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

May 21, 2007

Enginex Project Number: 8039

**Prepared For:
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1.0 INTRODUCTION

Enginex Environmental Engineering (Enginex) was retained to oversee the completion of a Commonwealth Edison (ComEd) utility trench and monitor radiation levels during soil excavation activities performed at 550 North St. Clair Street. The purpose of the utility trench was to install additional electrical conduit within the identified right-of-way to allow 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 (refer to Appendix A).
- Enginex prepared the “550 North St. Clair Street - General Procedures for Thorium Monitoring” document (refer to Appendix B), 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 C) was incorporated into the overall safety procedures for the site work.
- An on-site walk through meeting was held on March 23, 2007 between the various interested parties. Representatives from the following interested parties were present for the walk through meeting: Enginex; Stan A. Huber Consultants, Inc. (SAHCI) the radiation monitoring contractor; SET Environmental, Inc. (SET) the soil disposal contractor; and Meade Electric (Meade) the electrical conduit installation contractor.



2.0 DAILY FIELD ACTIVITIES

The work scope consisted of excavating the proposed trench location along a right-of-way area where ComEd intended to route electrical conduit for power service to new construction ongoing at that location. The excavation was completed between March 26 and April 24, 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 trench was installed in 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. The trench was a total of approximately 204 feet long and 3 feet wide. The trench depth was approximately 5 feet deep, for the most part, but extended to a depth of approximately 8 feet to pass beneath utility lines at the north and south ends of the trench.

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 trench 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 D.

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

March 26, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day. Huber conducted a radiation safety training session prior to beginning the site work.

Saw-cutting of the pavement at the corner of Ohio and St. Clair (near test pit #1) began at approximately 10:00. SAHCI completed the radiation baseline survey over the pavement of the length of the planned trench once saw-cutting was complete. The asphalt pavement was removed from the north end of the excavation with the use of a jackhammer and backhoe at



approximately 12:30. Trench excavation using a backhoe began at the northwest end of the excavation (at the intersection of Ohio and St. Clair). SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box.

Trench excavation work ended at approximately 14:45. Only a portion of a single roll-off box of soil was generated. SET removed the roll-off box at the end of the day, but returned it for use the following day. Site work ended at approximately 15:00, and personnel demobilized from the site.

March 27, 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. SET delivered the same roll-off box from the previous day for use.

Trench excavation using a backhoe began at approximately 10:00. Excavation continued where it terminated the previous day and continued to the southeast. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box. SET delivered a secured Baker box at approximately 11:00 in the event elevated radiation levels were measured. The secured Baker box was placed in a parking lot on the corner of St. Clair and Illinois for the duration of the project. Utility lines were encountered at the north end of the trench excavation near the ComEd manhole located on Ohio. The presence of the utility lines required hand digging until they could be safely cleared. The roll-off box became full at approximately 12:00 and an empty roll-off box was delivered by SET. SAHCI collected three composite soil samples from the full roll-off box prior to its removal. Soil removal continued once the empty roll-off box was in place.

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



March 28, 2007

The Meade work crew arrived on-site at approximately 9:30 and began unloading equipment. Meade began setting up traffic control at approximately 9:45. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Shoring equipment was delivered at 10:00. Shoring installation in the vicinity of utility lines began at 10:30. With shoring in place, hand digging continued at approximately 12:45. Trench excavation continued to the southeast using a backhoe. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box.

Trench excavation work ended at approximately 14:15. A single roll-off box of soil was generated for the day. SAHCI collected three composite soil samples from the roll-off box prior to its removal from the site. 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.

March 29, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Hand digging around utilities in the shored trench began at approximately 10:30. Additional shoring was installed at approximately 11:20 and hand digging continued. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box. New underground utilities were encountered, which required additional hand digging to a lower depth for clearance. The excavation was extended to a depth of approximately ten (10) feet in order to clear the utility lines.

Trench excavation work ended at approximately 14:15. A single roll-off box of soil was generated for the day. SAHCI collected three composite soil samples from the roll-off box prior to its removal from the site. 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.



March 30, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Digging began at approximately 10:00. The Meade crew began to extend the trench south along St. Clair. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box. The roll-off box became full at approximately 12:30 and SAHCI collected three composite soil samples prior to its removal. SET removed the full roll-off box and delivered an empty one. Trench excavation then continued using a backhoe once the utilities were safely cleared.

Trench excavation work ended at approximately 14:45. Two roll-off boxes of soil were generated for the day. SAHCI collected three composite soil samples from the second roll-off box prior to its removal from the site. SET removed the second roll-off box after the site work was completed for the day. Site work ended at 15:00, and personnel demobilized from the site.

