SET Environmental, Inc.
450 Sumac Road
Wheeling, IL 60090
Phone: 847/537-9221 Fax: 847/537-9265

In partnership with:

SOIL EXCAVATION AND MONITORING REPORT
COMED UTILITY TEST PITS
550 NORTH ST. CLAIR STREET
CHICAGO, ILLINOIS

March 6, 2007

Enginex Project Number: 8039

Prepared For:
ComEd-ESD
Three Lincoln Center
Oakbrook Terrace, IL 60181

Prepared By:
Enginex Environmental Engineering
27834 North Irma Lee Circle
Lake Forest, IL 60045

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1.0 INTRODUCTION

Enginex Environmental Engineering (Enginex) was retained to oversee the completion of test pits and monitor radiation levels during soil excavation activities performed at 550 North St. Clair Street. The purpose of the test pits was to observe existing subsurface utilities, and determine the feasibility of installing additional electrical conduit within the identified right-of-way to allow Commonwealth Edison (ComEd) to run power service to new construction ongoing at that location.

The work site is in the Streeterville area previously identified by the United States Environmental Protection Agency (USEPA) and the Chicago Department of Environment (CDE) as potentially contaminated with thorium from historical operations at the former Lindsey Light and Chemical Company. The issuance of a City of Chicago right-of-way permit for excavation in this area requires that radiation monitoring be conducted. The USEPA and CDE has provided guidance for conducting radiation monitoring and implementing appropriate health and safety procedures for working in areas where higher levels of radiation may be present.

The following activities were performed prior to beginning the site work:

- ComEd obtained a right-of-way permit from the City of Chicago to perform the trenching activities.

- Enginex prepared the "550 North St. Clair Street - General Procedures for Thorium Monitoring" document (refer to Appendix A), which was forwarded to the USEPA prior to beginning the work. This document describes the radiation monitoring and soil disposal protocol that was followed during the site work.

- The USEPA health and safety plan for excavation work in the Streeterville area (refer to Appendix B) was incorporated into the overall safety procedures for the site work.

- A pre-site work kick-off meeting was held on February 20, 2007 between the various interested parties. Representatives from the following interested parties were present for the kick-off meeting: Enginex, Linn Mathis (site developer), Stan A. Huber Consultants, Inc. ([SAHCI]; radiation monitoring contractor), SET Environmental, Inc. ([SET]; soil disposal contractor), and Meade Electric ([Meade]; ComEd's electrical conduit installation contractor). SAHCI also took background radiation counts above the pavement, and Enginex took baseline photographs of the work area.

2.0 DAILY FIELD ACTIVITIES

The work scope consisted of excavating five test pits to locate and observe existing subsurface utilities along a right-of-way area where ComEd intends to route electrical conduit for power service to new construction ongoing at that location. The five test pits were excavated between February 21 and 23, 2007. The City of Chicago right-of-way permit allowed work to be performed between 9:30 AM and 3:30 PM each day. The test pits were spaced along the right-of-way on St. Clair Street between the ComEd utility vault located at the intersection with Ohio Street and an alley immediately south of the 550 North St. Claire building. One test pit was located at the intersection of Ohio Street, two test pits were located along St. Claire Street, and two test pits were located within the alley south of the building. Each test pit was approximately 81/2 feet long by 41/2 feet wide, with a depth ranging between 5 and 6 feet.

Traffic control, consisting of a combination of barricades (including lane closures), cones, and signs, was set up prior to the beginning of work each day. Steel plates and asphalt patch were laid across open test pit sections at the end of work each day. A safety meeting, STAR meeting, and job analysis were conducted by SET and (Meade) personnel prior to beginning work each day. Site photographs depicting the starting and ending site conditions and other activities are included in Appendix C.

The following presents a brief summary of work performed each day:

<u>February 21, 2007</u>

The Meade work crew arrived on-site at approximately 9:00 and began unloading equipment. SAHCI performed a shortened 30 minute training session on radiation safety, since members of the Meade work crew had received the training at previous job sites. Refer to SAHCI's report in Appendix D for an outline of topics covered during the radiation safety training session and an attendee sign-in sheet. Meade began setting up traffic control at approximately 9:30 AM. Saw-cutting of the pavement began at 10:00. A backhoe was used to perform the test pits, except where hand digging was necessary in the vicinity of identified utilities. The excavated pavement debris and soil was placed directly into a roll-off box delivered earlier by SET.

Excavation of the test pit #1 began at approximately 10:45 and was completed at approximately 12:30. A 24-inch gas main was observed in test pit #1, which required hand digging beneath it to the final trench depth of approximately 51/2 feet. Excavation of test pit #2 began at approximately 13:00 and was completed at approximately 14:30. No utilities were identified in test pit #2, so excavation was terminated at a depth of approximately 5 feet. Steel plates were placed over test pits #1 and #2 after their completion.

Trench excavation work ended at approximately 14:30. A single roll-of box of soil was generated. SAHCI collected three composite soil samples from the roll-off box at approximately 13:45. SAHCI also took radiation readings at the surface of the three remaining test pits, and measured elevated count rates above the location of test pit #3. Preparations were made for the possibility of encountering thorium-contaminated soil the next day. SET removed the roll-off box after the site work was completed for the day. Site work ended at 14:45, and personnel demobilized from the site.

<u>February 22, 2007</u>

The Meade work crew arrived on-site at approximately 9:00 and began unloading equipment. Meade began setting up traffic control at approximately 9:30 AM. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

The asphalt pavement was first removed above the location of test pit #3 to observe what was beneath the surface, and also take radiation readings of the soil to determine if thorium-contaminated soil was present. A layer of brick pavers from a past street surface was observed immediately below the asphalt, which was determined to be the source of the elevated radiation survey readings the previous day. Brick pavers are considered a natural source of radiation and did not require special handling and disposal. The radiation count rates for the soil screened beneath the brick pavers did not approach the action level.

Excavation of the test pit #3 began at approximately 11:00 and was completed at approximately 12:15. Jack-hammering and hand digging were required to remove the brick pavers, which slowed down the test pit excavations. No utilities were identified in test pit #3, so excavation was terminated at a depth of approximately 6 feet. Excavation of test pit #4 began at approximately 12:30. No brick pavers or elevated radiation count rates were observed at this location. Four to five separate utility lines were encountered in this test pit, which required most of it to be excavated by hand digging. Excavation activities for test pit #4 were discontinued at approximately 14:00. Steel plates were placed over test pits #3 and #4 at the end of the day.

Trench excavation work ended at approximately 14:00. A single roll-of box of soil was generated. SAHCI collected three composite soil samples from the roll-off box at approximately 14:30. SET removed the roll-off box after the site work was completed for the day. Site work ended at 15:00, and personnel demobilized from the site.

February 23, 2007

The Meade work crew arrived on-site at approximately 9:00 and began unloading equipment. Meade began setting up traffic control at approximately 9:30 AM. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Hand digging at test pit #4 was completed to a depth of approximately 6 feet. Excavation of test pit #5 began at approximately 11:15 AM. Test pit #5 was located in close proximity to test pit #4 and had the same utilities and required hand digging. Excavation activities for test pit #5 were discontinued at approximately 14:00. The depth of test pit #5 was approximately 6 feet. Steel plates were placed over test pits #4 and #5 at the end of the day.

Trench excavation work ended at approximately 14:00. A single roll-of box of soil was generated. SAHCI collected three composite soil samples from the roll-off box at approximately 14:30. SET removed the roll-off box after the site work was completed for the day. Site work ended at 15:00, and personnel demobilized from the site.

