INTERIM RESPONSE ACTION REPORT RADIOLOGICAL MATERIAL REMOVAL AND DISPOSAL

GREAT KILLS PARK
STATEN ISLAND, NEW YORK CITY, NEW YORK

Contract No.W912DQ-08-D-0003

Prepared for:

US Army Corps of Engineers

Prepared by:

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

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LIST OF ACRONYMS AND ABBREVIATIONS

CABRERA	Cabrera Services, Inc.
CFR	Code of Federal Regulations
cpm	counts per minute
CY	Cubic Yards
Ci	Curie
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ft	foot (feet)
GWS	gamma walkover survey
IDW	Investigative Derived Waste
LLRW	Low Level Radioactive Waste
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
m	milli
NaI	sodium iodide
NORM	Naturally Occurring Radioactive Material
NPS	National Park Service
NYPD	New York Police Department
OP	Operating Procedure
PPE	Personal Protective Equipment
^{226}Ra	radium-226
Rem/hr	Roentgen Equivalent Man per hour
RCA	Radiologically Controlled Area
RCOC	Radiological Contaminant of Concern
RSO	Radiation Safety Officer
SHSO	Site Health and Safety Officer
SAP	Sampling and Analysis Plan
Site	Great Kills Park
SOP	Site Operations Plan
SSHP	Site Safety and Health Plan
u	micro
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

Cabrera Services, Inc. (CABRERA) completed an interim response action in April 2009 at the Great Kills unit of Gateway National Recreation Area in Staten Island, New York (hereafter referred to as the Site). The objective of the action was to address radioactive hotspots identified by the U.S. Department of Energy (DOE) and the New York Police Department (NYPD) Counter Terrorism Team in 2005. Subsequent surveys by the National Park Service (NPS) and US Environmental Protection Agency (USEPA) identified a total of seven locations of elevated radioactivity near the ground surface in public areas at the Site. Consequently, excavated radioactive contamination, associated with discrete items and radiologically-contaminated soil and debris, were transported by truck to the Toxco transfer station in Oak Ridge, Tennessee, for consolidation with other wastes and eventual transfer to radium disposal facilities in Washington and Utah. The work was performed under the terms and conditions of Contract W912DQ-08-D-0003 between the U.S. Army Corps of Engineers (USACE), Kansas City District and CABRERA, on behalf of the NPS.

1.1 Site History and Potential Source of Contamination

Great Kills Park is located east and south of Great Kills Harbor on the shoreline of the lower New York Bay. In 1933, the Marine Park Project was initiated to develop Great Kills Harbor and the vicinity as a shorefront recreation area. A filling and grading operation was started on the mainland to make the lowland areas accessible in the public park.

In November 1944, placement of sanitation-controlled fill started at Great Kills Park and continued until July 1948. Approximately 15 million cubic yards (CY) of refuse material was reportedly transported by barge or trucks and spread across a portion of the park in a layer between 8 and15 feet (ft) thick to bring the grade above sea level and increase the useable land footprint (Baker, 2007).

In 2005, while performing an aerial background radiation survey of the New York City metropolitan area, the DOE and the NYPD Counter Terrorism Team detected a radioactive emission near the Model Airplane Field in the Park. Subsequent surveys conducted by Michael Baker & Associates for the NPS found a total of seven locations of elevated radioactivity in

public areas (near the Model Airplane Field and nearby baseball fields) at the Site. The elevated readings in each area were believed to be due to radium (Baker, 2007). The working hypothesis going into the action described herein was that the elevated readings were the result of radium sources discarded at the Site.

The radiological contaminant of concern (RCOC) associated with this project is radium-226 (^{226}Ra). Radium is a naturally occurring radioactive material formed by the decay of uranium and thorium in the environment. ^{226}Ra is an alpha, beta, and gamma emitter with a half-life of approximately 1600 years.

2.0 SUMMARY OF ACTIVITIES

This project was initiated in an effort to reduce the relative risk posed to the public and workers at the Park by removing the material responsible for the elevated readings and to confirm that radium sources or other discrete items were the primary source of the elevated survey results. CABRERA developed a set of project-specific work plans including a health and safety plan, a sampling and analysis plan, a quality assurance project plan, and a waste management component that were used to guide the response action (Cabrera, 2008; Appendix E). The following is a chronology of events, along with a brief description of the tasks included in this action. Refer to Appendix A for daily summary reports for completed activities and Appendix C for photographs of field conditions.

CHRONOLOGY OF EVENTS

Event	**Date Complete**
Mobilization & Site Preparation	1/6/2009
Initial Radiation Survey	1/7/2009
Soil/Hot Spot Excavation and Removal	1/10/2009
Backfill & Site Restoration/Partial Demobilization	1/10/2009
Confirmatory Surveys	1/10/2009
Packaging and Shipping - Sources	1/17/2009
Diffuse Waste Shipping	4/14/2009
Demobilization	4/14/2009

2.1 Mobilization and Site Preparation

Prior to the commencement of response activities and under the direction of NPS staff, equipment and materials were staged onsite at the Model Airplane Field parking lot, including a conex box used as a secure waste staging area. A kickoff meeting involving USACE, NPS, and CABRERA staff was held on January 5 to discuss logistics, safety practices, work flow, and to answer any questions about the proposed actions for NPS staff. A press release was prepared by

NPS, and CABRERA developed a fact sheet regarding radium (Appendix E) for use by NPS for staff and the public.

Radiological Control Areas (RCA), temporary security fencing, and air monitoring stations were established around the seven planned excavations. Security fencing and traffic controls were also used on Sewer Line Road and at the entrance to the Model Airplane Field, serving to prevent vehicle traffic and limit park visitor foot traffic for the duration of response activities.

2.2 Initial Radiation Survey

An initial gamma walkover survey (GWS) and dose rate readings were performed in the vicinity of the seven hotspots previously identified for response action to confirm their locations as well as to determine the approximate horizontal extent of elevated readings. Locations were marked with pin-flags and spray paint. While confirming the initial seven locations, walkover technicians identified additional areas of localized elevated readings in and around the Model Airplane Field and the ball field. These locations (an additional seven spots) were also flagged, and USACE and NPS were notified. Figure 1 shows all 14 locations. Following discussions, it was determined that the 14 locations would be prioritized for action based on the initial readings, as well as their accessibility to the public, and that each excavation would be limited to no more than three feet in depth and three feet in diameter. Soil removal would continue until all spots were addressed.

2.3 Soil Excavation

Excavations were performed manually, using shovels and hand tools and with the objective of isolating and removing discrete radium sources from each of the hotspot locations, while minimizing the amount of soil removed from each location. Excavated soil was screened for radiation to determine the presence of a discrete source, using measurements from a Ludlum 44-20 sodium iodide (NaI) gamma detector coupled with a Ludlum Model 2221 ratemeter, and a micro-Rem meter. Soil or debris that did not contain a discrete source, but was determined to have elevated radiological activity was considered diffuse contamination and placed in a 55-gallon steel drum. Discrete sources were segregated from other soil/debris and placed in a stabilized drum for maximum shielding. Excavations were shallow (i.e., less than 3 ft) and narrow; therefore no benching or sloping was necessary. Soil was removed from each

excavation in approximately 6-inch lifts and scanned for radiation in order to determine the presence of discrete radium sources. Polyethylene sheeting was placed around the excavation to ensure that any radiologically contaminated material removed from the excavation was captured and disposed. Radiation readings were taken at the bottom of the excavation, after the removal of each shovel volume, in order to determine whether significant contamination remained. Soil excavation continued at each location until a discrete source was removed from the excavation; if there was no evidence of a source present, the soil exhibiting the highest NaI readings was removed. In order to address as many hotspot locations as possible within the scope of the response action, some soil exhibiting elevated readings was left in place in the bottom of some of the holes, if it was determined that to do so would not adversely affect public safety (i.e., if readings at the ground surface were near background). Discrete sources that were located in excavated soil were segregated from other soil/debris and placed in a steel pipe with end caps; then the discrete source was placed in a 55-gallon drum for maximum shielding. Waste drums were taken to the secure storage area for temporary staging. All Investigative Derived Waste (IDW) was also staged in the waste drums.

2.4 Site Restoration

The NPS provided topsoil to fill excavated areas. A GWS was performed over the backfill stock pile to ensure soil was free from radiological contamination. Following the backfilling and compaction of backfill material, CABRERA personnel applied TURF grass seed in order to return excavation areas to pre-excavation conditions.

2.5 Confirmatory Surveys

After restoration to pre-excavation condition, GWS was performed in the vicinity of each excavation area and radiological conditions were documented. No unacceptable readings were detected at the ground surface around any of the excavations. Temporary fencing was removed from those areas where excavation was completed. Results of the surveys are included in Appendix D.

2.6 Temporary Waste Staging

Prior to demobilization on 10 January 2009, all 55-gallon waste drums were transferred to the secure waste staging area (locked connex box) prior to transport and off-site disposal. The two radium sources recovered were sealed in a steel container (pipe with end caps) and placed in the

middle of a drum for safe storage and shielding. A Radiological Control Area was established (Appendix C, Photograph C-24) and signage and temporary security fencing was installed around the connex box.

2.7 Waste Profiling & Packaging

Composite samples of each diffuse waste drum were taken on 10 January 2009 and submitted for off-site laboratory analysis for waste characterization parameters. Waste was determined to be Class A Low Level Radioactive Waste (LLRW) and was packaged for shipment as a U.S. Department of Transportation (DOT) Type A hazardous material as defined in 49 CFR 173.435.

2.8 Waste Shipment and Disposal

On 17 January 2009, CABRERA personnel returned to the site to ship waste material consisting of one drum containing two radium sources. The waste drum was loaded on a truck and transported by Chase Environmental to the Toxco transfer station in Oak Ridge, Tennessee for processing and eventual transfer to US Ecology in Richland, Washington. Removal of the radium sources from the site eliminated much of the radioactivity previously identified.

Following receipt and review of analytical results, CABRERA personnel returned to the site on 14 April 2009, to complete packaging and oversee shipping of the remaining three drums of diffuse contaminated material (soil and IDW). The drums were loaded on a truck and transported by Chase Environmental to the Toxco transfer station in Oak Ridge, Tennessee for consolidation with other wastes and eventual transfer to Energy Solutions in Clive, Utah. U.S. DOT radiological release surveys were performed on each waste drum prior to the waste being loaded for off-site transport. Further detail on waste shipment and disposal is discussed in Section 3. Appendix B contains copies of all waste shipping and disposal documents.

2.9 Demobilization

Site demobilization occurred in two phases. On 10 January 2009, following site restoration and securing waste, all personnel, materials, and equipment were removed from the Site, except the waste drums and the connex box used as a secure waste staging area.

On 14 April 2009, following final shipment, a second demobilization occurred. This consisted of removing all equipment associated with loading the packaged waste onto a truck for transport/disposal and removing the connex box and associated radiation rope/signage. A

radiological release survey was performed on the connex box prior to its removal from the Site to ensure that no radioactive material was inadvertently transferred offsite.

3.0 RESPONSE ACTION RESULTS

Response activities occurred between 5 January and 10 January 2009. Initial radiation surveys, including GWS and dose rate readings, were performed at the seven hotspot locations identified during previous surveys and field located by NPS staff. During the initial survey of these areas, seven additional hotspots were identified by CABRERA field personnel in the same general areas. Hotspots were defined as locations with readings approximately three times above background. With coordination between USACE and NPS staff, seven of the 14 hotspots were selected as a priority for response action. The locations of hotspots, including those at which no response action was performed, are presented in Figure 1. A total of three 55-gallon 17H drums containing approximately 0.8 cubic yards (CY) of radiologically-contaminated soil/debris and one drum containing two discrete radium sources were removed from the Site. Table 1 summarizes the dimensions and estimated waste volume from each excavated area. Excavation was halted at each hotspot location when a discrete source was removed from the excavation; if there was no evidence of source material present, the soil exhibiting the highest NaI readings was removed. After each excavated area was backfilled, dose rate measurements and GWS were performed in a confirmatory survey. Table 2 summarizes post-excavation survey results from each location. Post-excavation gamma walkover survey maps of excavated areas are located in Appendix D. Details for all hotspot locations that were selected as a priority for response action are listed below.

3.1 BBF-01

BBF-01 is located at the southern end of the baseball fields, southwest of the model airplane field (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were in excess of 1,000,000 counts per minute (cpm) and indicated a hotspot with very limited horizontal extent. (Background readings would be on the order of 10,000 cpm).

Excavation was completed on 8 January 2009. A circular excavation with a diameter of 2.4 ft by 2.1 ft below ground surface (bgs) uncovered a discrete radium source (radium tube), approximately 1 inch in length (Appendix C, Photograph C-8/9). The item was visually consistent with similar devices in common use in the early 20th century for cancer treatment

(Refer to information sheet in Appendix E), as confirmed by Cabrera health physics staff with prior experience at sites contaminated with these devices. Dose rates on contact with the source were measured in excess of 2 Roentgen equivalent man per hour (Rem/hr) with a micro-Rem meter. Dose rates measured at one foot and three feet from the source were 95 mRem/hr and 12.5 mRem/hr respectively. For comparison, background dose readings are approximately 7-10 mRem/hr. The project Radiation Safety Officer (RSO) calculated the activity to be 10 milliCuries (mCi), which is consistent with high activity found in medical radium items. All soil/debris removed to gain access to the source was determined to have elevated radioactivity and was placed in a waste drum for disposal. Approximately 2/3 drum (0.18 CY) of soil/debris and one discrete radium source was removed from this location.

3.2 SLR-01

SLR-01 is located on the north side of Sewer Line Road, near the entrance to the Model Airplane Field (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were off-scale (in excess of 1,000,000 cpm) at the hotspot location. A subsequent dose rate survey at ground surface had a maximum reading of 6 mRem/hr and indicated a hotspot with very limited horizontal extent.

Excavation was completed on 8 January 2009. A circular excavation with a diameter of 1.2 ft by 1.0 ft bgs uncovered a discrete radium source (radium needle), approximately a half-inch in length (Appendix C, Photograph C-22). Dose rates measured at one foot and three feet from the source were 25 mRem/hr and 3.5 mRem/hr respectively. The project RSO calculated the activity to be 3 mCi. All soil/debris removed to gain access to the source was determined to have elevated radioactivity and was placed in a waste drum for disposal. Approximately 0.15 drums (0.04 CY) of soil/debris and one discrete radium source were excavated from this location.

3.3 APP-01

APP-01 is located on the south end of the Model Airplane Field parking lot (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were between 100,000 to 200,000 cpm. A subsequent dose rate survey at ground surface had a maximum reading of 0.04 mRem/hr and indicated an elevated horizontal extent of approximately 10 ft by 12 ft.

Excavation was completed on 8 January 2009. A rectangular excavation, 3.0 ft in width by 6.0 ft in length and 1.0 ft deep, did not locate a discrete source (Appendix C, Photograph C-13). All excavated soil was determined to have elevated radioactivity and placed in a waste drum for disposal. Approximately 1.3 drums (0.36 CY) of soil/debris were removed from this location. Soils in the floor of the excavation remain slightly elevated, with dose rate readings of 50-70 uRem/hr. Surveys of soil at ground surface, north of the excavation leading towards the parking lot, had readings of 50-70 uRem/hr with micro-Rem meter and 100,000 to 200,000 cpm with an NaI detector; however a predetermined waste volume was reached at this location, and the excavation was halted. The area was subsequently backfilled and a follow-up survey was performed.

3.4 APP-02

APP-02 is located southwest of the model airplane field parking lot (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were in excess of 500,000 cpm. A subsequent dose rate survey at ground surface had a maximum reading of 1.1 mRem/hr and indicated a hotspot with very limited horizontal extent.

