entitled "Arbitration", of the Conditions of this Policy are hereby deleted from the Policy.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
as issuing agent

Dated: August 19, 2011

By:

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

CONTIGUITY ENDORSEMENT (SINGLE PARCEL)

The Company insures against loss or damage sustained by the insured by reason of:

The failure of the Land to be a single contiguous parcel without the presence of any gaps, strips or gores within the Land.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

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as issuing agent

Dated: August 19, 2011

By: _____

ENDORSEMENT
ISSUED BY

Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

ALTA 25 SAME AS SURVEY

The Company insures against loss or damage sustained by the Insured by reason of the failure of the Land as described in Schedule A to be the same as that identified on the survey made by Homer L. Chastain & Associates, LLP dated May 12, 2011 and last revised July 20, 2011 and designated Job No. 5681.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

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Dated: **August 19, 2011**

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ENDORSEMENT
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Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

ACCESS ALTA 17

The Company insures against loss or damage sustained by the insured if, at Date of Policy:

(i) the Land does not abut and have both actual vehicular and pedestrian access to and from N. Lake Shore Drive (pedestrian only), E. Grand Ave. (pedestrian only), N. Peshtigo Ct. and E. Illinois St. (the "Street"),

(ii) the Street is not physically open and publicly maintained,

(iii) the Land is not contiguous to N. Lake Shore Drive along its Easterly boundary and is not contiguous to E. Grand Avenue along its Northerly boundary and is not contiguous to N. Peshtigo Ct. along its Westerly boundary and is not contiguous to E. Illinois St. along its Southerly boundary, or

(iv) the insured has no right to use existing curb cuts or entries along that portion of the Street abutting the Land.

This endorsement is issued as part of the policy. Except as it expressly states, it does not (i) modify any of the terms and provisions of the policy, (ii) modify any prior endorsements, (iii) extend the Date of Policy or (iv) increase the Amount of Insurance. To the extent a provision of the policy or a previous endorsement is inconsistent with an express provision of this endorsement, this endorsement controls. Otherwise, this endorsement is subject to all of the terms and provisions of the policy and of any prior endorsements.

Old Republic National Title Insurance Company,
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Old Republic National Title Insurance Company

Attached to File No. N01110139

Underwriter Policy No. OX08082496

EXTENDED COVERAGE

Standard Exception Numbers 1, 2, 3, 4 and 5 are hereby deleted from this Policy.

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Old Republic National Title Insurance Company,
as issuing agent

Dated: August 19, 2011

By: _____

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