April 2, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

The Meade crew began to jackhammer through the wall of the manhole on the northwest end of the trench to install the conduit shells. Six (6) lines of conduit shells were installed linking the trench to the manhole. Additional shoring was installed at approximately 11:00 and soil removal was initiated at 11:30. Trench excavation using a backhoe continued to the south along St. Clair.

The trench excavation was stopped at approximately 14:00 because the roll-off box was full. Shoring was then installed within the newly completed trench section. A single roll-off box of soil was generated for the day. SAHCI collected three composite soil samples from the roll-off



box prior to its removal. 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.

April 3, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Trench excavation activities began at approximately 9:45. Trenching continued to the south along St. Clair using a backhoe. Paving bricks were encountered under the asphalt. Elevated radiation count levels (above background levels) were encountered when the paving bricks were encountered. The paving bricks are considered a natural source of radiation; therefore, no special handling and disposal of this material was necessary. The radiation count levels for soil underneath the paving bricks was at or below background levels.

Verneta Simon of the USEPA arrived on site at approximately 11:00 to discuss the status of the radiation monitoring with SAHCI and was satisfied with the work being performed. The roll-off box became full at approximately 12:00 and SAHCI collected three composite soil samples prior to its removal. At approximately 13:00, SET removed the full roll-off box from the site and delivered an empty one. Meade then continued the trench excavation using a backhoe to the south along St. Clair. The second roll-off box became full at approximately 14:30 and SAHCI collected three composite soil samples prior to its removal.

A total of two roll-off boxes of soil were generated for the day. SET removed the second roll-off box after the site work was completed for the day. Site work ended at 15:00, and personnel demobilized from the site.

April 4, 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.



The Meade crew began to install six (6) lines of conduit shells through the completed section of the trench at approximately 9:30. Installation of conduit piping in the completed trench section continued throughout the day. A concrete truck arrived at approximately 13:30 and began pouring concrete over the sections of conduit shells that had been installed.

Trench excavation work ended at approximately 14:30. No soil was generated for disposal on this day. Site work ended at 15:00, and personnel demobilized from the site.

April 5, 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.

Sand backfill was delivered at 9:45 and the Meade crew began to remove the trench shoring. The Meade crew began to backfill the excavation at approximately 11:00. Trench backfilling continued throughout the day. A second truck arrived to deliver sand backfill at approximately 12:15, and a third truck arrived to deliver gravel backfill at approximately 14:00. The sand backfill was added to the excavation and the gravel was added on top of the sand. A concrete truck arrived at approximately 14:15 and began pouring concrete over the gravel backfill.

Trench excavation work ended at approximately 14:30. No soil was generated for the day. Site work ended at 15:00, and personnel demobilized from the site.

April 6, 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.

Sand backfill was delivered at approximately 10:30, which was added to the excavation. A second truck arrived at 10:45 to deliver gravel backfill, which was added to the excavation above the sand backfill. SET delivered an empty roll-off box at approximately 11:00. Trench excavation using a backhoe resumed at approximately 11:30 and continued to the south along St. Clair. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its



placement into the roll-off box. At approximately 11:45, a concrete truck arrived to pour concrete over the backfilled section of trench.

Trench excavation activities ended at approximately 12:30 because the roll-off box became full. A single roll-off box of soil was generated for the day. SAHCI collected three composite soil samples from the roll-off box prior to its removal. The remainder of the day was spent installing trench shoring and hand digging to locate another bundle of subsurface utilities. Site work ended at 15:00, and personnel demobilized from the site.

April 9, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Hand digging around utility lines began at approximately 9:45. The Meade crew began to expand the trench around the bend into the alleyway going west. More paving bricks were encountered beneath the asphalt. SAHCI screened each bucket of soil removed from the excavation for radiation prior to its placement into the roll-off box. The first roll-off box became full at approximately 12:00. SAHCI collected three composite soil samples from the roll-off box prior to its removal. SET removed the full roll-off box and delivered an empty one at approximately 12:30. Hand digging around the utility lines then continued.

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

April 10, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.



Hand digging around utility lines and shoring installation began at approximately 10:15 at the southern end of the trench near the alley. Hand digging around the multiple utility lines continued throughout the day. The roll-off box became full at approximately 14:30. SAHCI collected three composite soil samples from the roll-off box prior to its removal.

Trench excavation work ended at approximately 14:30. Additional trench shoring was installed at approximately 14:45. A single roll-off box of soil was generated for the day. 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.

April 11, 2007

Work was cancelled due to rain.

April 12, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Hand digging around utility lines and shoring installation began at approximately 10:05 at the southern end of the trench near the alley. Hand digging around the multiple utility lines continued throughout the day. The excavation reached a maximum depth of eight (8) feet in the vicinity of the utility lines. The roll-off box became full at approximately 14:25. SAHCI collected three composite soil samples from the roll-off box prior to its removal.