Excavation was completed on 9 January 2009. An excavation 1.5 ft in length by 1.7 ft in width and 1.3 ft deep did not locate a discrete source (Appendix C, Photograph C-35). The highest instrument reading at the floor of the excavation during remedial activities was 11 mRem/hr with a micro-Rem meter at 1.2 ft bgs. At the final vertical extent of 1.3 ft bgs, dose rate readings at the floor of the excavation had reduced to 0.4 mRem/hr. Results concluded that a discrete source did not exist, but the majority of diffuse contamination had been removed from the excavation. All soil/debris removed was determined to have elevated radioactivity and was placed in a waste drum for disposal. Approximately 0.25 drums (0.07 CY) of soil/debris were excavated from this location.

3.5 APF-01

APF-01 is located in the north end of the Model Airplane Field (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were off-scale (in excess of 1,000,000 cpm). A subsequent dose rate survey at ground

surface had a maximum reading of 0.4 mRem/hr and indicated a hotspot with very limited horizontal extent.

Excavation was completed on 9 January 2009. A circular excavation with a diameter of 1.4 ft by 1.1 ft bgs did not locate a discrete source (Appendix C, Photograph C-18). The highest instrument reading at the floor of the excavation during remedial activities was 15 mRem/hr with a micro-Rem meter at 1.0 ft bgs. At the final vertical extent of 1.1 ft bgs, dose rate readings at the floor of the excavation had dropped to 0.07 mRem/hr. These results suggested that a discrete source did not exist, but the majority of diffuse contamination had been removed from the excavation. All soil/debris removed was determined to have elevated radioactivity and was placed in a waste drum for disposal. Approximately 0.15 drums (0.04 CY) of soil/debris were excavated from this location.

3.6 SLR-02

SLR-02 is located on the south side of Sewer Line Road, near the entrance to the Model Airplane Field. The initial radiation survey was completed on 6 January 2009. GWS results in the vicinity using a Ludlum 44-20 NaI detector were off-scale (in excess of 1,000,000 cpm) at the hotspot location. A subsequent dose rate survey at ground surface had a maximum reading of 0.6 mRem/hr and indicated a hotspot with very limited horizontal extent.

Excavation was completed on 9 January 2009. A circular excavation with a diameter of 1.4 ft by 1.0 ft deep did not locate a discrete source (Appendix C, Photograph C-19). The highest instrument reading at the floor of the excavation during remedial activities was 2 mRem/hr with a micro-Rem meter at 0.8 ft bgs. At the final vertical extent of 1.0 ft bgs, dose rate readings at the floor of the excavation had dropped to 0.19 mRem/hr. Results concluded that a discrete source did not exist, but the majority of diffuse contamination had been removed from the excavation. All soil/debris removed was determined to have elevated radioactivity and was placed in a waste drum for disposal. Approximately 0.15 drums (0.04 CY) of soil/debris were excavated from this location.

3.7 SLR-03

SLR-03 is located on the south side of Sewer Line Road, near the entrance to the Model Airplane Field (Figure 1). The initial radiation survey was completed on 6 January 2009. GWS results in

the vicinity using a Ludlum 44-20 NaI detector were in excess of 400,000 cpm at the hotspot location. A subsequent dose rate survey at ground surface had a maximum reading of 0.6 mRem/hr and indicated a hotspot with very limited horizontal extent.

Excavation was completed on 10 January 2009. An excavation 2.3 ft in length by 1.6 ft in width and 1.0 ft deep did not locate a discrete source (Appendix C, Photograph C-20). The highest instrument reading at the floor of the excavation during remedial activities was 1.8 mRem/hr with a micro-Rem meter at 0.4 ft bgs. At the final vertical extent of 1.0 ft bgs, dose rate readings at the floor of the excavation had dropped to 0.15 mRem/hr. Results concluded that a discrete source did not exist, but the majority of diffuse contamination had been removed from the excavation. All soil/debris removed was determined to have elevated radioactivity and was placed in the waste drum for disposal. Approximately 0.3 drums (0.08 CY) of soil/debris were excavated from this location.

4.0 WASTE SHIPMENT

During response activities at the site, three 55-gallon drums of waste material were generated, consisting of soils and debris with elevated activity levels and one drum containing two discrete radium sources. Sources were sealed in a steel container (pipe with end caps) and placed in the drum for safe storage and shielding. Appendix B contains documents for the shipments to Toxco in Oak Ridge, the certificates of disposal for the shipment to US Ecology, and the certificate for the shipment of the soil to Energy Solutions.

On 17 January 2009, CABRERA personnel returned to the Site to ship the drum containing the two radium sources. The waste drum was loaded on a truck and transported by Chase Environmental to the Toxco transfer station in Oak Ridge, Tennessee for processing. The radium sources were ultimately encapsulated in concrete, then transported and disposed as Naturally Occurring Radioactive Material (NORM) at the US Ecology disposal site in Richland, WA.

On 14 April 2009, CABRERA personnel again returned to the Site to ship the three remaining soil waste drums. The waste drums were loaded on a truck and transported by Chase Environmental to the Toxco transfer station in Oak Ridge, Tennessee for processing and consolidation with other wastes. Waste was eventually transferred to Energy Solutions in Clive, UT for disposal.

5.0 HEALTH & SAFETY

Health and safety procedures were conducted in accordance with the site-specific health and safety plan (Cabrera, 2008) (Appendix E) and in accordance with Cabrera corporate radiation safety procedures (Cabrera, 2005).

5.1 Access Control

A radiological control area (RCA) was used around the excavation areas. The RCA was maintained by snow fencing and barricades provided by NPS staff. Road barricades, used as access controls, were also established at the entrance to the model airplane field to prevent vehicle traffic and limit park visitors from entering the Model Airplane Field. A connex box, used as a temporary waste staging area, was locked at all times and had barricades surrounding the perimeter to prevent access.

5.2 Personal Protective Equipment (PPE)

All field personnel that entered the RCA surrounding the excavation were outfitted with modified level D PPE, including steel-toe boots, hardhat, reflective safety vest, safety glasses, and nitrile gloves.

5.3 Occupational Monitoring

Optically-stimulated luminescence (OSL) devices and thermo luminescent dosimeter (TLD) finger rings were worn by all personnel (Cabrera personnel only) that entered the RCA. Personnel exposures were within acceptable limits.

Air monitoring was conducted in accordance with CABRERA *OP-002: Air Sampling and Analysis* to measure personnel exposure to airborne radioactivity during intrusive activities. Air monitoring included the collection of up and downwind low volume air samples in the general work area. Air samples were then counted using a Ludlum Model 43-10-1 for sufficient time to achieve the required minimum detectable concentration (MDC) goal for ^{226}Ra.

Personnel also frisked hands and feet (i.e., soles of shoes) using a Ludlum 44-9 GM tube detector and Model 3 scaler/ratemeter prior to exiting the RCA to avoid the transfer of contamination to clean areas.

6.0 FINDINGS AND CONCLUSIONS

The following is a summary of the findings resulting from the interim response action conducted in the vicinity of the Model Airplane Field and the nearby ball fields at Great Kills Park in 2009. Refer to Figure 1 for soil removal locations.

- Radium is the radionuclide of concern at this location. The presence of radium source items in the shallow subsurface at areas of elevated surface readings was confirmed.
- The radium items discovered were small metal needles/tubes similar to those commonly used in cancer treatments in the early 20th century. The items that were identified during this action were corroded and no longer intact so that the radium liquid content would have been released to the surrounding soils. However these items are small (on average 20 millimeters or less in length and 2-3 millimeters in diameter) with subsequent small volume of radium liquid. Therefore the potential extent of soil contamination resulting from releases from any given item is expected to be limited. This was generally confirmed by the removals accomplished as part of this action.
- The source items were likely included in the sanitary fill material deposited at the Site in the early 20th century to expand the useable land mass at the park.
- Seven hotspots or contaminated areas of limited extent were identified by others during an initial scanning survey; these seven locations were confirmed by Cabrera, and an additional seven hotspots were identified by means of a limited scanning survey of the Model Airplane Field, and other areas surrounding the original hotspots.
- Removal of materials from the 14 locations was prioritized based on accessibility by the public and highest survey results.
- Two discrete source items (radium needles/tubes) were found (one each) at two of the seven locations. The metal cases were significantly degraded and appeared to have leaked into surrounding soils. Due to the elevated activity associated with these items, they were packaged separately with additional shielding in order to maintain acceptable exposure parameters to personnel handling excavated materials. These items were shipped for disposal at the US Ecology facility in Richland, Washington one week after removal actions were completed.
- While no other radium sources were confirmed in the remaining five locations, soil and fill material contaminated with radium was identified and removed. A total of 3 drums

(approximately 0.8 cubic yards total) of diffuse contaminated material was sampled and no hazardous materials exceeding waste characterization criteria were detected so that the waste was shipped as Class A Low Level Radioactive Waste for disposal at Energy Solutions facility in Clive, Utah.

- Based on post-excavation scan surveys and readings from the floors and walls of each excavation, it appears that six of the seven selected locations have sufficient material removed so that they no longer pose an unacceptable risk to the public (i.e., dose readings at the ground surface are near background). These locations are BBF-01, SLR-01, APP-02, APF-01 SLR-02, and SLR-03.
- One of the seven locations addressed during this action, APP-01, appeared to contain a thin layer of contaminated material that extended beyond the limits of excavation. While sufficient soil was removed to reduce the surface readings, this location should be included in subsequent survey and removal action planning.
- The remaining seven hotspots, BRN-01, BRN-02, APF-03, APF-04, APF-02 APP-03, and BBF-02, should be considered for subsequent removal action and confirmatory survey. While they pose no immediate risk to public health or safety, excavation and removal of material from these locations would support an overall reduction of risk in the park.
- It is recommended that another large scale scan survey be undertaken of the areas of the park that are 1) accessible to the public and 2) are underlain by sanitary fill. Vehicle-towed scanning arrays would be well suited to this area provided that an appropriate meter sensitivity, scan rate, and array spacing are employed to maximize resolution of radium 226 and its decay products. The purpose of this survey would be to reevaluate the impacted area to ensure that all hotspots have been identified and to support potential future removal action planning.

7.0 REFERENCES

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CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-05-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: low 30s
Wind Speed Range: E to NE at 3-10 mph
Precipitation Last 24 Hours: Type: None
Weather Delays ☒No ☐Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Setup and walkover.

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	8.5
Stephan Owe	Cabrera	Tech	004	8.5
Kim Nelson	Cabrera	Project Manager		

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Site tour with Client**
Kathlene Cuzzulino	**NPS**	**Site tour with Client**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
None					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0830 Arrived onsite – KN, WF, and SO – Met USACE rep GL and NPS reps.
- 0900 Conducted Site walk-through to all hotspot locations
- 1100 Conducted field work kick-off meeting with USACE and NPS reps and KN, WF, and SO
- 1130 WF contacts drum supplier to arrange delivery of 4 drums to Great Kills Park
- 1200 WF and SO leave site
- 1300 WF and SO arrive at hotel to conduct initial QC of all instrumentation
- 1530 WF and SO leave hotel to purchase supplies at home depot
- 1700 WF and SO arrive back at hotel

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

- **Discovery of undocumented elevated readings at the airplane field.**

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-06-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: low 30s
Wind Speed Range: E to NE at 3-10 mph
Precipitation Last 24 Hours: Type: None
Weather Delays ☒No ☐Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Setup and walkover.

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	9
Stephan Owe	Cabrera	Tech	004	9

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Oversight**
Eric M. Daly	**USEPA**	**Site tour with Client**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
None					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0830 Park Service unlocked gates to the ballfield area
- 0900 Started air sampler at the ballfield for background air sample. G. Lymberis (USACE) noted requirements for Fire Extinguisher and GFIC on extension cords.
- 1000 Off site to get Fire Ex. and GFI.
- 1130 Returned to site. Conducted safety briefing with Cabrera and USACE personnel
- 1200 Awaiting delivery of drums by UPS, started air samplers in anticipation of excavation
- 1235 – 1530 conducted walkover surveys of the planned excavation sites at the ballfield and those in the vicinity of the model airplane field.
- 1500 – while walking to the excavation site in the burn area S. Owe noted unexpected meter response from the 3x3 NaI. Readings with the 3x3 exceeded 1M counts, further investigation of found readings of ~400 uREM/hr contact in the mowed area of the model airplane field about 10

yards from the trail head leading to the burn area. Informed Kathlene Cuzzulino (Park Servic), Gus Lymberis (USACE), and Kim Nelson (Cabrera).

- 1600 – Drums not delivered started tracking them down. UPS did not understand the address and was preparing to return the drums to the origin.
- 1700 – Went to the UPS center and talked with personnel there. Located the drums in the system and explained the address, Will be delivered tomorrow AM.

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

- **Discovery of undocumented elevated readings at the airplane field.**

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-07-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: Mid30s
Wind Speed Range: NE at 12-15 mph
Precipitation Last 24 Hours: Type: Rain, 1.27 inches
Weather Delays ☐ No ☒ Yes, Hours: 4

3. SUMMARY OF WORK PERFORMED TODAY:
Drums received, Rain delay

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	4
Stephan Owe	Cabrera	Tech	004	4

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Oversight**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
None					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0800 Met with G. Lymberis at the park police building and discussed options for today and the rest of the week.
- 0900 discussed options with K. Nelson. Decided to cancel work today due to heavy rain.
- 1000 received drums from UPS, stored at the model airplane field parking lot.

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-08-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: 33-36F
Wind Speed Range: W at 18-25 mph
Precipitation Last 24 Hours: Type: None
Weather Delays ☒ No ☐ Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Removal activities.

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	9
Stephan Owe	Cabrera	Tech	004	9

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Oversight**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
2 sources Ra-226	**S**	**13mCi**	**Steel pipe in drum**		**BB Field**
Soil from BB field Excavation	**S**	**2/3 drum**	**Steel drum**		**BB Field**
Soil from Model Plane Field and roadside	**S**	**1.5 drum**	**Steel drum**		**Model Plane Field**
Total: ~2.3 drums of soil and 2 sources have been generated to date					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0800 Conducted Safety briefing, setup for work at BB field site
- 1100 excavation at the BB field found a Radium source. Dose rate readings were taken at one foot and at 3 feet and H Siegrist calculated activity. Activity is calculated to be 10mCi. The source was packaged in a 6 inch long 2” diameter steel pipe and placed in the drum of soil for temporary storage.
- 1230 setup to excavate the area on the side of the Model Plane Field access road. This site produced a small radium source Activity of the source is calculated to be 3mCi based on the 1 foot

and 3 foot dose rates. The source was moved to the drum at the BB field and placed in the same steel pipe container as the other source.

- 1500 setup at the location closest to the Model Plane Field parking lot. Excavation at this location found a layer of contamination that is spread over an area of several square meters. Excavated an area of ~3 feet x 6 feet to a depth of 1 foot. The area with in the excavation appears to be remediated but contamination remains in the side walls. At this point we had generated about 1.3 drums of waste at this location and do not have the contract capacity to complete the remediation and stopped excavation. Dose rates on the drums from this remediation are slightly elevated and range from 30 to 45 uREM (background is ~7 to 10 uREM)

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	**Reported To**	**Incident Description**
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-09-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: mid30s F
Wind Speed Range: W at 18-25 mph
Precipitation Last 24 Hours: Type: None
Weather Delays ☒ No ☐ Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Removal activities.

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	9
Stephan Owe	Cabrera	Tech	004	9

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Oversight**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
Soil from APP-02	**S**	**0.25 drum**	**Steel drum**		**Parking lot**
Soil from APF-01	**S**	**0.15 drum**	**Steel drum**		**Model airplane field**
Soil from SLR-02	**S**	**0.15 drum**	**Steel drum**		**Sewer Line Road**
Total: ~2.7 drums of soil and 2 sources have been generated to date					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0800 Conducted Safety briefing, Begin GWS of Baseball field
- 1000 WF and SO walk through site and take surveys at remaining hot spots with 3x3 NaI and dose rate meter. Also recorded dose rate at waste storage container
- 1430 excavated APP-02. No source found. 0.25 drums filled with soil. Ground surface reads 400uR/hr after excavation
- 1550 excavated APF-01. No source found. 0.15 drums filled with soil. Ground surface reads 70uR/hr after excavation

- 1655 excavated SLR-02. No source found. 0.15 drums filled with soil. Ground surface reads 190 uR/hr after excavation
- 1740 waste drum loaded on backhoe, taken to sealand. Sealand locked
- 1745 WF + SO lock access gates and leave site.