3.0 RADIATION FIELD SCREENING RESULTS

The field screening of radiation levels in the soil was performed by SAHCI using a Ludlum Model 2221 Scaler/Ratemeter with attached 2-inch by 2-inch NAI probe. The instrument was calibrated on October 24, 2006. The USEPA soil action level of 7.1 picocuries per gram (piC/g) total thorium for this instrument corresponds to 18,186 counts per minute (cpm).

Prior to beginning the trench excavation, background radiation levels were measured immediately above the pavement surface. Five random locations were selected for background readings in the area of the 550 North St. Clair Street site. The background readings were measured by collecting one-minute integrated counts at each of the selected locations. The background radiation levels ranged between 6,180 cpm and 11,476 cpm, and yielded an average level of 8,265 cpm. It should be noted that the background locations being above pavement likely yielded levels much lower than what would have been expected for urban soil and fill.

Soil gamma surface scans were performed after each 18-inch lift was removed from the trench. For the first five feet of the trench excavation, count rates were measured for the exposed soils along the trench floor and walls by entering the trench. Shoring had to be installed to support the trench walls after a depth of five feet, so entry into the trench to measure count rates was discontinued for safety reasons. At that point, count rates were measured for every 18-inch lift using the “Bucket Survey Method” prior to placement into a roll-off box. The highest measured count rates were recorded for the walls and floor of each section of the trench for each respective depth.

For the excavated soil, the radiation count rates ranged from 6,700 to 9,900 cpm for the five text pits. Count rates generally increased between a depth of 18 inches to 4.5 feet. The count rates for each of the depths from the five test pits were relatively consistent, and no obvious anomalies were observed. The count rates for test pit #4 were slightly higher than for the other four test pits. The count rates with depth were as follows: ranged between approximately 6,700 and 9,800 for the first 18 inches; ranged between approximately 7,700 and 9,900 from 18 inches and 3 feet; ranged between approximately 8,100 and 9,800 cpm from 3 feet to 4.5 feet; ranged between

8,100 and 9,800 from 4.5 feet to 6 feet for test pit #s 3, 4 and 5; and ranged between 8,100 and 9,800 cpm for the trench walls. The increase in count rates below a depth of 18 inches is likely due to the encountering of native soils and urban fill and the narrow geometry of the trench excavation. None of the measured count rates throughout the entire trench excavation approached the action level of 18,108 cpm. Consequently, the entire volume of the excavated soil was placed directly into roll-off boxes for off-site disposal.

For test pit #3, elevated count rates were measured above the pavement surface during screening prior to beginning the excavation. The asphalt surface was carefully pulled back to screen the surface soil prior digging. An intact layer of granite pavers (i.e., brick material used for past street surfaces) was found immediately below the asphalt surface. The radiation count rate on contact with the pavers was as high as 20,300 cpm. The elevated count rate for the granite pavers is due to Naturally Occurring Radioactive Material (NORM) found in granite. The removed brick pavers were not handled as thorium-contaminated material, which is routine protocol for this material that is found throughout the Chicago area and is known to contain NORM. Once the section of granite pavers was removed, the count rates for the soil beneath it did not approach the 18,186 cpm action level.

Refer to SAHCI's report in Appendix D for further details regarding the soil screening, as well as a drawing identifying the respective trench sections.

4.0 LABORATORY ANALYSIS AND SOIL DISPOSAL

Since the field screening readings did not exceed the 7.1 piC/g action level, soil excavated from the test pits was transferred directly into a roll-off box for off-site disposal. Three roll-off boxes of soil were generated during the test pit activities. Approximately seven cubic yards of soil were placed inside of the roll-off box. The roll-off boxes were transported to SET's facility in Wheeling, IL for storage until receipt of the analytical results and final disposition.

To verify the field screening results, composite soil samples were collected from the roll-off box for laboratory analysis of radiation levels. Three 20-milliliter (ml) composite soil samples were collected by SAHCI from the single roll-off box for laboratory analysis. The three composite samples represented approximately a third of the area of the respective roll-off box. Each composite sample was created by using a small manual auger to collect discrete samples from a minimum of four locations. The discrete samples were screened to remove solids greater than ¼-in and then mixed within a collection tray to homogenize. A 20-ml sample vial was then filled from the homogenized composite soil sample in the collection tray.

Each composite soil sample collected from the roll-off box was analyzed for radiation levels by SAHCI at its laboratory in New Lenox, IL after using a Canberra Genie 2000 NaI Gamma Spectroscopy System with NUTRANL software. The "total radium activity (TRA)" value from each laboratory analysis was used for comparison purposes against the 7.1 piC/g action level. The TRA values for composite soil samples from the three roll-off boxes ranged between 0.26 and 2.31 piC/g. None of the TRA values approached the action level of 7.1 piC/g action level, which was consistent with the field screening results (refer to SAHCI report in Appendix D). Consequently, the three roll-off boxes containing the trench excavation soils and pavement debris were disposed of as non-regulated material at the Onyx Landfill in Zion, IL. The analytical results were sent electronically to the USEPA for review upon receipt.

Worker exposure to radiation was also measured during the trench excavation activities using both personal air samplers and dosimeter badges. Two workers per day that worked closest to the trench excavation activities (i.e., theoretically had the highest exposure risk) were selected to wear personal air sampling devices throughout the duration of each work day. In addition, a total of five radiation dosimeter badges were assigned to individuals that worked in the closest vicinity of the trench excavation to be worn over the duration of the site work.

A Gillian Model BDX II Low Volume Person Air Sampler was used to perform the worker exposure air sampling. Each air sample was analyzed on a daily basis by SAHCI at its laboratory in New Lenox, IL. The air samples were analyzed the day after collection for gross alpha concentrations and again after four days if background was exceeded. The "day after" count serves as a comparison to identify high counts from the previous day. Thorium 232 has the lowest allowable air exposure level and was used as the basis of comparison. Thorium 232 was not found after analysis of the four-day count in any of the air samples (refer to SAHCI report in Appendix D for a summary of the air sampling protocol and the results of the laboratory analyses).

Landauer OSL (Optically Stimulated Luminescence) dosimeter badges were used for longer-term worker exposure analyses. The five assigned dosimeter badges were worn by workers throughout the duration of the trench excavation. The badges were submitted to Landauer for analysis on February 24, 2007.

5.0 FINAL SUMMARY

Five test pits were performed between February 21 and 23, 2007. The purpose of the test pits was to observe existing subsurface utilities, and determine the feasibility of installing additional electrical conduit within the identified right-of-way to allow Commonwealth Edison (ComEd) to run power service to new construction ongoing at that location. The work site is in the Streeterville area previously identified by the USEPA and the CDE as potentially contaminated with thorium, and thus required soil radiation levels to be monitored over the duration of the trench excavation for purposes of worker exposure and proper soil disposal. Procedures approved by the USEPA for soil radiation monitoring and soil disposal were followed.

The field screening of radiation levels in the soil was performed by SAHCI. Soil gamma surface scans were performed after each 18-inch lift was removed from the test pits. None of the measured count rates throughout the excavation of the five test pits approached the action level of 18,108 cpm. Consequently, the entire volume of the excavated soil was placed directly into three roll-off boxes for off-site disposal.

To verify the field screening results, composite soil samples were collected from the three roll-offes box for laboratory analysis of radiation levels. Each composite soil sample collected from the roll-off box was analyzed for radiation levels by SAHCI at its laboratory in New Lenox, IL. None of the TRA values approached the action level of 7.1 piC/g action level, which was consistent with the field screening results. Consequently, the three roll-off boxes containing the test pit excavation soils and pavement debris were disposed of as non-regulated material at the Onyx Landfill in Zion, IL.

Worker exposure radiation levels were also measured during the trench excavation activities using both personal air samplers and dosimeter badges. Results from the worker exposure monitoring showed minimal radiation exposure over the duration of the trench excavation activities.