Trench excavation work ended at approximately 14:30. Additional trench shoring was installed at approximately 14:45. A single roll-off box of soil was generated. 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.



April 13, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Digging began at approximately 10:00. After the subsurface utility lines at the corner of the alley were safely cleared, the Meade crew continued the trench excavation to the west into the alley using a backhoe. Paving bricks were encountered under the asphalt. Hand digging was once again required to remove soil around additional utility lines that were encountered in the alley. As the digging continued, trench shoring was installed. The excavation reached a maximum depth of eight (8) feet in the vicinity of the utility lines. The roll-off box became full at approximately 11:45. SAHCI collected three composite soil samples from the roll-off box prior to its removal. SET removed the full roll-off box and delivered an empty one at approximately 12:30. Hand digging of the trench resumed at approximately 13:00.

Trench excavation work ended at approximately 15:00. One and a half roll-off boxes of soil were generated for the day. SET removed the second roll-off box at the end of the day, but returned it for use the following day. Site work ended at 15:30, and personnel demobilized from the site.

April 16, 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. SET delivered the same roll-off box from the previous day prior to beginning soil excavation for the day. A site health and safety audit was performed at approximately 10:00. The audit was performed by a team of contractors selected by ComEd. The inspectors were satisfied with the work site.

Hand digging around utility lines and trench shoring installation began at approximately 10:00. The Meade crew returned to the location of subsurface utilities near the corner of the alley which required additional soil removal to clear the lines. Additional utilities were identified beneath the lines already cleared. The excavation reached a maximum depth of eight (8) feet in the



vicinity of the utility lines. The roll-off box became full at approximately 14:25. SAHCI collected three composite soil samples from the roll-off box prior to its removal.

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

April 17, 2007

Work was cancelled due to work being performed by the site developer that blocked access to the alley and trench.

April 18, 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

The Meade crew installed conduit shells beginning at approximately 9:30. The trench excavation resumed at approximately 11:00. The Meade crew continued excavating the trench using a backhoe west into the alley. Paving bricks were encountered beneath the asphalt. A concrete truck arrived on site at approximately 13:00 to pour concrete over the conduit shells that were previously installed.

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

April 19, 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.



Sand backfill was delivered at approximately 9:35, which was added to the excavation. A second truck arrived at approximately 12:30 to deliver gravel backfill, which was added to the excavation above the sand backfill. A concrete truck arrived at approximately 13:00 to pour concrete over the backfilled section of trench. A second concrete truck arrived at approximately 13:45 and continued to pour concrete over the backfilled section of the trench.

Trench excavation work ended at approximately 15:00. No soil was generated for the day. Site work ended at 15:30, and personnel demobilized from the site.

April 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. SET delivered an empty roll-off box prior to beginning soil excavation for the day.

Hand digging around utility lines within the alley and trench shoring installation began at approximately 10:30. The roll-off box became full at approximately 13:20. SAHCI collected three composite soil samples from the roll-off box prior to its removal. SET removed the full roll-off box and delivered an empty one at approximately 13:40. Hand digging around the utility lines continued throughout the remainder of the day.

Trench excavation work ended at approximately 15:00. One and a half roll-off boxes of soil were generated for the day. SET removed the half-filled roll-off box, but returned it for use the following day. Site work ended at 15:30, and personnel demobilized from the site.

April 24, 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. SET delivered the same roll-off box from the previous day prior to beginning soil excavation for the day.

Meade crew began installing conduit shells at approximately 10:00 as other crew members continued hand digging around utilities in the alley. The roll-off box became full at



approximately 12:45 and digging stopped. SAHCI collected three composite soil samples from the roll-off box prior to its removal. SET removed the full roll-off box at approximately 13:10. A concrete truck arrived at approximately 13:30 and began pouring concrete over the conduit shells. ComEd personnel arrived on site at approximately 13:45 to inspect progress.

Trench excavation work ended at approximately 14:40. A single roll-off box of soil was generated for the day. Site work ended at 15:00, and personnel demobilized from the site. Soil removal activities from the trench were completed by the end of this day, so radiation monitoring of the soil was discontinued.

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 (pCi/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 three 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. For the balance of the soil from the trench excavation, including after a depth of five feet, 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.

Radiation count rates were measured well above background levels at the pavement surface and in the top 18 inches for the southern half of the utility trench. 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. Radiation count rates taken from the surface to 8 inches deep were higher in sections of the trench excavation that contained the pavers. The radiation count rate on contact with the pavers was as high as 20,400 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.