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-10-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: low 20s F
Wind Speed Range: W at 18-25 mph
Precipitation Last 24 Hours: Type: Some snow flurries
Weather Delays ☒ No ☐ Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Removal activities/ Restoration

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004	9
Stephan Owe	Cabrera	Tech	004	9

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
None			

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics
Gus Lymberis	**USACE**	**Oversight**

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED
United Rentals	**John Deere 410 Backhoe**		**1-06-09**

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES
None			

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
Soil from SLR-03	**S**	**0.30 drum**	**Steel drum**		**Sewer line road**
Total: ~3.0 drums of soil and 2 sources have been generated to date					

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
None						

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0930 Conducted Safety briefing, Begin GWS of Backfill material stock pile
- 1000 SO takes bias soil samples from all excavation location
- 1000 WF beging back filling excavations with back hoe
- 1030 excavated SLR-03. No source found. 0.30 drums filled with soil. Ground surface reads 150 uR/hr after excavation
- 1300 Additional hot spot located at SRL-02 / SRL-03 area. This makes two additional hotspots in this area that were not excavated. Locations were captured during GWS of excavated areas.

- 1400 Final dose rates readings taken at Sealand with bicron. Drum with sources is located in center for max shielding. "Rad Rope" and radiation sign is hung in Sealand marking radiation area around drums. Caution tape wrapped around source drum for identification. Readings are taken on outside of sealand at waist level.
- Backhoe will be picked up the next day
- 1410 WF and SO off site

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY FIELD PRODUCTION REPORT

1. SITE INFORMATION:
PROJECT NAME: Great Kills Removal DATE: 01-17-09

CONTRACT NO: ### CABRERA PROJECT NO: 08-3800.07

SITE MANAGER/FIELD LEAD: Wade Fillingame

2. TODAY'S WEATHER (http://www.noaa.gov for 24 hour history): Temp Range: 8-20F
Wind Speed Range: W at 5-10mph
Precipitation Last 24 Hours: Type: None
Weather Delays ☒ No ☐ Yes, Hours: na

3. SUMMARY OF WORK PERFORMED TODAY:
Shipping Sources

4. PROJECT EMPLOYEES ON-SITE TODAY:

EMPLOYEE NAME	COMPANY	TASKS PERFORMED	COST CODE	HOURS WORKED
Wade Fillingame	Cabrera	Site Supervisor	004/006	8

5. SUBCONTRACTORS ONSITE TODAY

Subcontractor Name	Subcontracted Service	No. Personnel	Tasks Performed Today
Chase Environmental	**Waste Trans/Processing**	**1**	**Waste pickup**

6. NON-PROJECT PERSONNEL ONSITE TODAY (Clients, regulators, base personnel, etc.)

Name	Affiliation	Purpose/Discussion Topics

7. EQUIPMENT / MATERIALS ONSITE TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	DATE RECEIVED

8. EQUIPMENT / MATERIALS RETURNED TODAY:

VENDOR	EQUIPMENT	SERIAL NUMBER	NOTES

9. WASTE GENERATED/STORED ONSITE TODAY:

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	AMOUNT	CONTAINER TYPE	CONTAINER ID	DISPOSITION OR LOCATION OF CONTAINER
2 sources Ra-226	**S**	**13mCi**	**Steel pipe in drum**		
3 Drums of soil from various excavations	**S**		**Steel Drums**	**GK-01, 02, 03**	**Stored in container at the Model Plane Field**

10. WASTE SHIPPED SINCE PROJECT COMMENCEMENT

DESCRIPTION OF WASTE	SOLID, LIQUID, OR MIXED	QUANTIY (TONS, CY, DRUMS)	CONTAINER TYPE	CONTAINER ID	DATE SHIPPED OFFSITE	DISPOSITION OR LOCATION OF CONTAINER
Ra-226 sources	**S**	**13mCI**	**10gal drum**	**TO-TS-R-09-079**	**1-17-09**	**Shipped to Toxco, Oak Ridge, TN**

11. SAMPLE COLLECTION AND ANALYSIS

Sample Location ID No.	Sample Media (Soil, GW, other)	Sampler	Onsite Lab (Y/N)	Date Shipped to Lab	Date Results Required

12. DETAILED DESCRIPTION OF WORK PERFORMED TODAY (Note: Activity for each task location, descriptions and/or sketches, quantities excavated/stockpiled, field sheets generated, names of electronic files produced, etc., as necessary to describe the work):

- 0800 onsite with Jim Cabage from Chase Environmental to prepare shipment
- 0845 removed sources from soil drum. Prepared to put the pipe containing the sources into a foam spacer in a 55gal drum. Dose rates on the outside of the drum were expected to be 30 to 50 mREM/hr which would require that the drum be shipped as a Yellow III and would require placarding of the vehicle. Chase offered to provide a 10 gal drum and a DU shield to make the shipment. I opted to use this system. The dose rate on the package as shipped was 8mREM/hr and the TI was 0.4. The package was marked and labeled as a Yellow II, and no placarding was required.

- 0930 completed packaging and correcting/changing shipping papers. Kathleen Cuzzolino from the NPS was at the site to sign the shipping papers for the generator. She was provided with copies of the papers and left site.
- Frisk of personnel and equipment shows no contamination.
- 1000 offsite making copies of shipping papers.
- 1030 returned to site. Chase left site. Commenced survey of remaining drums and the storage container. Surveys were performed with a Bicron ion chamber, and a Ludlum mod 14C (GM) . Survey of the drums indicates that there may still be a discrete source remaining in the bottom 1/3 of drum GK-01. Dose rate in the lower 1/3 on one side was 55mREM/hr. This was previously masked by the elevated readings caused by having the sources stored in the same drums.
- Maximum observed dose rates on the drums as follows: GK-01 55mREM/hr, GK-02 4.0mREM.hr, GK-03 6.0mREM/hr.
- 1100 Survey of the storage container found a maximum dose rate of 1.5 mREM/hr. Posted the entrance to the container as a Radioactive Material Area and posted the immediate vicinity of the drums as a Radiation Area.

13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.

14. **CHANGES IN SITE CONDITIONS** (Record any site conditions that occurred that may have an impact on cost, schedule, quality or regulatory concerns at the site that were not part of the current scope of work)

15. HEALTH AND SAFETY INCIDENTS

	Name of Person	Reported To	Incident Description
First Aid	**None**		
OSHA Recordable	**None**		
Vehicle Accident	**None**		
Lost Time	**None**		

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE): 800-424-9300

ORGANIZATION: Chemtrec — WSDS #: CHEN01RAD

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 3

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [x] NO

EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY
Chase Environmental Group, Inc.
11450 Watterson Court
Louisville, KY 40299

SHIPPER ID #: N/A
[X] COLLECTOR
[ ] PROCESSOR

USER PERMIT NUMBER: T-KY003-L09
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY):

CONTACT: Janet Baker
TELEPHONE #: 865-481-8801

6. CARRIER NAME AND ADDRESS
R & R Trucking
PO Box 545
Duenweg, MO 64841

EPA ID #: MOR000501973
SHIPPING DATE: 4/15/2009

CONTACT: Don Richey
TELEPHONE #: 417-623-6885

SIGNATURE: [signature] DATE: 4/15/09

7. NRC FORM 540 AND 540A — PAGE 1 __1__PAGE(S)
NRC FORM 541 AND 541A — OF __1__PAGE(S)
NRC FORM 542 AND 542A — __1__PAGE(S)
ADDITIONAL INFORMATION — None_PAGE(S)

8. Manifest Number (Use this number on all continuation pages): TO-2009-091

9. CONSIGNEE-NAME AND FACILITY ADDRESS
Toxco, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low
Telephone Number (Include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste reciept

Date

10. Certification

This is to certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: [signature] TITLE: Authorized DATE: 4/15/09

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
Radioactive material, low specific activity (LSA-II), 7, UN3321 One steel drum with soil for survey and disposal	NA	NA	Solid/Oxide	Ra-226	3.70E+02	LSA-II	0.212	TO-SL-E-09-341
Non DOT Regulated Material One steel drum with soil for disposal	NA	NA	Solid/Oxide	Ra-226	1.20E-01	NA	0.212	TO-SL-E-09-342
Non DOT Regulated Material One steel drum with soil for disposal	NA	NA	Solid/Oxide	Ra-226	1.20E-01	NA	0.212	TO-SL-E-09-343

20. Generator Certification Statement:
The constituents of the waste herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Signature:_____ Title: _____

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS							2. MANIFEST NUMBER
NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WGHT kg	SPECIAL NUCLEAR MATERIAL (grams)				TO-2009-091
			U-233	U-235	Pu	TOTAL	
3	0.636	952.5	NP	NP	NP	NP	3
							PAGE 1 OF 1 PAGE(S)
			ACTIVITY (MBq/mCi)			SOURCE	4. SHIPPER NAME
ALL NUCLIDES		TRITIUM	C-14	Tc-99	I-129	(kg)	Chase Env. Group
3.70E+02 MBq		NP	NP	NP	NP	NP	SHIPPER ID NUMBER
1.00E+01 mCi							N/A

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER								16. WASTE CLASS
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION (See Note 1)	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	PHYSICAL DESCRIPTION 11 WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(s) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	AS-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
TO-SL-E-09-341/ 0685	4	0.212	317.5	5500	<3.67E-6	<3.67E-5	22	0.212	100	Oxide/NP	NP	Ra-226	3.70E+02	1.00E+01	NA
												Package total	3.70E+02	1.00E+01	
TO-SL-E-09-342/ 0685	4	0.212	317.5	60.0	<3.67E-6	<3.67E-5	22	0.212	100	Oxide/NP	NP	Ra-226	1.20E-01	3.25E-03	NA
												Package total	1.20E-01	3.25E-03	
TO-SL-E-09-343/ 0685	4	0.212	317.5	60.0	<3.67E-6	<3.67E-5	22	0.212	100	Oxide/NP	NP	Ra-226	1.20E-01	3.25E-03	NA
												Package total	1.20E-01	3.25E-03	

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other, describe in Item 6, or additional page

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion Exchange Media
31. Anion Ion Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass)
43. Activated Material
59. Other. Describe in Item 11, or Additional Page

Note 3. For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "-S."
For all solidification media, the vendor (manufacturer) and brand name must also be identified in Item 13. Code 100 = NONE REQUIRED.

Sorption

60. Speedi Dri
61. Celetom
62. Floor Dry/ Superfine
63. Hi Dri
64. Safe-T-Sorb
65. Safe-N-Dri
66. Floroo
67. Floroo X
68. Solid-A-Sorb
69. Chemsit 50
70. Chemsit 50
71. Chemsit 3030
72. Dicapanl HP200
73. Dicapanl HP500
74. Petroset
75. Petroset II
76. Aquaset
77. Aquaset II
89. Other. Describe in Item 13, or additional page

Solidification

90. Cement
91. Concrete (Encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or Additional Page
100. None Required

NRC FORM 542
(5-1998)

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

List all original "PROCESSED WASTE" before "COLLECTED WASTE".

1. WASTE COLLECTOR/PROCESSOR

NAME: Chase Environmental Group, Inc.

IDENTIFICATION NUMBER: T-KY003-L09

SHIPPING DATE: 4/15/2009

SHIPPER USE ONLY

2. MANIFEST NUMBER: TO-2009-091

3. PAGE 1 OF 1 PAGE(S)

4. GENERATOR IDENTIFICATION NUMBER	5. GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7. PREPROCESSED WASTE (OR MATERIAL) VOLUME (m3)	8. MANIFEST NUMBER UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE PREPROCESSED OR COLLECTED	10. ORIGINATING COMPACT OR STATE	11. AS PROCESSED/COLLECTED TOTAL A. SOURCE MATERIAL (kg)	B. SNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m3)
0685	Gatweay National Recreation Area 718-354-4609	210 New York Avenue Staten Island, NY 10305	0.636	NA	C	NY	NP	NP	3.70E+02	0.636
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A)							0.00E+00	0.000	3.70E+02	0.636

NRC FORM 542 (5-1998)

DRIVER'S INSTRUCTIONS FOR EXCLUSIVE USE VEHICLES

The Code of Federal Regulations, 49 CFR 173.403(i)and 173.441 (c and e) requires that specific instructions for maintenance of exclusive use shipments controls be provided by the shipper to the carrier. These instructions must be included with the shipment documents.

The following instructions shall be complied with for all exclusive use vehicles.

- Do not change out tractor before arrival at the receipt facility without notifying shipper.
- Do not change the fifth wheel adjustment on the tractor without notifying shipper.
- Do not move or transfer packages within the van or between vans while enroute to receipt facility without notifying shipper.
- The shipment must be loaded by consignor and unloaded by consignee from the transport vehicle in which originally loaded.
- Shipments must be braced so as to prevent leakage or shifting of load under conditions normally incident to transportation.
- The vehicle must be placarded "RADIOACTIVE" on all four sides when applicable until shipment is unloaded.

If the vehicle is involved in an accident or is required to make emergency braking which would shift the load and change radiation levels, notify the shipper immediately.

In case of an accident, vehicle malfunction, or deviation from the above instructions immediately contact one of the following:

Chase Environmental

865-481-8801

Any deviation from these instructions is a violation of State and Federal law and may result in carrier penalty.

Driver's Signature: _____ Date: 4/15/09

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE): 800-424-9300

ORGANIZATION: Chemtrec WSDS #: CHEN01RAD

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [x] NO

EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY
Chase Environmental Group, Inc.
11450 Watterson Court
Louisville, KY 40299

SHIPPER ID #: N/A
X COLLECTOR
PROCESSOR

USER PERMIT NUMBER: T-KY003-L09
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY):

CONTACT: Janet Baker
TELEPHONE #: 865-481-8801

6. CARRIER NAME AND ADDRESS
R & R Trucking
PO Box 545
Duenweg, MO 64841

EPA ID #: MOR000501973
SHIPPING DATE: 1/17/2009

CONTACT: Don Richey
TELEPHONE #: 417-623-6885

SIGNATURE
DATE

7. NRC FORM 540 AND 540A — PAGE 1 __1__PAGE(S)
NRC FORM 541 AND 541A — OF __1__PAGE(S)
NRC FORM 542 AND 542A — __1__PAGE(S)
ADDITIONAL INFORMATION — None__PAGE(S)

8. Manifest Number
(Use this number on all continuation pages)
TO-2009-013

9. CONSIGNEE-NAME AND FACILITY ADDRESS
Toxco, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low
Telephone Number (Include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste reciept
Date

10. Certification

This is to certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE | TITLE | DATE

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number. and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
Radioactive material, Type A package, 7, UN2915 One steel drum with radium needles for Richland	Yellow-III		Solid/Oxide	Ra-226	4.81E+02	NA	0.212	TO-TS-R-09-079

20. Generator Certification Statement:
The constituents of the waste herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Signature:_____ Title: _____

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE): 800-424-9300

ORGANIZATION: Chemtrec WSDS #: CHEN01RAD

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [x] NO

EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY

USER PERMIT NUMBER: T-KY003-L09 SHIPMENT #: N/A

CONTACT: Janet Baker

6. CARRIER NAME AND ADDRESS
R & R Trucking
PO Box 545
Duenweg, MO 64841

CONTACT: Don Richey

SIGNATURE

SHIPPER ID #: N/A
[X] COLLECTOR
[ ] PROCESSOR

GENERATOR TYPE (SPECIFY)

TELEPHONE #: 865-481-8801

EPA ID #: MOR000501973

SHIPPING DATE: 1/17/2009

TELEPHONE #: 417-623-6885

DATE

7. NRC FORM 540 AND 540A — PAGE 1 __1__ PAGE(S)
NRC FORM 541 AND 541A — OF __1__ PAGE(S)
NRC FORM 542 AND 542A — __1__ PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. Manifest Number
(Use this number on all continuation pages)
TO-2009-013

9. CONSIGNEE-NAME AND FACILITY ADDRESS
Toxco, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low

Telephone Number (Include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste reciept

Date

10. Certification

This is to certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 30 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE | TITLE | DATE

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number. and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
Radioactive material, Type A package, 7, UN2915 One steel drum with radium needles for Richland	Yellow-III		Solid/Oxide	Ra-226	4.81E+02	NA	0.212	TO-TS-R-09-079

20. Generator Certification Statement:
The constituents of the waste herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Signature:_____ Title: _____

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS

NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WGHT kg	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	0.212		NP	NP	NP	NP

ACTIVITY (MBq/mCi) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)
4.81E+02 MBq	NP	NP	NP	NP	NP
1.30E+01 mCi					

2. MANIFEST NUMBER TO-2009-013

3 PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME Chase Env. Group

SHIPPER ID NUMBER N/A

DISPOSAL CONTAINER DESCRIPTION / WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION (See Note 1)	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(S) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	16. WASTE CLASS A&A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
TO-TS-R-09-079/ 0685	4	0.212			<3.67E-6	<3.67E-5	36	0.212	100	Oxide/NP	NP	Ra-226	4.81E+02	1.30E+01	NA
												Package total	**4.81E+02**	**1.30E+01**	

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP ".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other, describe in item 6, or additional page

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion Exchange Media
31. Anion Ion Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass)
43. Activated Material
59. Other, Describe in Item 11, or Additional Page

Note 3: For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "-S."