APPENDIX A
GENERAL PROCEDURES FOR THORIUM MONITORING

SET Environmental, Inc
SET Environmental, Inc.
450 Sumac Road
Wheeling, IL 60090
Phone: 847/537-9221 Fax: 847/537-9265

550 North St. Clair, Chicago, IL
General Procedure for Thorium Monitoring

PRIOR TO WORK COMMENCING

- A permit and health & safety plan (HASP) will be obtained from IL DOE. - ComEd
- The “General Procedure” will be forwarded to the EPA for approval prior to commencing work. - Enginex
- USEPA will be contacted 48 hours prior to performing a walkover survey so that they may be present. - Enginex
- Permission will be obtained prior to beginning site work from the corresponding property owner(s) for which the electrical tie-in is being performed for the temporary storage of secured roll-off box(es) of thorium-contaminated soil that may be generated and require alternative disposal arrangements. - SET
- Site work and initial site conditions will be documented. - Enginex
  - Photographs of entire site before breaking ground will be taken.
  - For purposes of generating a site figure, an aerial photograph is not necessary. A map with measurements from a fixed feature (e.g., a curb) would suffice.
  - A walk-over survey will be conducted in the work location (site) and background gamma readings recorded. Background is considered to be 2.1 picoCuries per gram (pCi/g) as established for the Lindsay Light II sites.
- Sanitary facilities will be provided. - SET
  - Portable chemical toilets will be supplied.
  - Adequate washing areas will be provided.
- SET will review USEPA HASP and General Procedure.
- Enginex will review USEPA HASP and General Procedure.
- Meade will review USEPA HASP and General Procedure.

WORK SCOPE

- Health and safety meeting (e.g., tail-gate meeting) will be conducted before starting site work each day.
  - Potential exposure to thorium-impacted soil and what types of testing will be performed will be reviewed. - Enginex, page ii & 3, 6
  - Contents of the USEPA HASP will be discussed and general health and safety concerns covered (i.e. PPE, traffic, heavy equipment). – SET & Meade, pages 1-47
  - Clean/support, decontamination, and exclusion zones will be established if needed in the event the field screening readings are above the action level of 7.1 piC/g. - SET, page 4
  - A first-aid station will be set up. - SET, page 11

- The location of phone numbers and procedures for contacting ambulance services, fire dept, police and medical facilities will be identified. - SET, page 11
- The location of maps and routes to the closest medical facilities will be identified. - SET, page 11
- The location of sanitary facilities will be identified. - SET, page 34
- Personal and ambient air monitoring equipment will be administered for use. - Enginex, page 24

- Document readings and samples:
  - Personal Monitoring: Records of all radiation exposures incurred by field personnel will be maintained. - Enginex, page 10, 24-28
  - Surface Soil Scan Procedure: The excavation shall be screened for radiation count rates using a Ludlum Model 2221 Scaler / Ratemeter with attached 2”x 2” NaI probe. The instrument shall be calibrated for thorium with an established count rate threshold that correlates to the USEPA action level of 7.1 piC/g. The trench shall be excavated in lifts not to exceed 18 inches in depth.
    - After each lift, the trench shall be surveyed for total radiation count rate and the maximum level recorded. Down to an excavation depth of 41/2 feet below ground surface (i.e., before OSHA regulations require use of trench shoring or benching), the trench shall be entered to survey both the walls and floor. Beyond an excavation depth of 41/2 feet below ground surface, the trench floor shall be surveyed using the “Excavator Bucket Survey” procedure described below for each 18-inch lift upon removal from the trench. At this point, it will no longer be feasible to survey the trench walls, since they will be mostly covered by the shoring. A six-inch detector shield may be utilized if deemed necessary to obtain accurate survey results. - Enginex
  - Excavator Bucket Survey Procedure: After excavated soil is removed from the trench, the surface of the soil shall be surveyed for total radiation count rate within the excavator bucket before it is emptied. If the radiation count rates are at background levels at the soil surface in the excavator bucket, the soil spoils can be loaded directly into the clean soil roll-off box. If any count rates are noted above background levels but below the action level of 7.1 pCi/g, the bucket spoils shall be emptied on a known surface or plastic sheeting and resurveyed. If the follow-up survey shows no count rates greater than the action level of 7.1 pCi/g, the soil spoils can be then be loaded into the clean soil roll-off box. - Enginex
  - Thorium-Contaminated Soils Procedure: If any excavated soils are found during either surface scanning or bucket surveys with a count rate greater than the 7.1 pCi/g action level, then those soils shall be isolated, placed in supersacks, and stored in a locked roll-off box pending further sampling for laboratory analysis and disposal evaluation. The area of thorium-contaminated soils above the action level shall then be roped off and isolated as an exclusion zone. A sample of the material with the highest radiation count rate (whether excavated or in the trench) will be collected as a discrete sample and sent for laboratory analysis for confirmation purposes (if requested, this sample will also be provided to the USEPA). The trench location from which any material exceeding the action level is identified will be documented. Proper PPE, including Tyvek suits, rubber boots, and latex gloves will be worn by any personnel entering an exclusion

zone. Additionally, high volume air sampling will be implemented prior to moving or loading thorium-contaminated soil. All personnel and equipment leaving an exclusion zone shall be monitored for removable contamination. - Enginex

- Soil removal and sampling:
  - Soil removed from the excavation shall be stored in covered roll-off boxes off-site pending results of laboratory analysis. Three 20-milliliter (ml) composite samples shall be collected from each roll-off box. Each composite sample shall consist of soil gathered from a minimum of four separate sampling locations. The composite soil sample shall be screened to remove solids greater than ¼-inch, homogenized, and placed into the sample vial. Soil samples shall be sent for laboratory analysis after each work day. The analytical results will be submitted to the USEPA in electronic format for review prior to final soil disposition. - Enginex
  - ComEd will adhere to the following soil disposal protocol unless the USEPA requests a variation to the protocol either prior to the beginning of the trench excavation or within one week of receipt of the analytical results for review (e.g., USEPA requests roll-off boxes be held pending receipt of confirmatory analytical results for samples sent to USEPA laboratory). If the laboratory analytical results show a result less than the 7.1 pCi/g action level for each of the three composite samples collected from the individual roll-off boxes, the corresponding roll-off boxes will be disposed of as clean fill. If the laboratory analytical results are at or above the action level of 7.1 pCi/g for at least one of the three composite samples collected from the individual roll-off boxes, the corresponding roll-off boxes will be held pending the results of further evaluation and feedback from the USEPA, which may include further sampling and testing of the roll-off box(es) in question or receipt of results from the USEPA confirmation soil samples. Alternative soil disposal methods or additional sampling, subject to USEPA approval, will be implemented for any soils with a concentration exceeding the 7.1 pCi/g action level. - Enginex
  - ComEd must provide information on final material disposition locations for soil disposed of as clean fill. - SET
  - The USEPA should contact Enginex to make arrangements for the analysis of confirmation soil samples before or immediately following the completion of site work. The USEPA should provide a written request or Email identifying the specific samples it has selected for confirmatory analysis and the laboratory to where they should be forwarded. - USEPA
- Minimize potential public contact:
  - Public access to excavated soil will be restricted using barricades, temporary fencing, and jersey barriers. - Meade & SET, page ii
  - Excavated soil piles will be covered if needed to minimize fugitive dust. - Meade & SET, page ii
  - Off-site tracking by vehicles and potentially contaminated boots or clothing by workers will be controlled. - Meade & SET, page ii
- Photographs of area once work is completed will be taken. - Enginex
- A final report that contains the results of the radiation monitoring and/or surveying will be completed. - Enginex

- The final written report will be submitted to the following agencies: (page ii). - SET
  - USEPA
  - IL Department of Energy
  - Illinois Department of Nuclear Safety: Phone No. 217-785-0600
  - Chicago Department of the Environment: Phone No. 312-744-7672
  - IEMA (Illinois Emergency Management Agency): Phone No. 217-782-7860

APPENDIX B
USEPA HASP

United States
Environmental Protection
Agency

Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604

Illinois, Indiana
Michigan, Minnesota
Ohio, Wisconsin

EPA

Before You Dig - Tips for Construction Activities in the Streeterville Area

Chicago, Illinois

February 2001

INTRODUCTION

The purpose of this update is to provide basic background information on the history of thorium within the Streeterville area and basic procedures when uncovering or intruding into subsurface soils within the potentially contaminated area.