For the excavated soil, the radiation count rates ranged from 6,100 to 12,200 cpm for the entire excavation area. In the farthest north sections of the excavation, the count rates were generally higher from a depth of 3 to 4.5 feet. The count rates with depth were as follows: ranged between approximately 7,400 and 20,400 for the first 18 inches that included the pavers; ranged between approximately 6,800 and 10,800 from 18 inches and 3 feet; ranged between approximately 5,600 and 12,200 cpm from 3 feet to 4.5 feet; ranged between 5,800 and 8,900 from 4.5 feet to 6 feet; ranged between 6,100 and 7,700 from 6 feet to 7.5 feet; and ranged between 6,800 and 12,200 cpm for the trench walls. The increase in count rates in the top 18 inches is due to the presence of pavers. None of the measured count rates of soil throughout the entire trench excavation (below a depth of 18 inches where the pavers were encountered) 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.

Refer to SAHCI’s report in Appendix E for further details regarding the soil screening, as well as a drawing identifying the respective monitoring sections.



4.0 LABORATORY ANALYSIS AND SOIL DISPOSAL

Since the field screening readings did not exceed the 7.1 pCi/g action level, soil excavated from the utility trench was transferred directly into a roll-off box for off-site disposal. Twenty (20) roll-off boxes of soil were generated during the trench excavation activities. Approximately seven cubic yards of soil were placed inside of each 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 each 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-inch 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 pCi/g action level. The TRA values for composite soil samples from the three roll-off boxes ranged between 0.17 and 4.14 pCi/g. None of the TRA values approached the action level of 7.1 pCi/g action level, which was consistent with the field screening results (refer to SAHCI report in Appendix E). Consequently, the 20 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 E 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. Badges worn during trench excavation activities from March 26 to 31, 2007 were received by Landaur for analysis on April 12, 2007. Badges worn during trench excavation activities from April 1 to 24, 2007 were received by Landaur for analysis on May 2, 2007.



5.0 FINAL SUMMARY

The trench was excavated between March 26 and April 24, 2007. The purpose of the utility trench was to install additional electrical conduit within the identified right-of-way to allow 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 excavation. None of the measured count rates of subsurface soil throughout the excavation of the trench (below a depth of 18 inches where the pavers were encountered) 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.

To verify the field screening results, composite soil samples were collected from the three roll-off boxes 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 pCi/g action level, which was consistent with the field screening results. Consequently, the 20 roll-off boxes containing the 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.



LEGEND

0' 2000'