For all solidification media, the vendor (manufacturer) and brand name must also be identified in item 13. Code 100 = NONE REQUIRED.

Sorption

60. Speedi Dri
61. Celetom
62. Floor Dry/ Superfine
63. Hi Dri
64. Safe-T-Sorb
65. Safe-N-Dri
66. Floroo
67. Floroo X
68. Solid-A-Sorb
69. Chemsil 30
70. Chemsil 50
71. Chemsil 3030
72. Dicaperl HP200
73. Dicaperl HP500
74. Petroset
75. Petroset II
76. Aquaset
77. Aquaset II
89. Other. Describe in Item 13, or additional page

Solidification

90. Cement
91. Concrete (Encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in item 13, or Additional Page
100. None Required

NRC FORM 542
(5-1998)

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

List all original "PROCESSED WASTE" before "COLLECTED WASTE".

1. WASTE COLLECTOR/PROCESSOR

NAME: Chase Environmental Group, Inc.

IDENTIFICATION NUMBER: T-KY003-L09

SHIPPING DATE: 1/17/2009

SHIPPER USE ONLY

2. MANIFEST NUMBER: TO-2009-013

3. PAGE_1_OF _1_PAGE(S)

4. GENERATOR IDENTIFICATION NUMBER	5. GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7. PREPROCESSED WASTE (OR MATERIAL) VOLUME (m3)	8. MANIFEST NUMBER UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE P=PROCESSED C=COLLECTED	10. ORIGINATING COMPACT OR STATE	11. AS PROCESSED/COLLECTED TOTAL A. SOURCE MATERIAL (kg)	B. SNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m3)
0685	Gatweay National Recreation Area 718-354-4609	210 New York Avenue Staten Island, NY 10305	0.212	NA	C	NY	NP	NP	4.81E+02	0.212
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A)							0.00E+00	0.000	4.81E+02	0.212

STATE OF WASHINGTON
2009
APPLICATION FOR A SITE USE PERMIT TO DISPOSE OF N.A.R.M. WASTES AT THE COMMERCIAL LOW-LEVEL RADIOACTIVE WASTE DISPOSAL SITE RICHLAND, WASHINGTON

WASHINGTON STATE DEPARTMENT OF ECOLOGY

A. Name of the company, organization, institution, etc., that is the original generator of the waste to be disposed of under this permit. (If the name changes, you must notify us by mail on the new letterhead.) Original generator means the last person who puts radioactive material to practical use. A broker may not list itself as the original generator of its client's radioactive material or waste, nor sign on behalf of the generator.

Gateway National Recreation Area
APPLICANT'S NAME:

B. Address where waste is generated (MUST include the 9-digit Zip. Contact your Post Office to obtain your Zip Code).

ADDRESS WHERE WASTE IS GENERATED	MAILING ADDRESS (IF DIFFERENT)
Great Kills Park	fort Wadsworth
Hylan Blvd & Buffalo St	210 New York Avenue
Staten Island NY 10306	Staten Island NY 10305-5019
CITY STATE ZIP CODE (9 DIGITS)	CITY STATE ZIP CODE (9 DIGITS)

C. Name of the contact person who will be able to provide answers to any questions we may have on your application, waste generating activities or shipments. **(NOTE: Permits will be mailed addressed to contact person; ensure mailing address and contact name agree.)**

Kathleen Cuzzolino Env. Protection Spec. (718) 354-4609 Ext
(FIRST) (M.I.) (LAST) TITLE PHONE

D. If this is a renewal of a site use permit please enter your permit number and volume of waste disposed of at the Richland site in the most recent calendar year in which you held a permit. Indicate if you are a first-time applicant.

___ **RENEWAL - SITE USE PERMIT #** _____ **- VOLUME DISPOSED** _____ **(CU FT)** ___ **(YEAR)**

X **FIRST-TIME APPLICANT**

E. Estimated volume of waste in cubic feet, and amount of activity in millicuries (mCi) that you will dispose of in Washington State in the next calendar year. **DO NOT USE SCIENTIFIC NOTATION.**

50 ft^3 80 mCi

F. Calculate the permit fee due using the enclosed fee schedule and enter amount of fee enclosed. $ 424.00

G. Types of N.A.R.M. wastes (e.g. pipe scale, decontamination waste, building rubble, etc.), and all radionuclides that you have approval to dispose of in Washington State.

1. REMEDIATION WASTE (SOILS & DEBRIS) AND SOURCES
TYPES OF WASTES

2. Radium-226 w/ Progeny
RADIONUCLIDES

H. Estimated percentage of each class of waste. Total of percentage from all classes should equal 100%. (See WAC 246-249-040 online at http://search.leg.wa.gov/wslwac/WAC%20246%20%20TITLE/WAC%20246%20-249%20%20CHAPTER/WAC%20246%20-249%20%20CHAPTER.htm).

CLASS A (90 %) **CLASS B** (%) **CLASS C** (10 %)

I. Do you u se a broker's services? If yes, indicate your broker's name and its Washington State Broker Site Use Permit number. If you use more than one broker, list them all.

YES X **NO** __ - CHASE ENVIRONMENTAL GROUP - B433
BROKER NAME(S) BROKER'S SITE USE PERMIT #(S)

J. Do you have a specific radioactive materials license from the NRC or Agreement State? **YES** _____ **NO** X If yes, do you package your own radioactive waste? **YES** _____ **NO** _____

K. If you operate under a general radioactive materials license who packages your waste for you?

_____ **PACKAGER'S NAME**

_____ **PACKAGER'S SITE USE PERMIT #**

L. Please indicate the one specific type which best describes your facility:

1. FUEL CYCLE
- **a. NUCLEAR POWER REACTOR** ( )
- **b. REACTOR FUEL PRODUCTION** ( )
- **c. OTHER (NON-REACTOR)** ( )

2. MEDICAL
- **a. HOSPITAL/CLINIC** ( )
- **b. RESEARCH** ( )
- **c. LABORATORY** ( )
- **d. OTHER** ( )

3. GOVERNMENT (NON-MEDICAL)
- **a. MILITARY** ( )
- **b. RESEARCH** ( )
- **c. REGULATORY** ( )
- **d. OTHER** (X)

4. INDUSTRIAL
- **a. RESEARCH & DEVELOPMENT** ( )
- **b. MANUFACTURING** ( )
- **c. NUCLEAR PHARMACY** ( )
- **d. WASTE BROKER** ( )
- **e. OTHER** ( )

5. ACADEMIC (NON-MEDICAL)
- **a. RESEARCH** ( )
- **b. LABORATORY** ( )
- **c. REACTOR** ( )
- **d. OTHER** ( )

M. The permit fee is required at the time of submitting an application (WAC 173-326-040(1)). Make check or money order payable to the State of Washington, with your Washington State Site Use Permit number (if applicable) written on the check or money order. Please provide the following information:

030240 **CHECK OR MONEY ORDER #**

CABRERA SERVICES INC. **NAME OF COMPANY ISSUING CHECK**

N. I certify that I am fully authorized to enter into the terms and conditions of this permit and am legally authorized to bind the applicant thereto. I hereby agree to comply with all applicable state and federal regulations related to the safe management of radioactive waste (including the assurance that the waste contains no hazardous components as defined in Washington Administrative Code, Chapter 173-303 WAC, Dangerous Waste Regulations, and complies with the site operator's Radioactive Materials License and with all Department of Transportation packaging and shipping requirements as defined in 49 CFR 170 through 179). I understand that the State of Washington reserves the right to suspend or revoke this permit. The information provided on this form is complete and true to the best of my knowledge.

SIGNATURE OF PERSON AUTHORIZED TO SIGN THIS APPLICATION (IN BLUE INK) Barry T Sullivan

PRINTED NAME OF PERSON SIGNING Barry T. Sullivan

TITLE General Superintendent

DATE OF SIGNATURE 1/15/2009

O. Mail check or money order and application form (with **original ink signature**) to:

Department of Ecology
Cashiering Section
PO Box 47611
Olympia, WA 98504-7611

P. Correspondence (other than application forms) may be addressed to diha461@ecy.wa.gov (e-mail), or:

Department of Ecology
Nuclear Waste Program
PO Box 47600
Olympia, WA 98504-7600

The Department of Ecology is an Equal Opportunity employer. If you need this document in an alternate format, please contact the Nuclear Waste Program at (360) 407-7109 (voice) or 1-800-833-6388 (TTY).

PLEASE ALLOW A MINIMUM OF 5 WEEKS TO PROCESS AND ISSUE SITE USE PERMIT. INCOMPLETE APPLICATION OR LATE PAYMENT WILL CAUSE DELAY.

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE): 800-424-9300

ORGANIZATION: Chemtrec WSDS #: CHEN01RAD

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [x] NO

EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY
Chase Environmental Group, Inc.
11450 Watterson Court
Louisville, KY 40299

SHIPPER ID #: N/A
X COLLECTOR
PROCESSOR

USER PERMIT NUMBER: T-KY003-L09
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY):
CONTACT: Janet Baker
TELEPHONE #: 865-481-8801

6. CARRIER NAME AND ADDRESS
R & R Trucking
PO Box 545
Duenweg, MO 64841

EPA ID #: MOR000501973
SHIPPING DATE: 1/17/2009
CONTACT: Don Richey
TELEPHONE #: 417-623-6885
SIGNATURE: [signature]
DATE: 1/17/09

7. NRC FORM 540 AND 540A — PAGE 1 __1__ PAGE(S)
NRC FORM 541 AND 541A — OF __1__ PAGE(S)
NRC FORM 542 AND 542A — __1__ PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. Manifest Number (Use this number on all continuation pages): TO-2009-013

9. CONSIGNEE-NAME AND FACILITY ADDRESS
Toxco, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low
Telephone Number (Include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste receipt:
Date:

10. Certification

That we certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: [signature]
TITLE: Technician
DATE: 1/17/09

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME - m^3	19. ID NUMBER OF PACKAGE
Radioactive material, Type A package, 7, UN2915 One steel drum with radium needles for Richland	~~Yellow-II~~ Yellow II	0.4	Solid/Oxide	Ra-226	4.81E+02	NA	~~0.212~~ 0.038	TO-TS-R-09-079

20. Generator Certification Statement:
The constituents of the waste herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Signature: [signature] Title: Env. Protection Specialist

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS

NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WEIGHT kg	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	~~0.212~~	~~[illegible]~~	NP	NP	NP	NP
	0.038	.501				

ACTIVITY (MBq/mCi) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)
4.81E+02 MBq	NP	NP	NP	NP	NP
1.30E+01 mCi					

2. MANIFEST NUMBER: TO-2009-013

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME: Chase Env. Group

SHIPPER ID NUMBER: N/A

DISPOSAL CONTAINER DESCRIPTION / WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION (See Note 1)	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(S) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT (IF > 0.1%)	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	16. WASTE CLASS AA-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
TO-TS-R-09-079/ 0685	4	0.212	35	80	<3.67E-6	<3.67E-5	36	0.212	100	Oxide/NP	NP	Ra-226	4.81E+02	1.30E+01	NA
												Package total	4.81E+02	1.30E+01	

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other, describe in Item 8, or additional page

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. RCRA or State Hazardous
28. Demolition Rubble
29. Cation Ion Exchange Media
31. Anion Ion Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass)
43. Activated Material
59. Other, Describe in Item 11, or Additional Page

Note 3: For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "-S."
For all solidification media, the vendor (manufacturer) and brand name must also be identified in Item 13. Code 100 = NONE REQUIRED.

Sorption

60. Speedi Dri
61. Celatom
62. Floor Dry/ Superfine
63. Hi Dri
64. Safe-T-Sorb
65. Safe-N-Dri
66. Floco
67. Floco X
68. Solid-A-Sorb
69. Chemsil 30
70. Chemsil 50
71. Chemsil 3030
72. Diaperl HP200
73. Diaperl HP500
74. Petroset
75. Petroset I
76. Aquaset
77. Aquaset II
89. Other. Describe in Item 13 or additional page

Solidification

90. Cement
91. Cerafels (Encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13 or Additional Page
100. None Required

RADIOACTIVE WASTE SHIPMENT CERTIFICATION FOR SHIPMENTS TO THE COMMERCIAL RADIOACTIVE WASTE DISPOSAL FACILITY OR RADIOACTIVE WASTE PROCESSOR

The following certification, completed as applicable, is made to the state of Washington:

Certification is hereby made to the state of Washington that the radioactive waste described on manifest/bill of lading No._____ has been inspected and it has been determined that the materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable federal and state regulations, laws, rules, and licenses.

The undersigned shall indemnify and hold harmless the state of Washington from any and all claims, suits, losses, charges, and expenses on account of injuries to any and all persons whomsoever, and any and all property damage arising or growing out of or in any manner connected with this shipment to the extent that the claims, suits, losses, charges, or expenses are caused in whole or in part by negligent acts or omissions of the undersigned.[1]

Except for any violation of applicable state or federal statute or regulation or license condition respecting packaging and shipment, inspection and acceptance of any item or container or material covered by this certification by the state of Washington or a duly authorized contractor shall release the party who executed this certificate from any and all requirements of indemnification and hold harmless from injury or loss.

SECTION A:

GENERATOR: Gateway Recreation Area (National Parks Service)
(Company or Agency Name)

PERMIT NUMBER: _____

VOLUME OF WASTE IN THIS SHIPMENT: ~~7.5 cubic feet~~ 0.38 m^3

BY: Kathleen Cuzzolino (Printed Name) TITLE: Environmental Protection Spec.

SIGNATURE: [signature] DATED: 17 Jan 2009

SECTION B:

BROKER: _____
(Company Name)

PERMIT NUMBER: _____

VOLUME OF WASTE IN THIS SHIPMENT: _____

BY: _____ (Printed Name) TITLE: _____

SIGNATURE: _____ DATED: _____

SECTION C:

CARRIER: R + R Trucking
(Company Name)

VOLUME OF WASTE IN THIS SHIPMENT: .038 m^3

BY: James R Cabage (Printed Name) TITLE: Driver

SIGNATURE: [signature] DATED: 1/17/09

DOH RHF-31D
Updated 3/01

[1] Federal government agencies entering into this certification are subject to all applicable federal law including, but not limited to, the Federal Tort Claims Act and the Anti-Deficiency Act.

ENVIRONMENTAL MANAGEMENT AND CONTROLS, INC.

3106 SOUTH FAITH HOME ROAD
TURLOCK, CALIFORNIA 95380
E-MAIL:emclga@aol.com

PHONE (800) 552-6121
PHONE (209) 667-1102
FAX (209) 667-1583

March 18, 2010

John O'Neil
Chase Environmental Group
109 Flint Rd.
Oak Ridge, TN 37830

Dear John

The following is a list of the radioactive waste drum(s) that were sent for disposal to the Richland, Washington disposal site on our shipment 09-W-N2. Enclosed is the NRC Form 542 and acknowledgement of receipt.