BACKGROUND

In the 1990's, U.S. EPA became involved in Streeterville due to the discovery and excavation of approximately 40,000 tons of radioactive thorium-contaminated soils that were located during property development and utilities installation and maintenance. Additional subsurface thorium contamination has been found in other Streeterville locations. This contaminated material must be managed in accordance with State and Federal environmental requirements. U.S. EPA believes that radioactive material from the Lindsay Light and Chemical Company (Lindsay Light) was disposed of in the Streeterville area, but there is no complete information where it was disposed.

Our historical research indicate that beginning in about 1904 and continuing, perhaps, through the mid 1930's, Lindsay Light manufactured thorium mantles impregnated with thorium in the City of Chicago. The Lindsay Light operation originated at 22 West Hubbard and later moved to 161 East Grand and 316 East Illinois Street in Chicago, Illinois. Ore was processed at the Illinois Street site and made into mantles at the East Grand site.

Details regarding Lindsay Light operations at 22 West Hubbard are very sketchy. From the early 1900s until the early 1920s, the 22 West Hubbard building was a five-story building occupied by Lindsay Light, however, it is not known which operations took place at this location. About 1932, Lindsay Light began moving to West Chicago, Illinois and closed its Streeterville operations by about 1936.

PROCEDURES

If subsurface thorium wastes are uncovered without proper environmental controls, workers and the public may be exposed to elevated radiation levels. Also, if not managed properly, the radioactive materials might be spread to other locations. If your work involves removing the asphalt, concrete or other materials covering subsurface soils or tunneling, digging or otherwise intruding into subsurface soils, the following radiation survey testing procedures must be followed. The results should be presented in a written report sent to U.S. EPA. This report should be detailed enough that someone not present would be able to follow the actions performed. Please call U.S. EPA 48 hours prior to performing a walkover survey so that we may observe. This report should be given to U.S. EPA prior to breaking ground in Streeterville.

- **Determine the site radiation level.** Hold a gamma-ray survey probe (sodium iodide detector) about 6 inches off the ground and walk the entire area along parallel lines about 3 - 4 feet apart. The site background level is determined by looking at the lowest count rate readings and looking for spots and regions of elevated radiation levels. If background readings appear to be elevated over expectations, U.S. EPA may ask for an off-site determination of background for the area.

- **Quantify exposure environment.** Take readings of 30 second counts, on contact with the ground, at intervals of 10 feet along parallel lines five feet apart to quantify the exposure environment (these include background levels). Next, take readings at selected spots where initial readings were over twice the background level.

- **Assess an anomaly.** If readings indicate anomalies, then subsurface gamma-ray count rate readings and soil samples will need to be collected. These samples will need to be analyzed for radionuclide identification and quantification. However, radioactive waste may be created here and workers and equipment could get contaminated, so this phase should not be done without a U.S. EPA approved health and safety plan and a means of disposing of contaminated soil, protective clothing, etc.

FOR ADDITIONAL INFORMATION

If you have questions about these procedures, equipment specifications, or thorium contamination in Streeterville, please contact:

Verneta Simon
On-Scene Coordinator
Superfund Division (SE-5J)
(312) 886-3601
simon.verneta@epa.gov

Fred Micke
On-Scene Coordinator
Superfund Division
(312) 886-5123
micke.fredrick@epa.gov

Larry Jensen
Senior Health Physicist
Superfund Division
(312) 886-5626
jensen.larry@epa.gov

24-hour response number
(312) 353-2318

Lindsay Light site-related information is available at the following location:

Harold Washington Public Library
400 South State
Chicago, Illinois

Monday: 9:00 a.m. to 7:00 p.m.
Tues. and Thurs.: 11:00 a.m. to 7:00 p.m.
Wed., Fri., and Sat.: 9:00 a.m. to 5:00 p.m.

WEB SITE

This and additional updates can be found at the following web site:

www.epa.gov.region5/sites/

Scroll down through the list to find the Lindsay Light II/RV3 North Columbus Drive site.

HEALTH AND SAFETY PLAN

Title: Health and Safety Plan

Revision Number: 0

Date: Replaces: New

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FIGURES

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
NEAREST HOSPITAL	
ILLINOIS DEPARTMENT OF NUCLEAR SAFETY (IDNS) EMERGENCY NUMBER	(217) 785-0600
PROJECT COORDINATOR	
ILLINOIS EMERGENCY MANAGEMENT	(217) 782-7860
USEPA REGION 5 - 24-HOUR EMERGENCY NUMBER	(312) 353-2318

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

Notify agencies identified on the enclosed emergency notification list.

USEPA	312-353-2318	(US Environmental Protection Agency)
IDNS	217-785-0600	(Illinois Department of Nuclear Safety)
Chicago D.E.	312-744-7672	(Chicago Department of the Environment)
IEMA	217-782-7860	(Illinois Emergency Management Agency)

Notification should include, as a minimum, the following

- Location of Excavation

- Potential Contact with Thorium Containing Soil (11 (e)(2) by-product material)

- Field surveys and sampling measured a maximum reading of ________ cpm (if readings have been taken) in soils remaining, although higher concentrations may be present.

The following support services should be secured:

- Gamma radiation survey equipment (micro-R meter, NaI detector) should be secured promptly for site screening.

- Health Physics contractors, personnel and monitoring equipment should be secured promptly to provide survey and monitoring services in accordance with the attached plan, and to survey equipment for release as uncontaminated.

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 _________ (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 the ______________________________ 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.

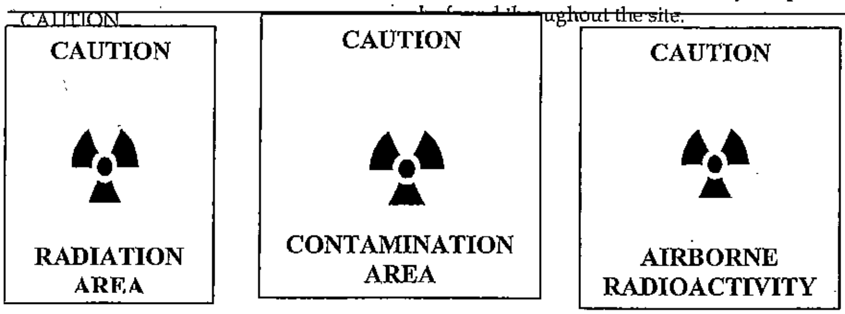
This plan meets the requirements of OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and applicable subparts of OSHA 29 CFR 1926, 1910 and 10 CFR. Visitors will be required to review the health and safety plan and read and sign the visitor information sheet (Figure 1.1).

FIGURE 1.1
VISITOR INFORMATION SHEET

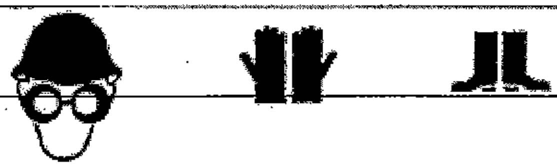
VISITOR INFORMATION

NOTICE TO VISITOR: ALL VISITORS MUST BE ESCORTED AT ALL TIMES WHILE ON THIS SITE.