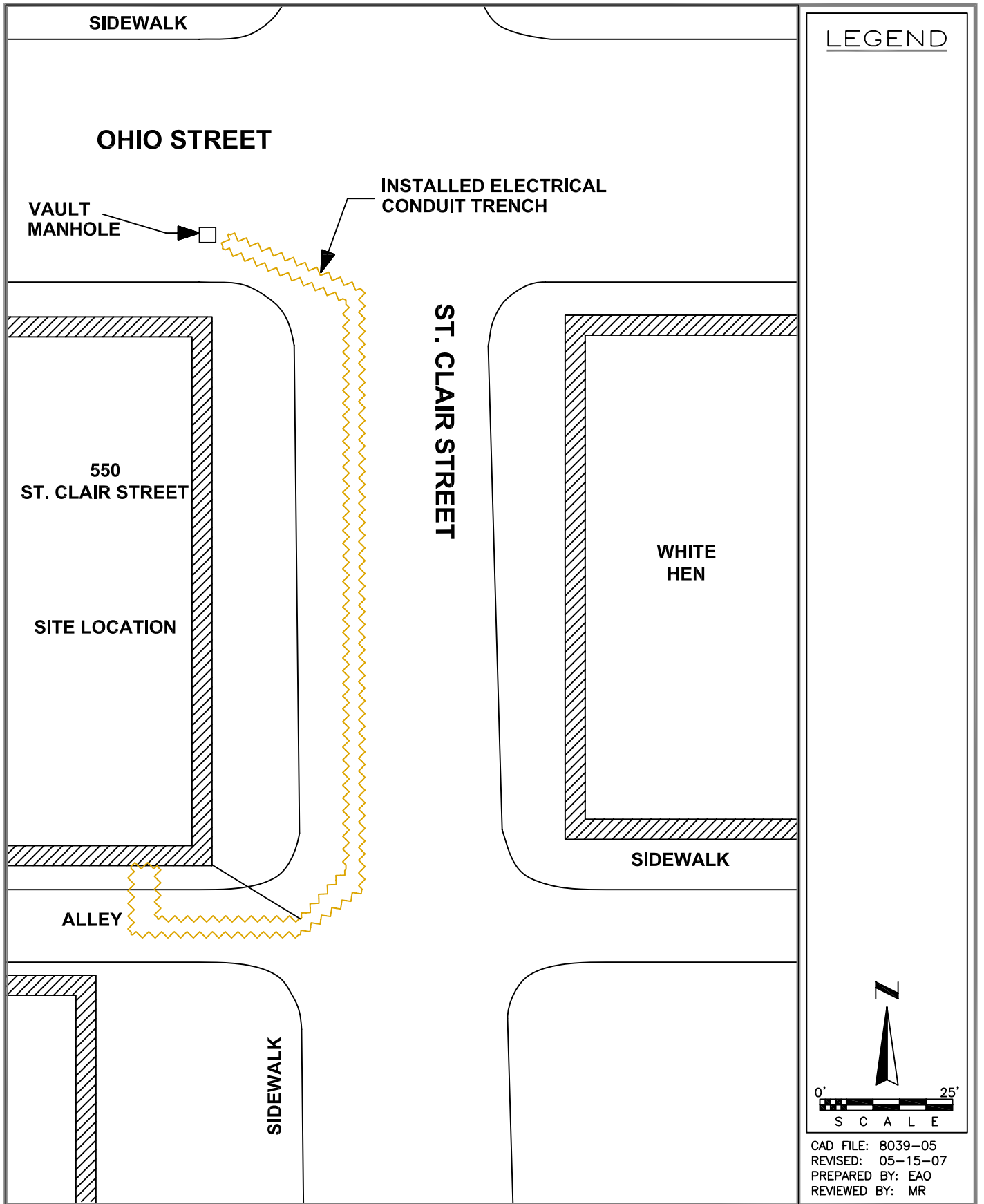
S C A L E

CAD FILE: 8040-02-B
 REVISED: 03-08-07
 PREPARED BY: EAO
 REVIEWED BY: MR



COM-ED UTILITY LOCATION TEST PITS
550 NORTH ST. CLAIR STREET
CHICAGO, ILLINOIS

FIGURE 1
SITE LOCATION MAP



COM-ED UTILITY TRENCH LOCATION
550 NORTH ST. CLAIR STREET
CHICAGO, ILLINOIS

FIGURE 3
SITE PLAN SHOWING
TRENCH LOCATION



APPENDIX A
CITY OF CHICAGO PERMIT

Permit # 707562775

AMENDED



Received Date: Mar 16, 2007 2:43:56

**COMMONWEALTH EDISON CO
227 WEST MONROE
STREET-9TH FLOOR
CHICAGO, IL 60606**

**City of Chicago
Department of Transportation
(312) 744-4652**

JIM TORRES 312-394-3260

ACTIVITY HOURS

Permitted activity hours begin at 9:30 A.M. Permitted activity hours will end at 3:30 P.M. ANY WORK ON ARTERIAL STREETS MUST ADHERE TO ALL RUSH HOUR RESTRICTIONS. 540 - 550 N ST CLAIR ST Sidewalk & Parkway Opening(s)

Permitted activity hours begin at 9:30 A.M. Permitted activity hours will end at 3:30 P.M. ANY WORK ON ARTERIAL STREETS MUST ADHERE TO ALL RUSH HOUR RESTRICTIONS. 540 - 550 N ST CLAIR ST Street Opening (Curb Lane & Traffic Lane)

Permitted activity hours begin at 9:30 A.M. Permitted activity hours will end at 3:30 P.M. ANY WORK ON ARTERIAL STREETS MUST ADHERE TO ALL RUSH HOUR RESTRICTIONS. 540 - 550 N ST CLAIR ST Street Opening (Curb Lane & Traffic Lane)

DATES

Mar 19, 2007 through Apr 19, 2007

ACTIVITIES

Sidewalk & Parkway Opening(s):

Dig #: TBD

There will be 1 for the purpose of INSTALL CONDUIT.

125 Feet x 3 Feet.

Excavation may commence on - NO SOONER.

Sidewalk & Parkway Opening(s):

Dig #: TBD

540 - 550 N ST CLAIR ST

WORK TO BE PERFORMED BY MEADE AND METRO MEX.

PERMIT REQ. 00036622

OK. G. WILLIAMS.

Street Opening (Curb Lane & Traffic Lane):

Dig #: TBD

There will be 1 opening(s) in the public way for the purpose: INSTALL CONDUIT.

125 Feet x 3 Feet

Excavation may commence on - NO SOONER.

540 - 550 N ST CLAIR ST

RESTORATION AGREEMENT IS 145X21 AND 55X16

OK BY WILLIAMS LITTLE ON MARCH 16TH, 2007

Street Opening (Curb Lane & Traffic Lane):

Dig #: TBD

There will be 1 opening(s) in the public way for the purpose: INSTALL CONDUIT.

125 Feet x 3 Feet

Excavation may commence on - NO SOONER.