Manifest	Drum #
Gateway NRA EMC-09-001	0685
Michael Reese Hosp. EMC-09-001	0074

If you require any further information, please do not hesitate to contact me.

Sincerely,

Gaye Nelson

Gaye Nelson
Manager
Environmental Management & Controls, Inc.

US Ecology Washington, Inc.
1777 Terminal Drive
Richland, WA 99354

Attachment 41-5

Office (509) 946-4945
Fax: (509) 946-5495
www.usecology.com

USEcologyWashington

ENVIRONMENTAL MANAGEMENT & CONTROLS
GAYE NELSON
3106 S FAITH HOME ROAD
TURLOCK CA 95380

This is to certify that the waste shipment described below was received for disposal at the US Ecology Richland, Low-Level Radioactive Waste Disposal Facility. This certification satisfies the Acknowledgment of Receipt of Waste Conditions of the State of Washington Radioactive Materials License WN-I019-2 issued to US Ecology, Inc.

BATES NUMBER: 24256

GENERATOR NUMBER: CAT-08-001-1828

SHIPMENT NUMBER: 09-W-N2

DATE RECEIVED: 3/09/10

SIGNATURE: Douglas Huffer DATE: 03/12/10

Discrepancies (if any) between wastes listed on the manifest and waste materials received in the shipment:

NONE

NOTE: This certification does not necessarily imply that the waste has been buried. You will be advised if any problems with the shipment are encountered during the burial process.

Any inquiries to this acknowledgment should be directed to Michael Ault, Facility Manager.

024255

NRC FORM 540
Expires 7/31/2010

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (Include Area Code)
209-678-6782 nights or Day phone 8-5 (209)667-1102

ORGANIZATION
Thomas Gray & Associates

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?
[X] YES
[ ] NO
Seal #~~1204~~ 1206

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ——>
6 metal boxes
4 metal dms

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT?
If "Yes" provide Manifest Number ——> NO

EPA MANIFEST NUMBER

5. SHIPPER - NAME AND FACILITY
EMC
3106 S Faith Home Road
Turlock, Ca 95380

SHIPPER I.D. NUMBER
CAT080011828
[X] COLLECTOR
[X] PROCESSOR
GENERATOR TYPE (Specify)

USER PERMIT NUMBER: B400
SHIPMENT NUMBER: 09-W-N2

CONTACT: Gaye Nelson
TELEPHONE NUMBER: 209-667-1102

6. CARRIER - Name and Address
R & R Trucking
PO Box 545
Duenwig, MO 64841

EPA I.D. NUMBER: MOR000501973
SHIPPING DATE: 3/8/2010

CONTACT: Jo Vance
TELEPHONE NUMBER: 800-625-6885

SIGNATURE - Authorized Shipper's Representative
DATE: 3-8-10

7. NRC FORM 540 AND 540A — PAGE 1 OF 1 PAGES(S)
NRC FORM 541 AND 541A — PAGE 1 OF 4 PAGES(S)
NRC FORM 542 AND 542A — PAGE 1 OF 4 PAGES(S)
ADDITIONAL INFORMATION — PAGE 1 OF ____ PAGES(S)

8. MANIFEST NUMBER
(Use this number on all continuation pages)
01974

9. CONSIGNEE - Name and Facility Address
US Ecology
1/4 Mile West Area 200 East Area
Richland, WA 99352

CONTACT: Mike Ault
TELEPHONE NUMBER (Include Area Code): 509-377-2411

SIGNATURE - Authorized consignee acknowledging waste receipt
DATE: 3-9-10

10. CERTIFICATION This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the applicable requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: Gaye Nelson
TITLE: Manager
DATE: 3-8-10

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANS. INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES	16. TOTAL PACKAGE ACTIVITY IN SI UNITS	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (kg/lbs)	19. PACKAGE I.D. NUMBER
UN2915 Radioactive Material, Type A Package, 7 Seal #172158	Yellow III	3	solid/oxides	Ra226	590.52 MBq (15.96) mCi	n/a	510.7536 1126	1. ENCAP09-W-N1
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Ra226, Cs137, Kr85, Ni63, Pm147, Re187, Th232	249.380111 MBq (6.740003) mCi	LSA-II	1650.1968 3638	2. 09-W-N4
RQ UN2915 Radioactive Material, Type A Package, 7 Seal #172159	Yellow III	5	solid/oxides	Ra226	2960 MBq (80) mCi	n/a	518.9184 1144	3. ENCAP09-W-N2
RQ UN2915 Radioactive Material, Type A Package, 7 Seal #172160	Yellow III	4	solid/oxides	Ra226	2960 MBq (80) mCi	n/a	512.568 1130	4. ENCAP09-W-N3
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Ra226, Co57, Ge68, Th232	30754.71084 MBq (831.2084011) mCi	LSA-II	1903.3056 4196	5. 09-W-N5
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Ra226, Re187, Th232, Pm147, Kr85, Co60, Cs137 Ge68	45015.69928 MBq (1216.640521) mCi	LSA-II	1944.1296 4286	6. 09-W-N6
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Co57, Ge68, Ra226, Th232	36394.47835 MBq (983.63455) mCi	LSA-II	1788.9984 3944	7. 09-W-N7
UN2915 Radioactive Material, Type A Package, 7 Seal #172161	Yellow II	1	solid/oxides	Ra226	671.3058555 MBq (18.1434015) mCi	n/a	514.3824 1134	8. ENCAP09-W-N4
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Ra226, Ra228	95.11886 MBq (2.57078) mCi	LSA-II	3531.7296 7786	9. 09-W-N8
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7	n/a	n/a	solid/oxides	Ra226, Nat Th	123.95 MBq (3.35) mCi	LSA-II	2436.7392 5372	10. 09-W-N12

Received Date 3-9-10

CEG CHASE
Environmental Group INC.

Waste Management and Remediation Services

April 21, 2009

Mr. Wade Fillingame
Cabrera Services, Inc.
107 New Ridge Road
Oak Ridge, TN 37830

Dear Mr. Fillingame:

Enclosed please find a copy of the signed NRC Form 540, acknowledging receipt at Toxco MMC in Oak Ridge, TN, of the low-level radioactive material shipped from Gateway National Recreation Area on April 15, 2009. If you have any questions concerning this shipment, please call us toll-free at 877-389-2124.

We appreciate the opportunity to be of service to Cabrera Services, and look forward to working with you again.

Sincerely,
Chase Environmental Group, Inc.

Rebecca Mumper
Customer Service Representative

www.chaseenv.com • 865.481.8801 • 865.481.8818 fax
109 Flint Road • Oak Ridge, TN 37830

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE): 800-424-9300
ORGANIZATION: Chemtrec — WSDS #: CHEN01RAD

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO
3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 3
4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [x] NO
EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY
Chase Environmental Group, Inc.
11450 Watterson Court
Louisville, KY 40299
USER PERMIT NUMBER: T-KY003-L09
SHIPMENT #: N/A
CONTACT: Janet Baker
SHIPPER ID #: N/A
X COLLECTOR
PROCESSOR
GENERATOR TYPE (SPECIFY):
TELEPHONE #: 865-481-8801

6. CARRIER NAME AND ADDRESS
R & R Trucking
PO Box 545
Duenweg, MO 64841
EPA ID #: MOR000501973
SHIPPING DATE: 4/15/2009
CONTACT: Don Richey
TELEPHONE #: 417-623-6885
SIGNATURE
DATE: 4/15/09

7. NRC FORM 540 AND 540A — PAGE 1 __1__ PAGE(S)
NRC FORM 541 AND 541A — OF __1__ PAGE(S)
NRC FORM 542 AND 542A — __1__ PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. Manifest Number
(Use this number on all continuation pages)
TO-2009-091

9. CONSIGNEE-NAME AND FACILITY ADDRESS
Toxco, Inc.
109 Flint Road
Oak Ridge, TN 37830
Contact: Rick Low
Telephone Number (Include area code): 865-482-5532
SIGNATURE-Authorized consignee acknowledging waste receipt
Date: 4/20/09

10. Certification
I hereby certify that the herein named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.
AUTHORIZED SIGNATURE
TITLE: Technician
DATE: 4/15/09

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
Radioactive material, low specific activity (LSA-II), 7, UN3321 One steel drum with soil for survey and disposal	NA	NA	Solid/Oxide	Ra-226	3.70E+02	LSA-II	0.212	TO-SL-E-09-341
Non DOT Regulated Material One steel drum with soil for disposal	NA	NA	Solid/Oxide	Ra-226	1.20E-01	NA	0.212	TO-SL-E-09-342
Non DOT Regulated Material One steel drum with soil for disposal	NA	NA	Solid/Oxide	Ra-226	1.20E-01	NA	0.212	TO-SL-E-09-343

20. Generator Certification Statement:
The constituents of the waste herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Signature:_____ Title: _____

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

A09105

Appendix C – Photographic Log

Photograph	Date	Location	Description/Comments
C-1	1/6/2009	BBF-01	Pre-excavation
C-2	1/6/2009	APP-02	Pre-excavation
C-3	1/6/2009	BBF-01	Pre-excavation preparation
C-4	1/6/2009	Burn Area	Pre-excavation Survey
C-5	1/8/2009	BBF-01	Excavation - Source Identified in soil
C-6	1/8/2009	BBF-01	Excavation
C-7	1/8/2009	BBF-01	Survey in excavation
C-8	1/8/2009	BBF-01	Radium source identified (10 mCi)
C-9	1/8/2009	BBF-01	Radium source identified (10 mCi)
C-10	1/8/2009	BBF-01	Final excavation extents
C-11	1/8/2009	APP-01	Final excavation extents
C-12	1/8/2009	APP-01	Final excavation length (6 ft)
C-13	1/8/2009	APP-01	Final excavation extents
C-14	1/8/2009	APP-01	Waste soil in drum ($1\ ^{1/3}$ drums total)
C-15	1/8/2009	APP-01	Waste soil in drum ($1\ ^{1/3}$ drums total)
C-16	1/9/2009	SLR-01	Final excavation extents
C-17	1/9/2009	SLR-01	Final excavation depth
C-18	1/9/2009	APF-01	Final excavation extents
C-19	1/9/2009	SLR-02	Final excavation extents
C-20	1/10/2009	SLR-03	Final excavation extents
C-21	1/10/2009	SLR-03	Final excavation extents
C-22	1/10/2009	Waste Storage	Radium Sources
C-23	1/10/2009	Waste Storage	Radium Sources
C-24	1/10/2009	Waste Storage	Temporary Waste storage Area

Photograph C-1. BBF-01 Pre-excavation

Photograph C-2. APP-01 Pre-excavation

Photograph C-3. BBF-01 Pre-excavation Prep

Photograph C-4. Burn Area Survey

Photograph C-5. BBF-01 Source in soil

Photograph C-6. BBF-01 Excavation

Photograph C-7. BBF-01 Excavation Survey

Photograph C-8. BBF-01 Radium Source (10 mCi)

Photograph C-9. BBF-01 Radium Source (10 mCi)

Photograph C-10. BBF-01 Final Excavation Extents

Photograph C-11. APP-01 Final Excavation Extents

Photograph C-12. APP-01 Excavation length – 6ft

Photograph C-13. APP-01 Final Excavation Extents

Photograph C-14. Soil in drum (1 1/3 drums total)

Photograph C-15. Soil in drum (1 1/3 drums total)

Photograph C-16. SLR-01 Final excavation extents

Photograph C-17. SLR-01 Final depth (1.0 ft bgs)

Photograph C-18. APF-01 Final excavation extents

Photograph C-19. SLR-02 Final excavation extents

Photograph C-20. SLR-03 Final excavation extents

Photograph C-21. SLR-03 Final excavation extents

Photograph C-22. Radium Sources

Photograph C-23. Radium Sources

Photograph C-24. Waste Storage Area (Connex Box)

N

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS CPM

- 18,000 - 20,000
- 20,000 - 22,000
- 22,000 - 24,000
- 24,000 - 26,000
- 26,000 - 28,000

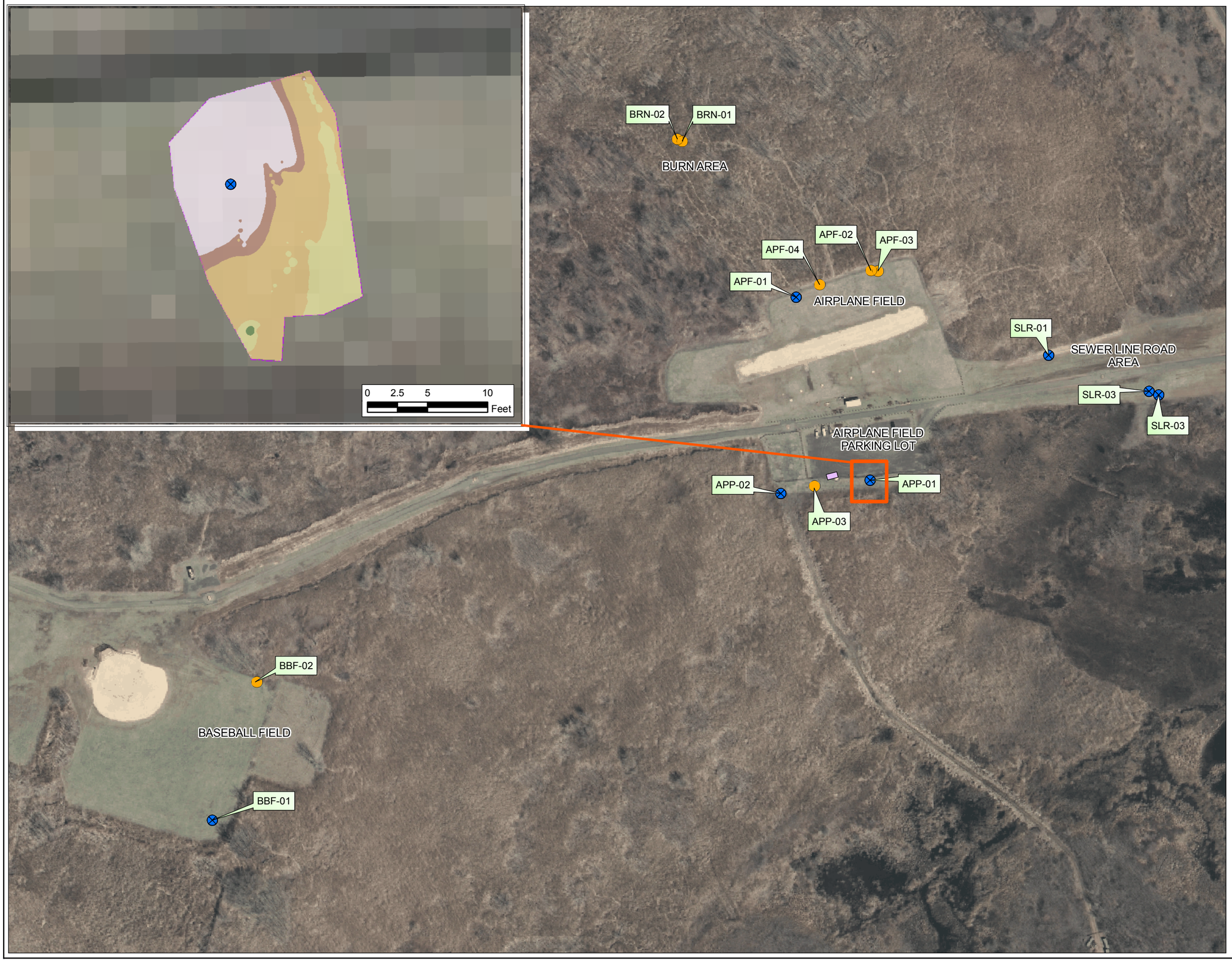
GWS = Gamma walkover survery
CPM = Counts per minute