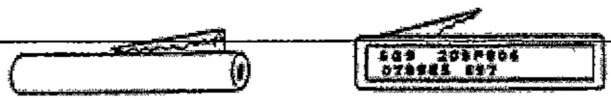
CAUTON. Radioactive materials may be present on this site. Radioactive materials may be found throughout the site.



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.

Name____ Date____________________

2.0 SAFETY MANAGEMENT

The following safety management structure 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 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.

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.

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. Known impacted areas where exclusion zones are to be established during the removal effort are shown on Figure 3.1. Although the clean/support zones are anticipated to remain fixed, other zones will move about the Site as excavation work progresses.

Figure 3.1 - Impacted Areas Where Exclusion Zones May Be Established

4.0 HAZARD ASSESSMENT

The following represents potential hazards associated with this project.

4.1 PRINCIPAL CONTAMINANTS (KNOWN OR SUSPECTED)

- Thorium
- Uranium
- Radium
- Radon

The contaminants are present in the soil at low concentrations. These primary routes of entry to the body will be considered:

ROUTE	ENTRY MADE VIA:
Inhalation	Airborne dust containing heavy metal radionuclides.
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.

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 to note 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

If the field activities occur 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 to determine noise levels.

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 Material Safety Data Sheets (MSDS) 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

All project personnel shall participate in a dosimetry program administered by the Project Health Physics Personnel. (The dosimetry program shall comply with 32 IAC 340[1] , i.e. dosimeters shall be processed by a dosimetry processor accredited by the National Voluntary Laboratory Accreditation Program.) The Project Health Physics Personnel 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, all individuals shall be required to use a dosimeter (either self-reading type, film badge or Thermoluminescence Detector (TLD)) 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.

Bioassays are not anticipated to be required for the excavation and removal activities proposed, based on levels documented as present. The determination of the need for bioassay will be based on dosimetry monitoring and review and recommendations from the Project Health Physics personnel.

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.

[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.

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.
- 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 Project Manager. A copy of the form is shown as Figure 4.1.

FIGURE 4.1 (PAGE 1 OF 3)
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 (PAGE 2 OF 3)
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		

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 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 applicable radiological 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 1912; 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 1912 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. 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, 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.

(A Safe Work Permit will be required to be completed and will be included as Figure 5.2. A Confined Space Entry Permit will be required to be completed and is included as Figure 13.1.)

SAFETY MEETING REPORT (PAGE 1 OF 2) (FIGURE 5.1)

Date	Division	Department	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	

Supervisor's Presentation	Discussion of Safe / Unsafe Work Practices, Materials, Precautions, Hazards, Equipment Familiarization, etc.
Employee Feedback	Comments, Questions, Complaints, etc.
Supervisor's Corrective Action Plan	Known Plans for Correction, Parts on Order, Items to Be Discussed with Depart. Head, and correction of Items Previously Submitted
Department Head Comments	Resolution of Questions, Items or Issues Raised in Meeting or With Supervisor

Supervisor	Department Head
Facility Manager	Have Employees Attending Sign on Reverse Side. Forward a Copy to the local Safety Department

Safety Meeting Report (Page 2 of 2)

To Be Signed by All Employees Attending the Meeting			
I have received and understand the information and/or training indicated on the reverse side.			
Signature	Date	Signature	Date

List All Employees Absent from the Meeting	

Insert Safe Work Permit Figure 5.2

Permit to be provided by Contractor

FIGURE 5.3
SITE SAFETY PLAN
LOW CONTAMINATION OF FUEL,
PNAs IN SOILS

<u>SUMMARY INFORMATION</u>

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 the Site Security Plan (Appendix E to the Removal Action Work Plan) and 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, dust suppression will be important as a means of minimizing exposure levels and off-site migration of contaminants. The Field Team Leader will routinely monitor the project area. The OSHA personal exposure limit (PEL) for nuisance dust is 15 mg/m3.

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, and
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity areas.

By closely monitoring these three elements, a continuous record of personnel exposure to airborne radioactivity is maintained.

Lapel samplers worn for personal air monitoring can be utilized for airborne radioactivity monitoring. Air filters shall be analyzed on a daily basis to determine potential contributions to dose from radionuclides. 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. Such analyses shall be performed after allowing time for decay of some interfering radionuclides.

Downwind monitoring of the excavation areas for radioactive particulate activity also will be performed. High volume air samplers shall run continuously during operations and be evaluated on a daily basis for gross alpha activity. Comparisons will be made to 32 IAC 340 Appendix A to ensure that adequate radiological controls are in place for workers and the general public. As low as reasonably achievable (ALARA) concepts will be utilized when considering protective measures to ensure that internal exposures are minimized, while also considering the effects of such protective measures with respect to external exposures. Controls on the Site, such as wetting of soils and procedural changes, will be employed prior to the prescription of respiratory protective equipment.

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 is best addressed in procedures rather than in the health and safety plan. Air samples will be decayed a minimum of 5 hours to allow for counting without interference from radon-222 and its daughters. Thoron (Rn-220), if present in significant amounts, will require decay for up to 4 days to allow for decay of it is Pb-212 daughter (10.6 hour half life).

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 regulatory limits for workers and the general public. Radiation surveys will consist of ambient gamma surveys using micro-R meter or Geiger detectors, as appropriate, and contamination surveys.

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 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 ACTION LEVELS

7.7.1 Radiological Action Levels

Radiological action levels for on-site workers will be determined by smear/swipe measurements as well as airborne particulate monitoring for the presence of radioactivity. The Field Team Leader 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.

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.

Radiation Type	Action Level	Level of Respiratory Protection/Action
a. Contamination on smear samples	60 pCi/100 cm^2 gross alpha [a]	Consider modified Level C (full- face APR) based upon ALARA evaluation.
b. Airborne Radioactivity	30% DAC[b]	Consider Level C (full-face APR) based upon ALARA evaluation. Ensure proper posting. Consider internal monitoring
c. Ambient Gamma (work areas)	5 mrem/hr[c]	Consider procedures for shielding of soils. Ensure proper posting.
d. Ambient Gamma (off-site areas)	2 mrem/hr[d]	Implement immediate controls to reduce dose equivalent rate.

Notes

(a) This is approximately 3 times the unrestricted release criteria in the NRC Regulatory Guide 1.86. If any dry-brushing or otherwise abrasive-type decontamination of the sampled equipment is required, the Action Level shown shall require modified Level C (full-face APR).

(b) 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.

(c) 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.

(d) 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
- Hard hat
- Chemical resistant, OSHA approved safety shoes/boots
- Cotton or leather gloves
- 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
- Cotton or leather gloves
- 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
- Chemical-resistant steel toe boots
- Hard hat

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 7.0 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. It is not anticipated that chemical cleaning will be necessary for decontamination.

9.2 PERSONNEL

If levels of radioactivity show that individuals can remove coveralls and other personal protective clothing and equipment before leaving the work-site and, thus complete decontamination, the individuals may leave the Site. 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 ______________________________ 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
- 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 (e.g., 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 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.

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 Confined Space Entry Permit (Figure 13.1) 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

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.