540 - 550 N ST CLAIR ST

PERMIT REQ. 00036622

WORK TO BE PERFORMED BY MEADE AND METRO MEX

OUC 33775

ENVIRNOMENTAL SIGN OFF BY RAHMAT BEGUM ON MARCH 19TH, 2007

Restrictions:

1. A copy of the permit must remain on-site for inspector's review.
2. Permit fees must be paid within 24 hours of the date of issuance. Failure to pay will result in the immediate cancellation of the permit. Monthly billing accounts are not applicable.
3. Permitted Hours: 9:30 AM to 3:30 PM (days)

Restrictions:

4. All directional boring must be pre-approved by the Office of Underground Coordination.
5. Contractor must secure plating over all openings in the roadway during non-working hours until such time when the road surface is restored.
6. Contractor must notify DIGGER at 312-744-7000 no less than 48 hours (exclusive of Saturdays, Sundays and Holidays) but no more than 14 calendar days in advance of the start of the excavation or demolition, unless the excavation date was provided with the application and remains unchanged. Prior to 26 calendar days the Contractor must notify DIGGER to renew the dig date!
7. It is the Excavator's responsibility to request refreshing of marks when needed, but no longer than 28 calendar days after the last requested date.
8. When applicable, all excavation areas are to be clearly marked in safety white paint prior to calling DIGGER. White paint is not required for joint meets or emergency work.
9. Excavators requesting dig tickets are responsible for the protection of utility markings at the job site. Any markings of underground utilities utilizing utility colors, must be done by facility owners or authorized agents only.
10. Permittee must provide a sign which identifies the telephone number and company or person performing the work. Signage may be affixed to barricades.
11. Permanent base pavement restoration to follow within 5 days after the completion of underground work.
12. All pavements are to be restored in accordance with CDOT Construction Standards.
13. Work to be performed as per plans and specifications.
14. Use of pneumatic equipment must not begin before 8:00 A.M. or continue after 8:00 P.M.
15. Maintain pedestrian traffic at all times.
16. Pavement opening to be backfilled to grade/or plated during off work hours.
17. Parkway excavation by hand, cut and replace sod wherever possible.
18. Permittee to provide all barricades, signs and/or flagmen as necessary.
19. Sidewalk pavement broken by hand or with pneumatic hammer only.
20. All traffic control will be the responsibility of the contractor and must comply with all MUTCD standards.
21. Restore all lanes to normal operation during non-working hours.
22. Must use flagmen and/or arrow boards to maintain traffic operations through the work zone.
23. All street openings must be restored with concrete base to grade.
24. Streets recently resurfaced must be restored to proper standards (resurface to nearest 1/4 pt, see CDOT Construction Standards for further details).



APPENDIX B
GENERAL PROCEDURES FOR THORIUM MONITORING



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 pCi/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 4 1/2 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 4 1/2 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 C
USEPA HASP**



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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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.

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

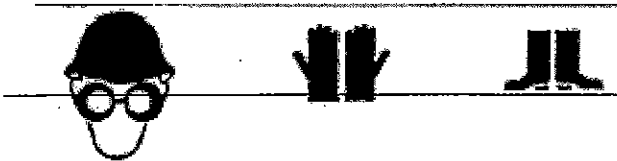
VISITOR INFORMATION

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

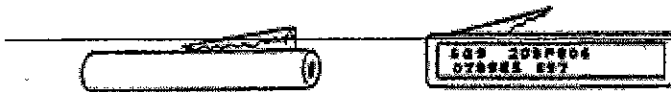


CAUTION. Radioactive materials may be present on this site. Radioactive materials
are found throughout the site.

<p>CAUTION</p>  <p>RADIATION AREA</p>	<p>CAUTION</p>  <p>CONTAMINATION AREA</p>	<p>CAUTION</p>  <p>AIRBORNE RADIOACTIVITY</p>	<p>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.</p>
<p>CAUTION</p>			



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:

<u>ROUTE</u>	<u>ENTRY MADE VIA:</u>
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 340¹, 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 <input type="checkbox"/> YES <input type="checkbox"/> NO		
EMPLOYEE RETURNED TO WORK <input type="checkbox"/> YES DATE/TIME _____ <input type="checkbox"/> NO		
<input type="checkbox"/> INJURED EMPLOYEE INTERVIEW/STATEMENT - ATTACHED		
WITNESSES		
<input type="checkbox"/> WITNESSES INTERVIEWS/STATEMENTS ATTACHED		
<input type="checkbox"/> PHOTOGRAPHS OF SITE - ATTACHED		
<input type="checkbox"/> DIAGRAMS OF SITE - ATTACHED		
EQUIPMENT RECORDS - ATTACHED - REVIEWED		<input type="checkbox"/> YES <input type="checkbox"/> 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
CORRECTIVE ACTION		DATE STARTED	
SAFETY COMMUNICATION NOTICE PREPARED	DATE		
SAFETY DIRECTOR SIGNATURE			