0 100 200 400 Feet

APF-01
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE
	Cabrera Services 103 E. Mount Royal Ave. Baltimore, MD 21202	U.S. Army Corps of Engineers, Baltimore District



N

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS

CPM

- 18,000 - 30,000
- 30,000 - 40,000
- 40,000 - 80,000
- 80,000 - 100,000
- 100,000 - 230,000

GWS = Gamma walkover survey
CPM = Counts per minute

0 100 200 400
Feet

APP-01
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE
Cabrera Services 103 E. Mount Royal Ave. Baltimore, MD 21202		U.S. Army Corps of Engineers, Baltimore District

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS

CPM

- 18,000 - 30,000
- 30,000 - 40,000
- 40,000 - 50,000
- 50,000 - 80,000
- 80,000 - 100,000

GWS = Gamma walkover survery
CPM = Counts per minute

0 100 200 400
Feet

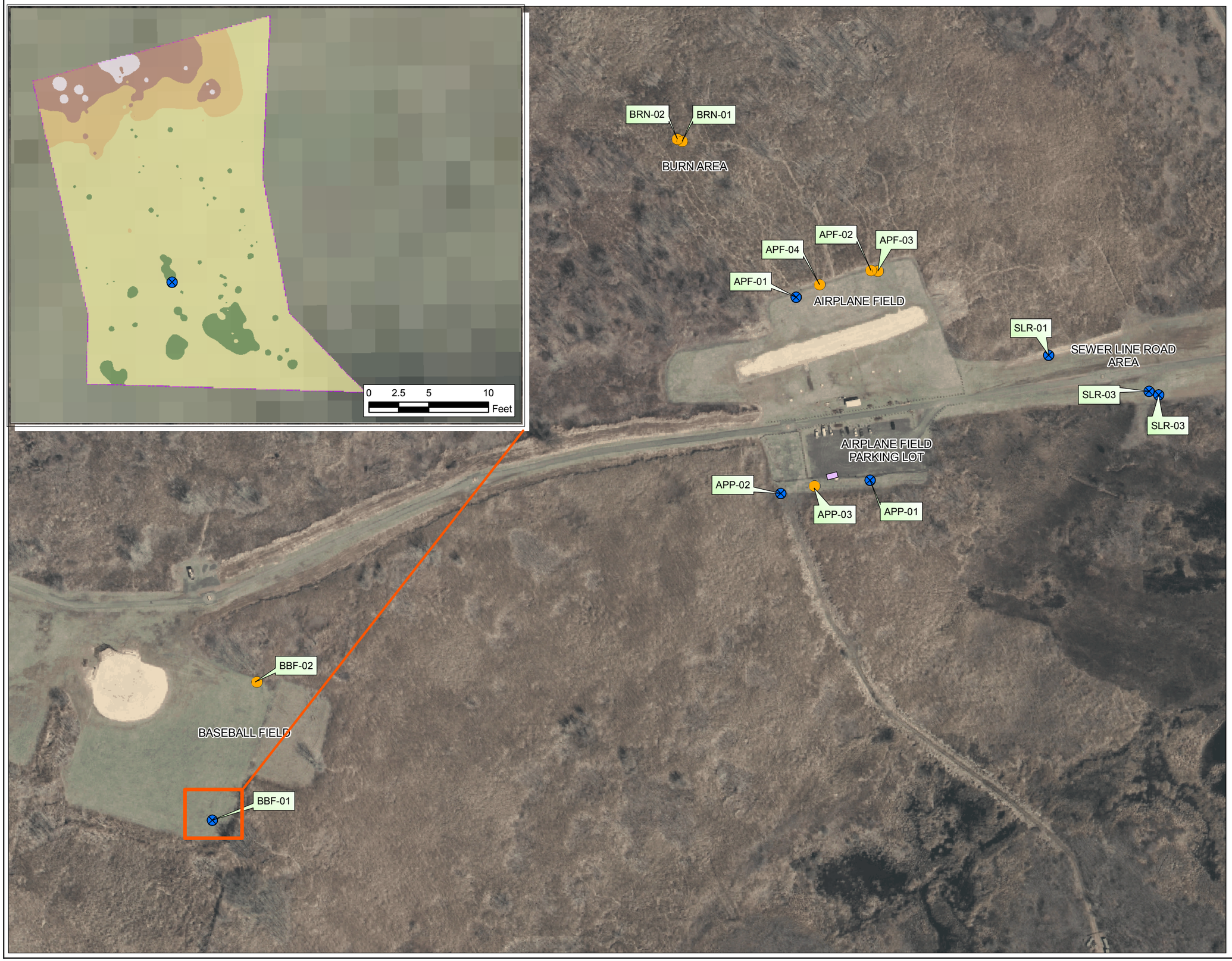
APP-02
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE

Cabrera Services
103 E. Mount Royal Ave.
Baltimore, MD 21202

U.S. Army Corps of Engineers, Baltimore District



N

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS CPM

- 18,000 - 20,000
- 20,000 - 22,000
- 22,000 - 24,000
- 24,000 - 26,000
- 26,000 - 28,000

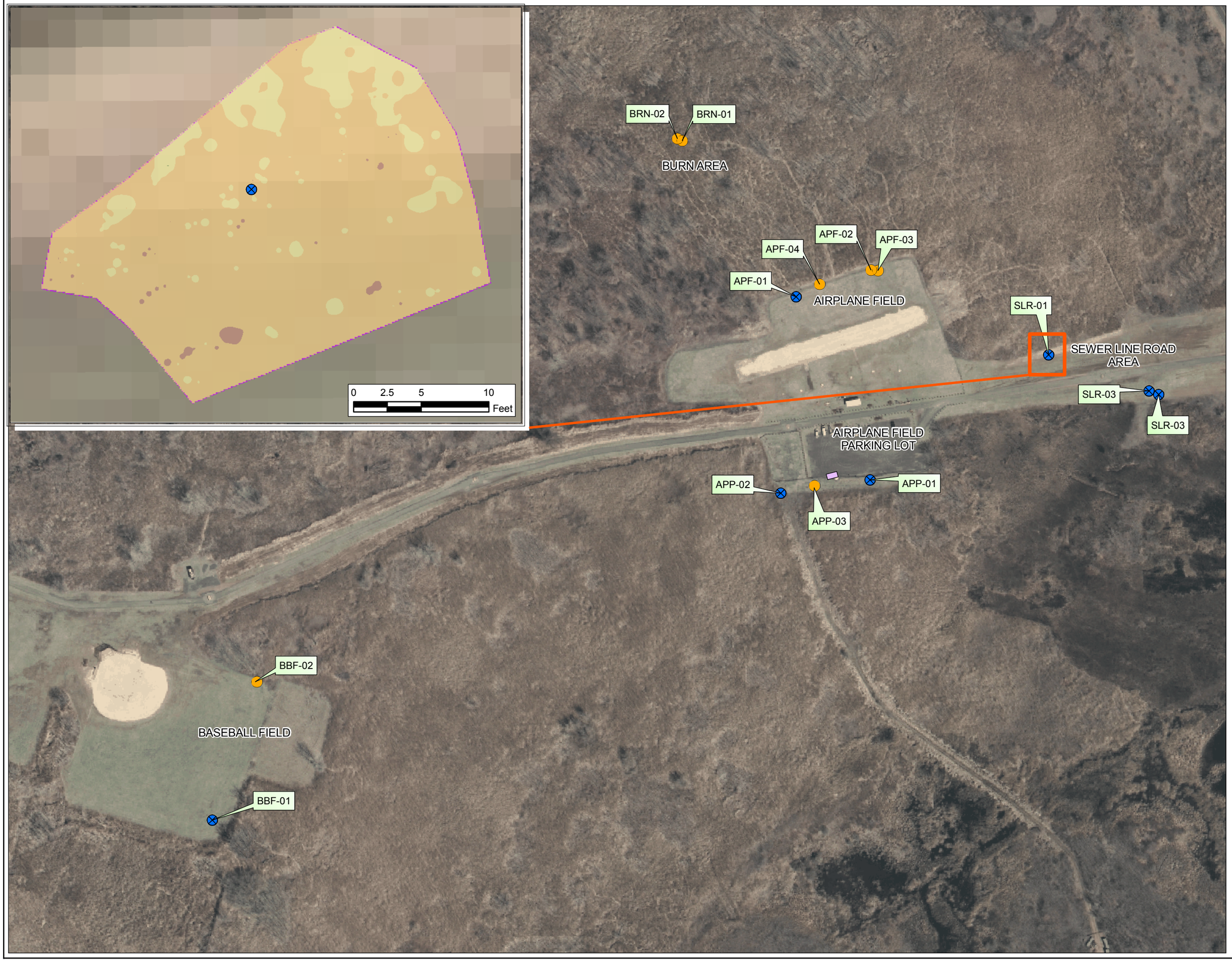
GWS = Gamma walkover survery
CPM = Counts per minute

0 100 200 400 Feet

BBF-01
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE
Cabrera Services 103 E. Mount Royal Ave. Baltimore, MD 21202		U.S. Army Corps of Engineers, Baltimore District



N

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS

CPM

- 14,000 - 15,000
- 15,000 - 16,000
- 16,000 - 17,000
- 17,000 - 18,000
- 18,000 - 19,000

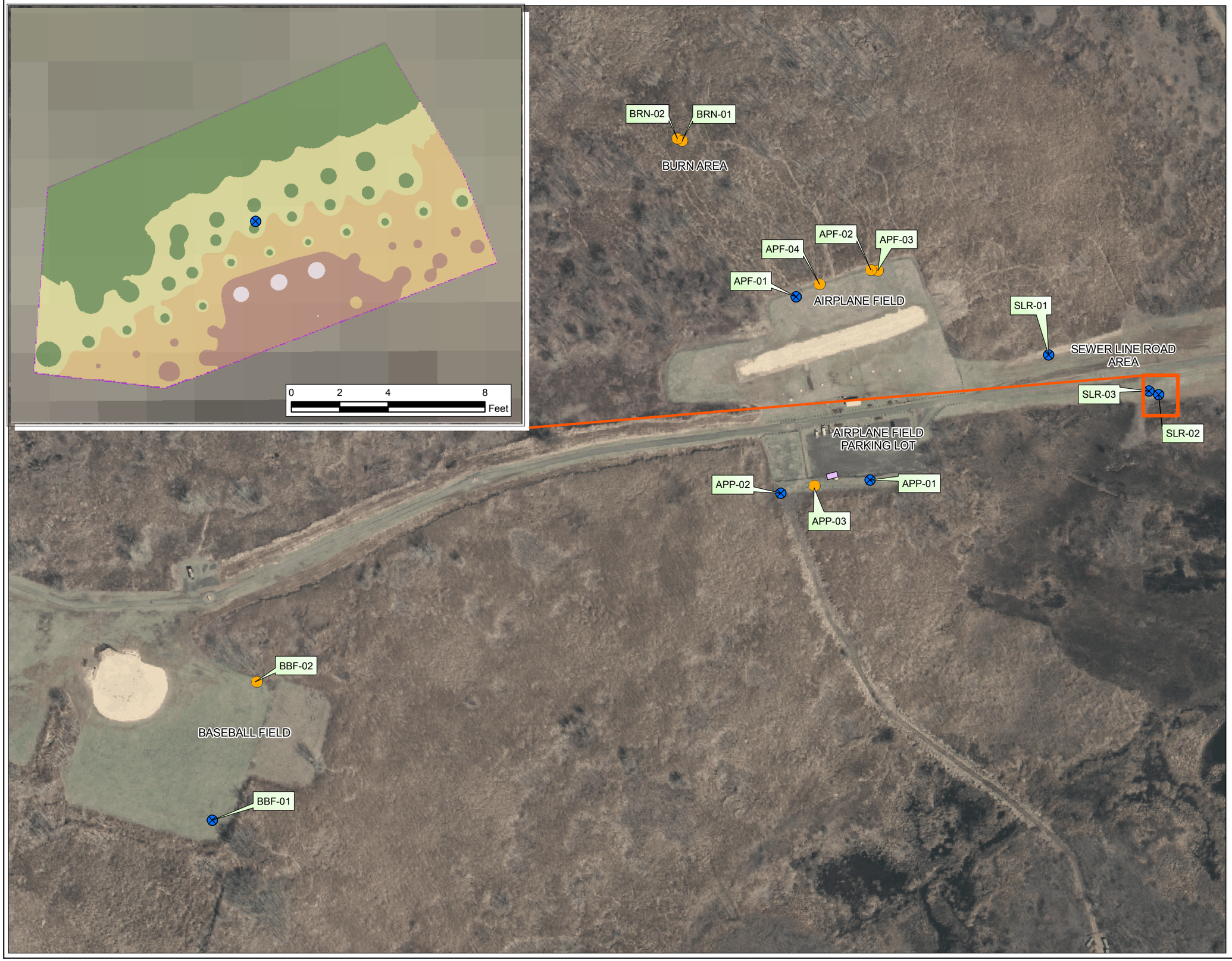
GWS = Gamma walkover survery
CPM = Counts per minute

0 100 200 400
Feet

SLR-01
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE
Cabrera Services 103 E. Mount Royal Ave. Baltimore, MD 21202		U.S. Army Corps of Engineers, Baltimore District



N

Legend

HOT SPOT LOCATION

- REMEDIATED
- NO ACTION

POST EXCAVATION GWS CPM

- 22,000 - 30,000
- 30,000 - 40,000
- 40,000 - 100,000
- 100,000 - 200,000
- 200,000 - 300,000

GWS = Gamma walkover survery
CPM = Counts per minute

0 100 200 400 Feet

SLR-02
POST EXCAVATION
GAMMA WALKOVER SURVEY RESULTS

RADIOACTIVE MATERIAL REMOVAL
GREAT KILLS PARK
STATEN ISLAND, NEW YORK

05/10	CABRERA Project No. 08-3800.07	FIGURE
Cabrera Services 103 E. Mount Royal Ave. Baltimore, MD 21202		U.S. Army Corps of Engineers, Baltimore District

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

MEETING MINUTES

Date: 1/05/09

To: Kathleen Cuzzolino, Tom Simmons, Tom Gibison, Angelo Antzoulis

Cc: Gus Lymberis, Wade Fillingame

From: Kim Nelson, Cabrera Services

RE: Great Kills Park Radioactive Material Removal and Disposal Kick Off Meeting

---

The following is a summary of the agenda and discussion items for the above-referenced meeting, held at the Environmental Field Station at Great Kills Park. Meeting was preceded by a walkover and verification of the seven areas of concern as well as field spotting area of proposed septic tank near public restrooms.

ATTENDANCE:

Name	Organization	Telephone Number	Email
Tom Gibison**	USACE-Phil	215.656.6625	Thomas.M.Gibison@usace.army.mil
Angelo Antzoulis	USACE - NY		Evangelo.Antzoulis@usace.army.mil
Gus Lymberis**	USACE-NY	917.790.8481	Gus.T.Lymberis@usace.army.mil
Dave Taft	NPS-GATE/SIU	718.354.4642 347.539.0247 (c)	Dave_Taft@nps.gov
Kathleen Cuzzolino**	NPS-GATE/SIU	718.354.4609 917.750.6953 (c)	Kathleen_Cuzzolino@nps.gov
Carol Thompson	NPS-GATE/SIU	646.879.0626	Carol_Thompson@nps.gov
Melissa Axtman	NPS-GATE/SIU	718.354.4645	Melissa_Axtman@nps.gov
Kim Nelson**	Cabrera	301.467.3777 (c)	knelson@cabreraservices.com
Wade Fillingame**	Cabrera	865.300.5789	wfillingame@cabreraservices.com
Stephan Owe	Cabrera	410.332.8177	sowe@cabreraservices.com

Phil Melfi	NPS-GATE/SIU	718.577.1268	Phil_Melfi@nps.gov
Keith Cattonar	NPS-GATE/SIU		kcattonar@aol.com
Kathy Garofalo	NPS-GATE/SIU		

** - Designated Agency Primary Point of Contact

AGENDA

* Introductions
* Review project objectives
* Review rad survey history
* Set priorities for excavation
* Review /discuss logistics for field effort and working with NPS
* Discuss the comment resolution on draft plans

SUMMARY:

Introductions: T. Gibison opened and set expectations for meeting. K. Cuzzolino pleased with support provided by USACE team to date.