CONFINED SPACE ENTRY PERMIT (FIGURE 13.1)
(Pre-Entry/Entry Check List)

Date and Time Issued: ______ Date and Time Expires: ______

Location and Description of Confined Space: ______

Purpose of Entry: ______ Job Supervisor: ______

PRE-ENTRY CHECKLIST

1. Atmospheric Checks:

Time	______	Initials ______			
Oxygen	______	______	______	______	% (Record first)
Explosive	______	______	______	______	% L.E.L.
Toxic	______	______	______	______	PPM H_2S

	N/A	Yes	No
2. Source isolation (No Entry):			
Pumps or lines blinded	☐	☐	☐
disconnected, or blocked	☐	☐	☐
Lockout-De-Energized	☐	☐	☐
3. Ventilation Modification:			
Mechanical (grounded)	☐	☐	☐
Natural Ventilation only	☐	☐	☐

4. Atmospheric check after isolation and ventilation:

						Permissible	
Oxygen	______	______	______	______	%	>19.5	<23.5
Explosive	______	______	______	______	%L.E.L.*		<10%
Toxic	______	______	______	______	PPM	<10PPM H_2S	
Time	______						

Instrument Name, I.D.#, & Calibration date: ______ ______ ______

Instrument Worn by Entrant (name): ______

	N/A	Yes	No
5. Emergency Escape Respirator			
Worn by entrant	☐	☐	☐

6. Other hazards: ______

Must complete Entry Checklist, on right, if there are other hazards. If conditions are in compliance with the above requirements and forced air ventilation alone controls <u>all the hazards</u> in the space and there is no reason to believe conditions may change adversely, then <u>entry</u> may proceed. Complete and post this checklist with this permit. If conditions are not in compliance with the above requirements or there is reason to believe that conditions may change adversely, proceed to the right-hand side Entry Checklist portion of this permit and acquire attendants, additional equipment, and emergency numbers

Should alarms sound or any indication of ill effects becomes evident entrant must evacuate the area. **VOID IF ENTRY NOT STARTED WITHIN 30 MIN. OF TESTING**

ENTRY CHECKLIST (MUST BE COMPLETED IF THERE ARE):

- Uncontrolled atmospheric hazards
- Engulfment hazards
- Odd internal configuration that could cause entrapment or asphyxiation
- Other recognized safety or health hazards

PERMIT REQUIRED CONFINED SPACE

1. Entry, standby, and back up persons: Yes ☐ No ☐

Successfully completed required training? ______ name of entrant Yes ☐ No ☐

Is it current? ______ name of attendant Yes ☐ No ☐

2. Equipment:	N/A	Yes	No
Direct reading gas monitor - tested (calibrated) - worn on entrant	☐	☐	☐
Safety harnesses and lifelines for entry and standby persons	☐	☐	☐
Hoisting equipment	☐	☐	☐
Communication Procedures ______	☐	☐	☐
Respiratory Protection (SCBA)	☐	☐	☐
Rescue Equipment	☐	☐	☐
Signs Posted/Area Secured	☐	☐	☐
Protective Clothing	☐	☐	☐
All electric equipment & lighting listed Class I, Division I, Group D and Non-Sparking tools	☐	☐	☐

3. Rescue Procedure and Emergency

Ambulance #

Local Hospital # ______

Fire # ______

Safety Supervisor # ______

Non-entry rescue by retrieval system employed as indicated above. Emergency escape respirator for entrant (10 min). Should alarms sound or any indication of ill effects becomes evident the entrant must evacuate the area.

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Supervisor Authorizing entry ______

All above conditions satisfied (printed names and signatures of confined space operations personnel)

______ ______ ______

signature signature signature

This permit to be kept at job site. Return job site copy to Safety Office following job completion.

Remarks (comment on any problems encountered) ______

* L.E.L. - Lower Explosion Limit

N/A = Not Applicable

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 C
SITE PHOTOGRAPHS

Photo 1: Taken south to north. Shows locations of planned test pits along St. Clair near alley and looking north towards Ohio prior to beginning work.

Photo 2: Taken east to west. Shows south end and alley locations of planned test pits prior to beginning work.

Photo 3: Taken south to north. Shows radiation walkover survey above location of test pit #1 prior to beginning excavation.

Photo 4: Taken south to north. Shows excavation of test pit #1, with backhoe loading clean soil into roll-off box.

Photo 5: Taken south to north. Shows 24-inch gas main crossing test pit #1 location.

Photo 6: Taken east to west. Shows placement of steel plate over test pit #1 after its completion.

Photo 7: Taken west to east. Shows radiation screening of soil in test pit #2.

Photo 8: Taken south to north. Shows completion of test pit #2 with no utilities present.

Photo 9: Taken east to west. Shows brick pavers (i.e., old pavement surface) beneath the asphalt surface at test pit #3 location that created elevated radiation surface screening count levels.

Photo 10: Taken south to north. Shows multiple utilities crossing test pit #4 location.

APPENDIX D
SAHCI THORIUM MONITORING REPORT

Stan A. Huber Consultants, Inc.
Health Physics and Radiation Safety Services

200 North Cedar Road—New Lenox, Illinois 60451-1751—(800) 383-0468 or (815) 485-6161—FAX (815) 485-4433—Email sahci@sahci.com—Home Page www.sahci.com

February 26, 2007

Meredith Cywinski
General Manager
Enginex Environmental Engineering
28734 North Irma Lee Circle
Lake Forest, Illinois 60045

RE: 550 N. St. Clair St. – ComEd Test Hole Monitoring

Dear Ms. Cywinski:

Stan A. Huber Consultants, Inc (SAHCI) was hired by your firm to provide radiation monitoring during excavation of five ComEd test holes at 550 N. St Clair St, in Chicago, Illinois. The monitoring was performed on February 21 – February 23, 2007. All activities were conducted under the guidance of document *550 N. St Clair St, Chicago, IL – General Procedure for Thorium Monitoring.*

Radiation Safety Training

On February 21, 2007 I performed a radiation safety training session for the contractors working on the project. The training was approximately one-half hour in duration. The training outline and attendance sheet can be found in Attachment 1.

Instrumentation

Surface gamma scans were performed using a Ludlum Model 2221 Scaler / Ratemeter with attached 2"x2" NaI probe. The instrument was calibrated on October 24, 2006. The USEPA action level of 7.1 picocuries per gram (pCi/g) total thorium for this instrument is 18,186 counts per minute (cpm).

Background was determined for this site by selecting 5 random locations on St. Clair Street and collecting one-minute integrated counts at each location. The following count rates were collected:

Location 1	6180 cpm
Location 2	11476 cpm
Location 3	9792 cpm
Location 4	6775 cpm
Location 5	7104 cpm
	8265 cpm = average background count rate

Soil Gamma Scans

Gamma surface scans were performed using the Ludlum Model 2221 Scaler / Ratemeter described above. Data was collected by entering the excavation after each 18 inch lift and recording the highest count rate for the floors and walls. This method was used until the excavation was approximately 4.5 feet deep. The bucket survey method was utilized for all soils excavated below 4.5 feet deep.

The maximum gamma count rate for each section and lift was recorded on the Radiation Survey Form found in Attachment 2.

There was a section of pavement around test hole #3 that showed an elevated count rate at the surface. Typically the count rate over pavement is around 5000 cpm to 8000 cpm. However, this area showed a consistent count rate of approximately 12,000 cpm at the surface. The surface asphalt was carefully pulled back and an intact layer of granite pavers was found. The count rate on contact with the pavers was as high as 20,300cpm. The elevated count rate is due to Naturally Occurring Radioactive Material (NORM) found in the granite. Although the count rate is above the action level of 18,186 cpm, the pavers were removed and not handled as thorium impacted material. This is normal protocol when dealing with this type of pavers that are found throughout the Chicago area and known to contain NORM. After the pavers were removed the soil directly below was screened and found to have a maximum count rate of 8700 cpm, which is well below the action level.

Other than the section of granite pavers, no other count rates were found in any of the test holes that exceeded the threshold limit of 18,186 cpm.