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:	TO:
			<input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	<input type="checkbox"/> A.M. <input type="checkbox"/> P.M.
NUMBER PRESENT	NUMBER ABSENT	MEETING CONDUCTED BY	DID MEETING INCLUDE REQUIRED TRAINING? <input type="checkbox"/> Yes (DESCRIBE BELOW) <input type="checkbox"/> 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		

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**

SUMMARY INFORMATION

DATE: _____ UPDATE: _____

PROJECT NAME: _____ PROJECT NO: _____

LOCATION: _____

SITE CONTACT AND PHONE NUMBER: _____

TYPE OF FACILITY: (active or inactive - describe previous use, previous agency action, soil type, topography, surrounding community)

PLAN PREPARED BY: _____

SITE SAFETY OFFICER: _____ CPR/FIRST AID TRAINED STAFF: _____

REVIEWED BY: _____ DATE: _____

WORK SCOPE/CONSTRUCTION/INVESTIGATION

Task 1 _____

Task 2 _____

Task 3 _____

PROPOSED START DATE: _____

UNUSUAL FEATURES/SITE SECURITY (include site map): _____

UTILITIES: Marked Scheduled Meet Date _____ Time _____

ANALYTICAL DATA (to be summarized below or attached, if available)

CONFINED SPACE: Yes No (If yes, describe and address permitting and entry procedures in an attachment.) _____

AIR MONITORING:

Monitoring equipment: HNu meter with 10.2 eV lamp or _____

Action level = 15 PID units in breathing zone for Level C upgrade. Stop work = 50 PID units in breathing zone.

O₂ 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.

<u>Signature</u>	<u>Responsibility</u>	<u>Date</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

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.

<u>Signal</u>	<u>Meaning</u>
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 its 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

- Atmospheric Checks:

Time	_____	Initials	_____				
Oxygen	_____			% (Record first)	_____		
Explosive	_____			% L.E.L.	_____		
Toxic	_____			PPM H ₂ S	_____		
- Source isolation (No Entry):

Pumps or lines blinded	_____	N/A	Yes	No
disconnected, or blocked	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
Lockout-De-Energized	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
Ventilation Modification:			Yes	No
Mechanical (grounded)	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
Natural Ventilation only	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
- Atmospheric check after isolation and ventilation:

Oxygen	_____	%	>19.5	Permissible
Explosive	_____	%L.E.L.*	<23.5	<10%
Toxic	_____	PPM	<10PPM H ₂ S	
- Instrument Name, I.D.#, & Calibration date: _____
 Instrument Worn by Entrant (name): _____
 Emergency Escape Respirator _____
 Worn by entrant Yes No
 Other hazards: _____

Must complete Entry Checklist on night, if there are other hazards. If conditions are in compliance with the above requirements and forced air ventilation alone controls all the hazards in the space and there is no reason to believe conditions may change adversely, then entry 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
 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 _____
 signature

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

- Entry, standby, and back up persons:

Successfully completed required training?	_____	name of entrant	Yes	No
Is it current?	_____	name of attendant	Yes	No
Equipment:			N/A	Yes
Direct reading gas monitor - tested (calibrated) - worn on entrant	_____		<input type="checkbox"/>	<input type="checkbox"/>
Safety harnesses and lifelines for entry and standby persons	_____		<input type="checkbox"/>	<input type="checkbox"/>
Hoisting equipment	_____		<input type="checkbox"/>	<input type="checkbox"/>
Communication Procedures	_____		<input type="checkbox"/>	<input type="checkbox"/>
Respiratory Protection (SCBA)	_____		<input type="checkbox"/>	<input type="checkbox"/>
Rescue Equipment	_____		<input type="checkbox"/>	<input type="checkbox"/>
Signs Posted/Area Secured	_____		<input type="checkbox"/>	<input type="checkbox"/>
Protective Clothing	_____		<input type="checkbox"/>	<input type="checkbox"/>
All electric equipment & lighting listed	_____		<input type="checkbox"/>	<input type="checkbox"/>
Class I, Division I, Group D and Non-Sparking tools	_____		<input type="checkbox"/>	<input type="checkbox"/>
Rescue Procedure and Emergency Ambulance #	_____		<input type="checkbox"/>	<input type="checkbox"/>
Local Hospital #	_____			
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. | | | Yes | No |
|--|--|--|-----|----|

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.

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

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) _____

signature _____

* 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 D
SITE PHOTOGRAPHS



Photo 1: Taken south to north. Shows the locations of the completed test pits and planned trench along St. Clair prior to beginning work.