Project Objectives: D. Taft reiterated primary objective for this project: to make good on Govt promise to the public that the rad anomalies would be addressed. He requested that we remain mindful of and honor public perception of perceived risk from the anomalies.

Survey History: T. Gibison and K. Cuzzolino provided brief overview of discovery and subsequent survey of radiation anomalies. Significant public and political attention following discovery (several years ag). NPS has prioritized the 7 anomalies in the event that soil excavations exceed assumed dimensions (approx 2 ft x 2 ft x1.5 ft). (Map with priorities labeled to be added to work plan.)

Logisitics: W.Fillingame will be field lead for Cabrera. Gus Lymberis will provide field oversight/support for USACE. K. Cuzzolino will be on-site every day and primary POC for NPS. C. Thompson is NPS Grounds Supervisor and will support access, backfill, etc. D. Taft will be backup NPS POC for Kathleen. T. Gibison is day to day POC for USACE; he will keep Kansas City Contracting Officer up to date. A. Antzoulis providing additional support and approval for G. Lymberis. K. Nelson is primary POC for Cabrera; authorized to commit company.

Communication will be critical this week given the short time frame and the cascading decisions that may be required based on actual field conditions. Nelson, Gibison, and Cuzzolino will communicate with each other and will have responsibility for informing/involving other in their respective agencies, as needed. Fillingame will be primary on-site POC for Cabrera. G. Lymberis reiterated his position as onsite contractor oversight and support to field team.

Communicating/interacting with the Public: In the event field crew is approached by members of the public or media – politely acknowledge question and let them know generally what we are doing (removing radiation previously identified by survey); and refer them to Brian Feeney, NPS PAO at 718.354.4606 for additional information. We want to be respectful of publics' concerns, so don't respond with "no comment" or give them no information. Use caution tape/rad ropes to extend exclusion zone and keep public at a distance from work zone for safety purposes. D> Taft stated that NPS will prepare a press release to be issued this week; Cabrera to support/review as needed.

Logistics: Work hours – park open dusk to dawn. We will plan on starting work at 0800 and will work until dusk (approx 4:30). Restroom facilities at the Ranger Complex or Field Station. Dumpsters for non-contaminated investigation derived waste are located across from ball fields. If we need indoor space/electric, we will have access to the stable. Initial decision is to stage the conex storage container with staged waste – more secure, easier for Park Police to keep an eye on it (v. leaving it in/near Model Airplane Parking Lot). NOTE: following meeting, NPS requested we locate the unit in the Airplane Parking Lot due to concerns raised by NPS employees about having the unit so close to their offices. Cabrera agreed.

Safety Concerns: Site Specific Safety Plan (hard copy) was supplied to G. Lymberis. He requested that we have a copy of USACE EM-385-1-1 Safety Manual available on-site. Nelson stated that plan developed in accordance with OSHA and applicable USACE guidance; A. Antzoulis added that the Safety Plan has already been reviewed and accepted by USACE reviewers. Some discussion over exposure to radioactive materials once we have excavated them. 2.5millirem per hour is the NRC exposure limit, above which access needs to be restricted by some kind of barrier. Snow fencing currently in place meets this criteria for excavation sites. Excavated materials will be placed directly in steel drums. A mobile storage container (conex box) will be delivered to the site and all drums will be placed in this locked unit for temporary storage until analytical results are back and acceptance/shipment to disposal facility is coordinated. The drums will provide some barrier, the storage unit will provide additional shielding, and we may also put a secondary fence around the storage unit just to discourage access. The potential exists that if we excavate discrete items with higher activity, the associated dose rate would require additional secondary packaging in order to ensure dose acceptable outside the storage unit. We take readings on the drums themselves as well as the outside of the unit and the area around the unit; at no time will we allow levels to exceed acceptable safety standards. As far as Cabrera worker safety, we are mindful of perception and will work in construction attire if at all possible.

Waste Characterization: Discussed samples to be collected and analyticals; one composite sample will be collected and submitted for full EPA waste characterization analyses, along with gamma scan and radium 226 analysis. Disposal facility requires this. We don't anticipate there will be other contaminants present at levels high enough to trigger this soil to require characterization as mixed waste, but there is a chance due to the source of these soils as landfill/dredge material. Heavy metals would be most likely co-contaminant. Expect analytical results approx 30 days after sampling, and another 30 days or so to get waste profile prepared and accepted by disposal facility. G. Lymberis made the point that while NPS has a USEPA Waste Generator ID Number, a new number may be required, depending on what our results are. Will evaluate once data is in.

Work Schedule: Reviewed plan for this week, weather dependent: rest of today for staging/calibrating instruments, background air sampling and other preliminary surveys; Tuesday and Wednesday – excavate 7 locations; Thursday – sample, backfill holes and do post excavation surveys; package waste for storage; Friday – site restoration/demob.

Site Restoration: Contract includes backfilling holes and reseeding. Cabrera will line excavations with geotextile before backfilling in the event we need to revisit; NPS to provide topsoil; will stage near the Airplane Parking Lot by Thursday; Cabrera will move it and fill excavations. Commercial turf mix (rye and fescues) is fine – Cabrera to apply following backfill.

Work Plan Comment Resolution/Distribution: Cabrera has responded to all written comments and finalized documents. Electronic versions ok with all parties with exception of G. Lymberis who was provided hard copy of the Safety Plan after the meeting. Reviewed responses-acceptable. Gibison requested a written response to all comments for the record and so that K Cuzzolino could forward responses to T Papura from NYSDEC for the record. Nelson to submit responses to email of consolidated comments to Gibison.

ACTION ITEMS:

- Send map and notification to Fire Department regarding temporary storage of potentially radioactive material. – **K Cuzzolino** *complete*
- Notify PAO about activities/Develop press release – **D. Taft** (nelson to provide review/input if requested) - *complete*
- Send draft meeting minutes via email to Kathleen and Tom for distribution – **K. Nelson** *complete*
- Provide Gus with hard copy of SSHP – **Nelson** *complete*
- Prepare written comment responses to all comments and submit via email to Kathleen and Tom (NYSDEC responses most critical) – **Nelson** *complete*
- Send electronic copies of final documents to Kathleen, Tom, and Angelo for files/distribution – **Nelson** *complete*

SITE OPERATIONS PLAN / SAMPLING AND ANALYSIS PLAN

RADIOACTIVE MATERIAL REMOVAL AND DISPOSAL

GREAT KILLS PARK
STATEN ISLAND, NEW YORK

Contract # W912DQ-08-D-0003/0002

Prepared for:
UNITED STATES ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

Prepared by:

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION
103 E. Mount Royal Ave., Suite 2B
Baltimore, Maryland

December 2008

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FIGURES

1-1 SITE LOCATION MAP

1-2 TARGET EXCAVATION AREAS

LIST OF ACRONYMS

CABRERA	Cabrera Services, Inc.
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQCR	daily quality control reports
GPS	global positioning system
GWS	gamma walkover survey
IDW	investigation-derived waste
in.	inch
LLRW	Low Level Radioactive Waste
NaI	sodium iodide
nCi/g	nanoCuries per gram
NIST	National Institute of Standards and Technology
NPS	National Park Service
NYPD	New York Police Department
OP	operating procedure
POC	point of contact
PPE	personal protective equipment
QC	quality control
^{224}Ra	radium-224
^{226}Ra	radium-226
^{228}Ra	radium-228
RCOC	radionuclide contaminant of concern
RPP	Radiation Protection Plan
SAP	Sampling and Analysis Plan
Site	Great Kills Park national recreation area
SOP	Site Operations Plan
SSHP	Site Safety and Health Plan
USACE	United States Army Corps of Engineers
USEPA	US Environmental Protection Agency
yd^3	cubic yards

1.0 INTRODUCTION

Cabrera Services, Inc. (CABRERA) has prepared this *Site Operations Plan (SOP)*, which includes a *Sampling and Analysis Plan (SAP)*, for performing the investigation and removal of radioactive "hot spots" located near the ground surface at the Great Kills Park (hereafter referred to as the Site) on Staten Island, New York (see Figure 1-1).

The United States Environmental Protection Agency (USEPA), National Park Service (NPS), and others have indicated that radioactivity exceeds site background levels at seven hot spot locations at the Site (Figure 1-2), and the elevated radioactivity is associated with radium. The form of that radioactive contamination may be associated with discrete items or sources located near the ground surface or with radiologically-contaminated soil or debris (diffuse contamination).

This work is accomplished in accordance with the United States Army Corps of Engineers (USACE)'s July 15, 2008 Statement of Work entitled, *Radioactive Material Removal and Disposal, Great Kills Park, Staten Island, NY*, under the terms and conditions of Contract W912DQ-08-D-0003 between the Kansas City District USACE and CABRERA. This work will be performed in accordance with the *Site Safety and Health Plan for Radioactive Removal at Great Kills Park (SSHP;* CABRERA, 2008), which includes a *Radiation Protection Plan (RPP)*.

1.1 Site History and Contaminants

Great Kills Park is located east and south of Great Kills Harbor on the shoreline of the lower New York Bay. In 1933, the Marine Park Project was initiated to develop Great Kills Harbor and the vicinity as a shorefront recreation area. A filling and grading operation was started on the mainland to make the lowland areas accessible in the public park. In November, 1944, placement of sanitation-controlled fill started at the Site and continued until July 1948. Approximately 15 million cubic yards (yd^3) of refuse material was transported by barge or trucks to the landfill to create a layer throughout the Site between 8 and 15 feet thick (Baker, 2007).

In 2005, the U.S. Department of Energy (DOE) and the New York Police Department (NYPD) Counterterrorism Team detected a radioactive emission near the Site Model Airplane Field while performing an aerial background radiation survey of the New York City metropolitan area. Subsequent surveys by the NPS and USEPA found a total of seven locations of elevated radioactivity in public areas within the Site. The radioactivity in each area was found to be due to radium (Baker, 2007).

The radiological contaminant of concern (RCOC) associated with this project is radium-226 (^{226}Ra). Radium is a naturally occurring radioactive material formed by the decay of uranium and thorium in the environment. ^{226}Ra is an alpha and gamma emitter with a half-life of approximately 1600 years.

1.2 Project Objective

The activities described herein are designed to achieve the sole objective of reducing radiation exposure resulting from the seven "hot spots" identified by prior survey. While adequate and appropriate measures have been taken to date to limit public access to these seven locations, and they do not pose an unacceptable exposure risk, there is a public perception that these

occurrences may be dangerous to visitors to the park. The goal of the removal actions described in Section 2.0 is to reduce the measurable activity at the ground surface in the seven locations previously identified to near background levels. Any field conditions that differ from those stated in the SOW may require additional response activities.

FIGURE 1-1: SITE LOCATION MAP

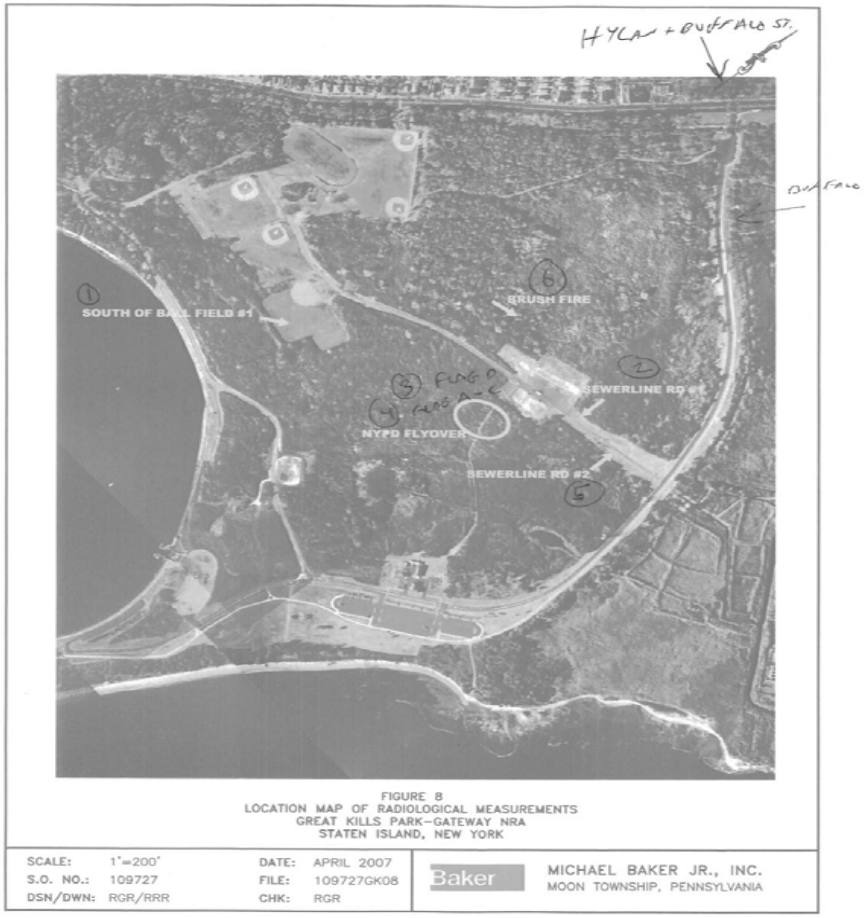

FIGURE 1-2: TARGET EXCAVATION AREAS

2.0 FIELD ACTIVITIES

2.1 Mobilization

CABRERA will mobilize equipment, personnel and materials to the site to perform the Removal Action, establish exclusion zones around each "hot spot", install temporary security fencing, and establish a secure storage area (i.e., connex box) for equipment and waste containers. NPS has marked the seven locations with pin flags and set up snow fence perimeters around each of the areas of concern and cleared vegetation from those areas to facilitate the removal and surveying activities.

2.2 Remediation

An initial gamma walkover survey (GWS) will be performed in the vicinity of the seven hot spots identified by USEPA and NPS to determine the approximate horizontal limits of elevated readings, which will be physically marked (using spray paint or pin flags). Initial GWS results will be used to define work zones, establish the perimeter of exclusion zones (marked with radiation rope and/or caution tape) and delineate planned excavation boundaries at the ground surface.

Excavation will be performed with the objective of removing discrete radium sources from the upper (approximate) 1-½ feet at seven hot spot locations at the site. Excavation will be performed manually using shovels, and will be assisted by a small (i.e., 14-foot reach) backhoe as necessary. The backhoe will also be used on-site for moving temporary fencing and supplies during mobilization, site restoration, and demobilization, as well as moving 55-gallon waste drums between excavation locations and a temporary on-site storage spot until they can be picked up for transport and off-site disposal.

Excavation will be guided using a sodium iodide (NaI) gamma detector. If discrete radium sources (e.g. instruments, devices, etc.) are found, they will be segregated from excavated soil and placed into containers for characterization. If readings within the excavation suggest that soils surrounding the item have not been impacted, then no additional soils will be removed. Waste is not expected to exceed the volume of 1 55-gallon drum if diffuse contamination is not found. Waste must be packaged with care so as to not exceed U.S. Department of Transportation (DOT) limits for transportation, as discussed in Section 2.4.

If discrete radium sources are not found, soil exhibiting the highest NaI readings will be excavated and placed in drums. The priority for excavation (i.e., order of excavation among locations) and agreement on the extent of excavation within each area will be established by USACE on-site personnel during excavation in the event that the extent of contamination exceeding background levels exceeds one cubic yard (the volume of four 55-gallon drums). The assumption regarding maximum volume of soil removed from any one location is that the excavated area will not exceed 2 ft by 2 ft by 1.5 ft. The priority for removal locations is as follows and depicted on Figure 1-2:

1) South of Ballfield 1

2) Sewerline #1

3) Flags D (NYPD Flyover Area)

4) Flags A-C (NYPD Flyover)

5) Sewerline #2 (includes two of the 7 hotspots)

6) Burn Area

These priorities have been established by NPS, based on radioactivity measurements collected in 2008 and the relative visibility and accessibility by the public. The final prioritization and/or decision on how much soil to remove from each location will be dependent on actual field conditions, and is subject to change with technical agreement by NPS and USACE, and at the direction of the USACE Contracting Officer.