Soil Sample Analysis

All soils were placed directly into a 20 cubic yard roll-off container after excavation. 3 composite soil samples were obtained from each roll-off container. The samples were analyzed using a Canberra Genie 2000 NaI Gamma Spectroscopy system with NUTRANL software.

9 total samples were collected from the 3 roll-off containers that were filled over the course of the project. Analysis results and copies of the Chain of Custodies of the soil samples collected from these containers can be found in Attachment 3.

Air Monitoring

Personnel air monitoring was performed by collecting air samples with Gilian Model BDX II Low Volume Personal Air Samplers. Two samples were collected each day that excavation took place. The air samplers were assigned to the two workers that were most likely to be exposed to airborne particulates.

Each sample was analyzed the day after collection for gross alpha concentrations and again after 4 days if background was exceeded. The “day after” count serves 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, serves as the official measurement of thorium-alpha.

The most restrictive air concentration of all of the radionuclides that could potentially be encountered during excavation is for Th-232, with the following limits:

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

There were no instances where Th-232 was found after analysis of the 4 day count. Air sample analysis data is summarized in Attachment 4.

Personal Dosimetry

Each worker that would be entering the excavation was assigned a Landauer OSL (Optically Stimulated Luminescence) dosimeter prior to the start of the project. A total of 5 dosimeters were issued. The dosimeters were submitted to Landauer for analysis on February 26, 2007. The exposure report will be submitted as soon as it is received.

Thank you for your assistance with this project. If you have any questions or need additional information please call me at (815) 485-6161.

Sincerely,
Stan A. Huber Consultants, Inc.

Glenn Huber, CHP
President

Attachment 1

Training Documentation

550 N. St. Clair Street – ComEd Test Holes

Radiation Safety Training Verification Form

550 N. St. Clair St. – ComEd Utility Excavation

Topic: Radiation Safety

Instructor: Glenn Huber

Date: 2/19/07

Print Name	Company	Social Security #	Date of Birth	Badge # Issued	Signature
Randy Thompson	Mead	5815	1 6 55	00210	Randy Thompson
Steven D. Hall	MEAD	0857	03-31-63	00211	Steven D. Hall
Dan LaDore	MEAD	3161	9-23-55		[illegible]
Steve Holmes	MEAD	0236	12-20-74		[illegible]
Jesus Raygoza	MEAD	2855	3-2-51	00212	Jesus Raygoza
Ryen Jamcock	〃	4551	4-25-72		[illegible]
Mat Taylor	Meade	2434	11-13-78	00213	[illegible]
Catherine Chvesmthakes	DAI Env.	4712	11-28-82		[illegible]
Tyler Widasky	Engineer	6260	8/12/80		[illegible]
Terance M[illegible]	SET	6398	11/2/70	00214	[illegible]

Radiation Safety Training – 550 N. St. Clair St.

1. Basic Radiation Physics
    a. What is ionizing radiation?
    b. Types of radiation
        i. Alpha
        ii. Beta
        iii. Gamma
        iv. Neutron
        v. X-rays
2. ALARA
    a. Time
    b. Distance
    c. Shielding
3. Exposure vs. Contamination
4. Radiation Units and Quantities
    a. Radioactivity
    b. Exposure
5. Sources of Radiation
    a. Man-made
    b. Background
6. Radiation Biology / Health Effects
    a. Whole body vs. Localized
    b. External vs. Internal
    c. Acute vs. Chronic
    d. Internal Pathways
7. Personnel Monitoring
    a. Instrumentation
    b. Frisking
    c. Dose Limits
8. Air and Soil Monitoring
    a. Lift and Bucket Survey Procedure
    b. Personal Air Monitors
9. Working Safely Around Contaminated Soil

Attachment 2

Radiation Survey Form
Surface Gamma Scans

550 N. St. Clair Street – ComEd Test Holes

sahci
Stan A. Huber Counsultants, Inc.

Radiation Survey Form

Location/ Project ID: 550 N. St. Clair Street, Chicago IL - ComEd Excavation

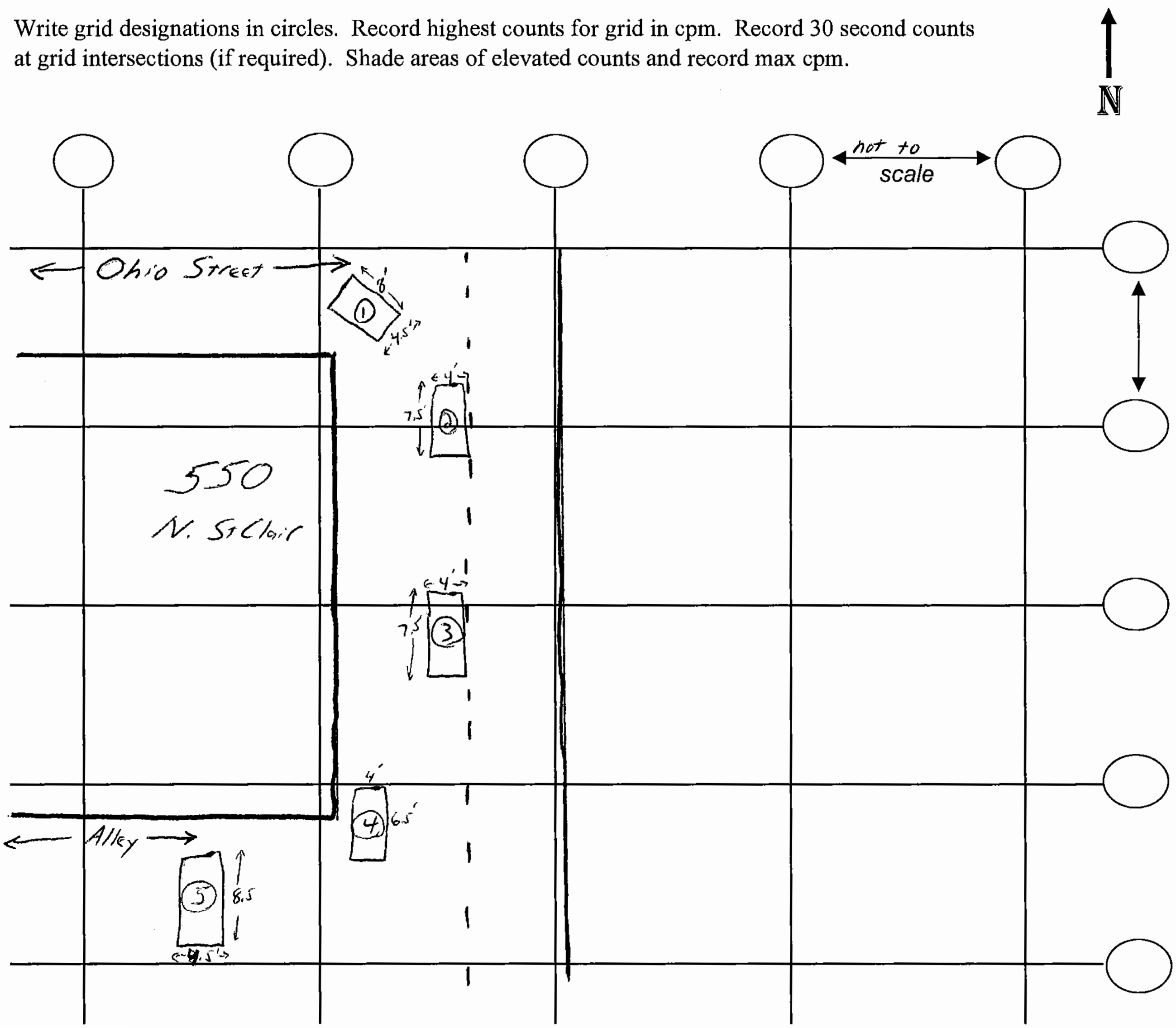
Date: 2/21/07 - 2/23/07 **Technician:** Glenn Huber / Joel Ahrweiler

Inst Model: Ludlum 2221 **Serial No. :** 134542

Probe Type: 1"x1" NaI / 2"x2" NaI; Shielded / Not Shielded **Lift Elevation:** surface - ~6 feet

Background 8265 **cpm** **Action Level:** 18,186 **cpm**

Write grid designations in circles. Record highest counts for grid in cpm. Record 30 second counts at grid intersections (if required). Shade areas of elevated counts and record max cpm.