Photo 2: Taken east to west. Shows south end of planned trench along alley prior to beginning work.



Photo 3: Taken south to north. Shows saw cutting through the pavement at the north end of the trench.



Photo 4: Taken west to east. Shows start of trench excavation heading southeast from the ComEd manhole on Ohio using a backhoe.



Photo 5: Taken west to east. Shows radiation screening of soil in trench during excavation.



Photo 6: Taken west to east. Shows radiation screening of soil using the "Bucket Survey Method."



Photo 7: Taken south to north. Shows utilities encountered at the north end of the excavation.



Photo 8: Taken north to south. Shows utilities encountered at the south end of the excavation prior to turning into the alley.



Photo 9: Taken east to west. Shows six lines of conduit shells running into the manhole on north end of excavation.



Photo 10: Taken west to east. Shows brick pavers (i.e., old pavement surface) beneath the asphalt surface along St. Clair that yielded radiation count levels above background readings.



Photo 11: Taken south to north. Shows the pouring of concrete into the trench over the conduit shells.



Photo 12: Taken south to north. Shows composite sampling of soil in roll-off boxes using hand auger. Hand auger samples from four locations homogenized in collection tray.



Photo 13: Taken south to north. Shows filtering of larger diameter materials from composite soil samples using sieve screen.



Photo 14: Taken south to north. Shows composite soil sample being collected from full roll-off box for radiation analysis in 20-ml vial after homogenization.



Photo 15: Taken south to north. Shows conduit shells in the trench along St. Clair.



Photo 16: Taken south to north. Shows location of the north end of the trench after it has been backfilled and the concrete poured.



Photo 17: Taken north to south. Shows steel plates placed over the top of the completed trench along St. Clair.



Photo 18: Taken east to west. Shows steel plates over the top of the south end of the completed trench in the alley.



APPENDIX E
SAHCI THORIUM MONITORING REPORT

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RADIATION DOSIMETRY REPORT

ACCOUNT NO. 67627	SERIES CODE NL1	ANALYTICAL WORK ORDER 0710220031	REPORT DATE 04/18/07	DOSIMETER RECEIVED 04/12/07	REPORT TIME IN WORK DAYS 4	PAGE NO. 1 OF 1
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PARTICIPANT NUMBER	NAME			DOSIMETER	USE	RADIATION QUALITY	DOSE EQUIVALENT (MREM) FOR PERIODS SHOWN BELOW			QUARTERLY ACCUMULATED DOSE EQUIVALENT (MREM)			YEAR TO DATE DOSE EQUIVALENT (MREM)			LIFETIME DOSE EQUIVALENT (MREM)			RECORDS FOR YEAR	INCEPTION DATE (MM/YY)
	ID NUMBER	BIRTH DATE	SEX				DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE		
FOR MONITORING PERIOD:							03/01/07 - 03/31/07			QTR 1			2007							
00NL1	CONTROL			Pa	CNTRL		M	M	M										4	10/78
00217				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	1	03/07
00219				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	1	03/07
00220				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	1	03/07
00221				Pa	CHEST NOTE		UNUSED												1	03/07
00222				Pa	CHEST NOTE		UNUSED												1	03/07

M: MINIMAL REPORTING SERVICE OF 1 MREM

QUALITY CONTROL RELEASE: RCH

1 - PR 8726 - RPT1308- N1

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RADIATION DOSIMETRY REPORT

ACCOUNT NO. 67627	SERIES CODE NL1	ANALYTICAL WORK ORDER 0712270198	REPORT DATE 05/09/07	DOSIMETER RECEIVED 05/02/07	REPORT TIME IN WORK DAYS 5	PAGE NO. 1 OF 1
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PARTICIPANT NUMBER	NAME			DOSIMETER	USE	RADIATION QUALITY	DOSE EQUIVALENT (MREM) FOR PERIODS SHOWN BELOW			QUARTERLY ACCUMULATED DOSE EQUIVALENT (MREM)			YEAR TO DATE DOSE EQUIVALENT (MREM)			LIFETIME DOSE EQUIVALENT (MREM)			RECORDS FOR YEAR	INCEPTION DATE (MM/YY)
	ID NUMBER	BIRTH DATE	SEX				DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE	DEEP DDE	EYE LDE	SHALLOW SDE		
FOR MONITORING PERIOD:							04/01/07 - 04/30/07			QTR 2			2007							
00NL1	CONTROL			Pa	CNTRL		M	M	M										5	10/78
00219				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	2	03/07
00220				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	2	03/07
00221				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	2	03/07
00222				Pa	WHBODY		M	M	M	M	M	M	M	M	M	M	M	M	2	03/07

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QUALITY CONTROL RELEASE: RCH

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