550 N. St Clair Street- Enginex ComEd Test Hole Excavation

2/21/07 - 2/23/07

Test Hole #1	Counts per minute (CPM)	
surface	7900	
-1.5'	7800	
-3.0'	8100	
-4.5'	8500	
-5.5'	8400	*
max wall cts	8100	

Test Hole #2	Counts per minute (CPM)	
surface	7600	
-1.5'	7700	
-3.0'	8200	
-4.5'	8500	
-5.0'	7700	*
max wall cts	8400	

Test Hole #3	Counts per minute (CPM)	
surface	12100	
-3 inches	pavers 20300	
-8 inches	8700	
-1.5'	8300	
-3.0'	8400	
-4.5'	8400	
-6.0'	7700	*
max wall cts	8500	

Test Hole #4	Counts per minute (CPM)	
surface	6700	
-1.5'	9800	
-3.0'	9900	
-4.5'	9800	
-6.0'	8500	*
max wall cts	9800	

Test Hole #5	Counts per minute (CPM)	
surface	7300	
-1.5'	8900	
-3.0'	8500	
-4.5'	8700	
-6.0'	8100	*
max wall cts	8800	

Notes: * Layers below 4.5' deep were checked using Bucket Survey Method. Walls of trench below 4.5' deep were not checked, since I did not enter excavation at this depth

Attachment 3

Soil Sample Analysis

Roll Off Boxes 20-12, 22-2, and 16-12

550 N. St. Clair Street – ComEd Test Holes

Nutranl Gamma Spec Report - 550 N. St. Clair Street

Stan A. Huber Consultants, Inc.
200 North Cedar Road
New Lenox, IL 60451
(800) 383-0468

Composite Soil Samples Collected on 2/21/07

Sample ID	Analysis Date	Sample Group	Description	Weight	U-238 Activity	U-238 Uncertainty	Th-232 Activity	Th-232 Uncertainty	Ra-226 Activity	Ra-226 Uncertainty	Total Radium Activity	Total Radium Uncertainty
1388	2/21/2007	550 N. St Clair	roll off 20-12 Sample A	29.6	7.91	4.01	-0.8	1.16	2.34	1.64	1.54	2.008780725
1389	2/21/2007	550 N. St Clair	roll off 20-12 Sample B	31.3	6.29	5.05	0.18	1.5	0.08	1.92	0.26	2.436472861
1390	2/21/2007	550 N. St Clair	roll off 20-12 Sample C	33.8	8.21	4.35	-0.24	1.23	2.43	1.72	2.19	2.114544868

Composite Soil Samples Collected on 2/22/07

Sample ID	Analysis Date	Sample Group	Description	Weight	U-238 Activity	U-238 Uncertainty	Th-232 Activity	Th-232 Uncertainty	Ra-226 Activity	Ra-226 Uncertainty	Total Radium Activity	Total Radium Uncertainty
1393	2/24/2007	550 N. St Clair	roll off 22-2 Sample A	31.9	9.56	5.11	2.05	1.45	-0.66	1.86	1.39	2.358410482
1394	2/24/2007	550 N. St Clair	roll off 22-2 Sample B	31.5	4.36	3.72	0.84	1.11	0.03	1.46	0.87	1.834039258
1395	2/24/2007	550 N. St Clair	roll off 22-2 Sample C	30.4	4.55	4.26	0.67	1.26	1.64	1.7	2.31	2.116034026

Composite Soil Samples Collected on 2/23/07

Sample ID	Analysis Date	Sample Group	Description	Weight	U-238 Activity	U-238 Uncertainty	Th-232 Activity	Th-232 Uncertainty	Ra-226 Activity	Ra-226 Uncertainty	Total Radium Activity	Total Radium Uncertainty
1396	2/24/2007	550 N. St Clair	roll off 16-12 Sample A	23.8	8.46	4.11	0.02	1.18	0.26	1.57	0.28	1.964001018
1397	2/24/2007	550 N. St Clair	roll off 16-12 Sample B	23.5	4.45	3.55	-0.38	1.07	1.3	1.43	0.92	1.78600112
1398	2/24/2007	550 N. St Clair	roll off 16-12 Sample C	27.8	6.33	3.39	0.28	1	0.72	1.32	1	1.656019324

Analyzed by Canberra Genie 2000 NaI Gamma Spec System
2"x2" NaI detector w/ NUTRANL software package

Attachment 4

Air Monitoring

550 N. St. Clair Street – ComEd Test Holes

Personal Air Monitoring Summary Sheet (PAM's -Daily Analysis)

February 21, 2007 - February 23, 2007

Enginex 550 N. St. Clair St. - ComEd Excavation

*** All PAM's with counts over background on day after analysis are recounted after 4 days (see attached)

Date Collected	Name	Sample ID	PAM #	Flow Rate (lpm)	Total Time Sampled	Total Sample Volume (ml)	Analysis Date	Gross Counts (30 min)	Bkg Counts (30 min)	Net CPM	Sample Concentration (uCi/ml)
2/21/2007	Glenn Huber	E025	002-766	2.5	255	637500	2/22/2007	9	9	0.00	0.00E+00
2/21/2007	Randy Thompson	E026	002-675	2.5	255	637500	2/22/2007	13	9	0.13	6.16E-14 *
2/22/2007	Glenn Huber	E027	002-766	2.5	320	800000	2/23/2007	10	11	0.00	0.00E+00
2/22/2007	Randy Thompson	E028	002-675	2.5	320	800000	2/23/2007	15	11	0.13	4.91E-14 *
2/23/2007	Joel Ahrweiler	E029	006-234	2.5	290	725000	2/24/2007	11	12	0.00	0.00E+00
2/23/2007	Randy Thompson	E030	002-675	2.5	290	725000	2/24/2007	8	12	0.00	0.00E+00

Note: Official airborne Th-232 concentrations are obtained from 4 Day Analysis.
See attached 4 Day Analysis Form for Occupational Dose Limit Information.

Personal Air Monitoring Summary Sheet (PAM's -4 Day Analysis)

February 21, 2007 - February 23, 2007

Enginex 505 N. McClurg Ct. - ComEd Excavation

***Note: All samples on this page were analyzed after 4 days to allow for thorium daughter decay

Date Collected	Name	Sample ID	PAM #	Flow Rate (lpm)	Total Time Sampled	Total Sample Volume (ml)	Analysis Date	Gross Counts (30 min)	Bkg Counts (30 min)	Net CPM	Sample Concentration (uCi/ml)	% of DAC
2/21/2007	Randy Thompson	E026	002-675	2.5	255	637500	2/26/2007	9	12	0.00	0.00E+00	0.00%
2/22/2007	Randy Thompson	E028	002-675	2.5	320	800000	2/26/2007	11	12	0.00	0.00E+00	0.00%

Occupational Dose Limit for Occupational Radiation Exposure = 5 rem Total Effective Dose Equivalent

2000 DAC-Hours = 5 rem

DAC (Derived Air Concentration) for Th-232 = 5E-13uCi/ml

Administrative Site Limit for Occupational Exposure = 30% Th-232 DAC = 1.5E-13 uCi/ml