2.3 Radiological Survey of Excavated Areas

CABRERA will perform a radiological survey of the excavated hot spot locations to document then-current conditions. The post-excavation radiological survey will consist of a 100% GWS of the limits of excavation. Outdoor gamma scans will be performed in accordance with CABRERA operating procedure (OP)-001: *Radiological Surveys* (CABRERA, 2005). Scan surveys will be performed using a Ludlum Model 44-20 three-inch by three-inch (3-in. x 3-in.) NaI detector, or equivalent, coupled to a Ludlum Model 2221 ratemeter, or equivalent. This instrument will be enabled with a differential global positioning system (GPS) so that activity measurements can be spatially referenced.

Biased soil samples will be collected from three geographically diverse locations/excavations and in accordance with CABRERA OP-005: *Volumetric and Material Sampling* (CABRERA, 2006). Biased sample locations will be selected based on GWS results indicating elevated radioactivity.

Biased soil samples will be sent offsite for ^{226}Ra analysis. Samples will be handled, labeled, packaged, preserved, and shipped as described in CABRERA OP-005. Sample chain of custody will be maintained in accordance with CABRERA OP-008: *Chain of Custody* (CABRERA, 2000). Laboratory QC samples will be prepared and analyzed in accordance with the analytical laboratory's Quality Assurance Plan.

2.4 Waste Handling, Packaging, and Shipping

It is assumed that between one and four 55-gallon 17H drums will be transported as a U.S. DOT Type A hazardous material to US Ecology-Richland for disposal as Class A Low Level Radioactive Waste (LLRW). A single composite sample of excavated soil material will be collected and submitted for off-site laboratory analysis for disposal characterization purposes. Samples will be handled, labeled, packaged, preserved, and shipped as described in CABRERA OP-005. Sample chain of custody will be maintained in accordance with CABRERA OP-008. **Table 2-1** summarizes the characterization sample analyses to be performed on one composite soil sample by the offsite laboratory (GEL).

Table 2-1: Disposal Characterization Sample Analyses

ANALYSIS	METHOD

Gamma Spectroscopy	EPA 901.1
Ra-226	SW9315
% Moisture (PFLT)	SW-846 Method 9095
VOC	SW8260B
SVOC	SW8270C
TCLP Metals (+zinc)	EPA 6010B & 7470A
Pesticides	SW-846 EPA 8081A
Herbicides	SW-846 EPA 8151A
Reactivity	SW-846
pH	SW-846 Method 9045
PCBs	SW8082

Investigation-derived waste (IDW) is expected to be minimal as a result of this investigation. IDW will be generated from the use of personal protective equipment (PPE) and disposable sampling equipment and will be stored in the drums along with the other LLRW. These items will be scanned and if radiation levels above acceptable limits are detected, the items will be bagged and added to the drums of soil for off-site disposal. Small quantities of non-contaminated waste (i.e. standard municipal solid waste) will be bagged and disposed on-site (with permission of NPS) in commercial dumpsters located near the ballfields.

The filled drum(s) will be temporarily stored on site in a locked connex box until waste profiles have been completed and the materials accepted for disposal by the receiving facility. U.S. DOT radiological release surveys will be performed and documented for these containers prior to the waste being loaded for off-site transport.

The waste to be transported for off-site disposal will be considered a Class A LLRW as defined in Chapter 10, Section 61 of the Code of Federal Regulations (10 CFR 61) and can be transported as a U.S. DOT Type A hazardous material as defined in 49 CFR 173.435. Waste will be packaged as necessary in drums (e.g., covering the exterior of the drum with a steel sleeve, containing sources in concrete) in order to exhibit the following characteristics:

- Waste consisting of discrete instruments, articles, small sources or other devices (e.g., luminous paint on dials) will contain <10 nanoCuries per gram (nCi/g) radium (as packaged).
- The discrete items/sources can be readily packaged in a manner that ensures radium is essentially evenly distributed within the waste form (i.e., no one discrete item represents greater than 50 percent of the activity per waste package).
- No individual item/source in the waste package will have an individual activity of greater than 100 microCuries.
- Each waste package will have an activity of <80 milliCuries and will not exhibit external (on contact) surface radiation levels above 1 Roentgens per hour.

Waste pickup and shipping will require a second, short-duration mobilization to the site, which will entail CABRERA's disposal facility waste coordinator traveling to the site to inspect the waste package, prepare shipping paperwork, and coordinate waste pickup/transport and disposal with

subcontractors. The drum(s) of soil/debris will not be transported for off-site disposal until disposal characterization lab results have been received, waste profile sheets have been approved by the disposal facility, and the State of Washington has issued a generator use permit.

The drum(s) will be loaded onto a truck for transport to the Toxco transfer station in Oak Ridge, Tennessee for consolidation with other wastes and eventual transfer to US Ecology-Richland (Washington).

2.5 Site Restoration and Demobilization

Site restoration will consist of lining each excavation with geotextile fabric or other semipermeable barrier, backfilling the excavations with topsoil provided by NPS, and applying a commercial blend grass seed mix of rye and fescue. Snow fencing will be restored around each location, at least until analytical results are available and the exposure activity can be reassessed.

CABRERA will demobilize equipment and personnel from the Site following completion of field work, decontamination and U.S. DOT radiological release surveys. Demobilization will be phased. Initial demobilization will consist of equipment and personnel following excavation. The second demobilization will consist of personnel and equipment associated with loading the packaged waste onto a truck for transport to the selected disposal facility. The connex box and any exclusion zone barriers may also be removed at that time.

2.6 Quality Control

2.6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be completed prior to full mobilization, or immediately at the outset of the mobilization of personnel. The purpose of this meeting is to review Site plans and documents, discuss the project schedule and timeline, and review safety procedures.

2.6.2 Daily Quality Control Reports

CABRERA will maintain and will submit daily quality control reports (DQCRs) daily. The reports will be factual records containing numerical data of the contractor's daily quality control (QC) activities and resulting actions. The reports will be submitted to the USACE point of contact (POC) or designee on the DQCR form by the end of the next workday following the day of the report.

The reports will include the following:

- Phase or phases of remediation underway during the time of the report, including a listing of equipment and personnel on site and hours worked;
- QC activities that were taken, with identification of the phase;
- Results of QC activities, including nature of deficiencies observed and corrective actions taken or to be taken;
- Documentation of samples collected with sample locations;
- Quantity of waste material identified, excavated, containerized, loaded, stored, and transported and disposed of off-site;

- Other information as applicable to the project, including:
  - Weather conditions;
  - Subcontractor operations;
  - Job safety evaluations stating what was checked, results, and instructions or corrective actions.

2.6.3 Instrument Quality Control

Instruments used during the survey will have current calibration/maintenance records kept onsite for review and inspection. The instruments onsite will include the following:

- Ludlum Model 44-20 3-in. x 3-in. NaI detector, or equivalent, coupled to a Ludlum Model 2221, or equivalent
- Ludlum Model 44-9 Geiger-Mueller (GM) detector, coupled to a Ludlum Model 3, or equivalent
- Ludlum Model 2929/43-10-1 smear counter, or equivalent

Instrumentation shall be maintained and calibrated to manufacturers' specifications to ensure the instruments have the required traceability, sensitivity, accuracy, and precision. Instruments will be operationally checked daily (QC, or source checks) to ensure they respond in a consistent manner when exposed to known radiation sources. Records of daily source checks will be maintained and filed in the project file, along with control charts associated with each instrument.

Instruments will be operated and calibrated as described in CABRERA OP-020: *Operation of Contamination Survey Meters* (CABRERA, 2000b) and CABRERA OP-021: *Alpha-Beta Counting Instrumentation* (CABRERA, 2000c).

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(Baker, 2007) *Preliminary Assessment Report for Potential Radiological Contamination at Great Kills Park.* Michael Baker, Jr, Inc. August 2007.

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SITE SAFETY AND HEALTH PLAN / RADIATION PROTECTION PLAN

RADIOACTIVE MATERIAL REMOVAL AND DISPOSAL

GREAT KILLS PARK
STATEN ISLAND, NEW YORK

Contract # W912DQ-08-D-0003/0002

Prepared for:
UNITED STATES ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

Prepared by:

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION
103 E. Mount Royal Ave., Suite 2B
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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACGIH	American Conference of Industrial Hygienists
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
APR	Air-Purifying Respirator
BBP	Blood Borne Pathogen
CA	Construction Attire
CABRERA	Cabrera Services, Inc.
CFR	Code of Federal Regulations
CHP	Certified Health Physicist
CHSM	Corporate Health and Safety Manager
CIH	Certified Industrial Hygienist
cm^2	square centimeter(s)
CPR	Cardiopulmonary Resuscitation
CSP	Certified Safety Professional
DAC	Derived Air Concentration
dBA	decibel(s) adjusted
DOE	U.S. Department of Energy
dpm/100 cm^2	disintegration(s) per minute per 100 square centimeters
FOL	Field Operations Lead
ft	foot (feet)
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manual
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum Detectable Activity
MDC	Miniumum Detectable Concentration
mph	mile(s) per hour
mR/hr	milliRoentgen(s) per hour
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NYPD	New York Police Department
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
PM	Project Manager
PPE	Personal Protective Equipment Procedure
RCA	Radiologically Controlled Area
RCOC	Radiological Contaminant of Concern
RSO	Radiation Safety Officer
RPP	Radiation Protection Plan
RSP	Radiation Safety Program
RWP	Radiation Work Permit
SHSO	Site Health and Safety Officer
SOP	Site Operations Plan
SSHP	Site Safety and Health Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VP	Vice President

1.0 INTRODUCTION

This *Site Safety and Health Plan (SSHP),* which includes a *Radiation Protection Plan (RPP)*, has been prepared by Cabrera Services, Inc. (CABRERA) to guide investigation and removal activities of radioactive hot spots located near the ground surface at the Great Kills Park, Gateway National Recreation Area (hereafter referred to as the Site) on Staten Island, New York (Site Location Map included in Appendix A).

The United States Environmental Protection Agency (USEPA), National Park Service (NPS) and others have indicated that radioactivity exceeds site background levels at seven hot spot locations at the Site, and the elevated radioactivity is associated with radium. The form of that radioactive contamination may be associated with discrete items or sources located near the ground surface, or with radiologically-contaminated soil or debris (diffuse contamination).

This work will be accomplished in accordance with the U.S. Army Corps of Engineers (USACE)'s Statement of Work entitled, *Radioactive Material Removal and Disposal, Great Kills Park, Staten Island, New York City, New York,* under the terms and conditions of Contract W912DQ-08-D-0003 between the Kansas City District USACE and CABRERA.

The *SSHP* is presented as a supplement to the *Site Operations Plan for Radiation Removal, Great Kills Park* (*SOP;* CABRERA, 2008), and will be used to guide safe work practices during the implementation of excavation and sampling activities at the Site. Background information pertinent to the activities addressed in this *SSHP* is presented in the *SOP* and summarized below.

1.1 Purpose

The purpose of this document is to establish standard safety and health procedures for CABRERA personnel and subcontractors involved in the field implementation of the *SOP*, which involves potential exposure to radioactive material. This document meets the Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements set forth by the Occupational Safety and Health Administration (OSHA) in the *Code of Federal Regulations (CFR)* Title 29, Parts 1910.120 and 1926.65 (OSHA, 2005a).

This *SSHP* establishes the work practices necessary to ensure the protection of personnel assigned to perform onsite activities, as well as the local community and the environment during project implementation. The objective of this *SSHP* is to anticipate, identify, evaluate, and control safety and health hazards, in addition to providing emergency response procedures relative to operations conducted at the site. Specific hazard control methodologies have been evaluated and selected in an effort to minimize the potential for accident or injury.

The levels of personal protection and the procedures specified in this plan are based on the best information available from reference documents and current site data. These recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in this project.

Field activities specified in the *SOP* shall be performed in accordance with this *SSHP*, other applicable site health and safety regulations, internal CABRERA policies and procedures, OSHA requirements, and other applicable Federal, State, and local statutes. All onsite personnel will follow the health and safety procedures specified in this *SSHP*, be alert to potential changes in site hazards, and exercise reasonable caution at all times.

1.2 Site Description

Great Kills Park is located east and south of Great Kills Harbor on the shoreline of the lower New York Bay. In 1933, the Marine Park Project was initiated to develop Great Kills Harbor and the vicinity as a shorefront recreation area. A filling and grading operation was started on the mainland to make the lowland areas accessible in the public park. In November, 1944, placement of sanitation-controlled fill started at the Site and continued until July 1948. Approximately 15 million cubic yards (yd^3) of refuse material was transported by barge or trucks to the landfill to create a layer throughout the Site between 8-15 feet (ft) thick (Baker, 2007).

In 2005, the U.S. Department of Energy (DOE) and the New York Police Department (NYPD) Counter Terrorism Team detected a radioactive emission near the Model Airplane Field, while performing an aerial background radiation survey of the New York City metropolitan area. Subsequent surveys by the NPS and USEPA found a total of seven locations of elevated radioactivity in public areas within the Site. The radioactivity in each area was found to be due to radium-226 (^{226}Ra) (Baker, 2007).

The radiological contaminant of concern (RCOC) associated with this project is ^{226}Ra. Radium is a naturally occurring radioactive material formed by the decay of uranium and thorium in the environment. ^{226}Ra is an alpha and gamma emitter with a half-life of approximately 1600 years.

1.3 Field Activities

The scope of work for this project consists of the activities necessary to locate, remove, package, and dispose of radioactive material associated with the seven surface anomalies discussed above. For the purposes of assessing the health and safety aspects of this project, this *SSHP* discusses the fieldwork in terms of the following specific activities:

- Mobilization and Demobilization,
- Radiological Surveys, and
- Soil Removal and Soil/Sampling.

This *SSHP* outlines the precautions and procedures to be implemented during the performance of these activities to ensure worker health and safety and to protect the local community and environment.

2.0 HEALTH AND SAFETY ORGANIZATION

All operations and personnel having the potential for exposure to Site hazards are subject to the requirements of this *SSHP*. Work will not be performed in a manner that conflicts with the intent of this plan or the inherent safety, health or environmental precautions expressed herein. After due warnings, personnel violating health and safety procedures will be dismissed from the site and their supervisor will be notified. The individual's supervisor will take appropriate disciplinary action.

A list of the key project personnel, as well as their primary responsibilities and contact information, is presented below. Contact information for these personnel are also contained in Appendix B of this *SSHP* and will be posted at the jobsite. Specific responsibilities of the key personnel, as they relate to project health and safety, are discussed below.

2.1 Vice President

The Vice President (VP), Mr. David Watters, Certified Health Physicist (CHP), is responsible for establishing and executing program-level administrative matters, controls, policy matters, and lines of authority, responsibility, and communication. The VP is responsible for ensuring that necessary health and safety personnel have been assigned to the project team, and that applicable health and safety documents have been reviewed and approved prior to the commencement of onsite activities.

2.2 Project Manager

The Project Manager (PM), Ms. Kim Nelson, is responsible for establishing and executing project administration and controls, ensuring appropriate project staffing and training, and establishing personnel responsibilities and lines of communication. The PM is responsible for ensuring that the health and safety personnel assigned to the project are thoroughly trained and have the necessary equipment and materials to perform their duties. The PM is also responsible for ensuring that the required health and safety documents and notifications have been completed and submitted prior to the commencement of field activities.

2.3 Corporate Health and Safety Manager

The Corporate Health and Safety Manager (CHSM), Mr. Paul Schwartz, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), is responsible for the review and acceptance of this *SSHP*. No project involving hazardous, toxic, or radioactive materials will commence without his signed acceptance of the project *SSHP*. Additionally, the CHSM shall:

- Ensure that the *SSHP* complies with all Federal, State, and local health and safety requirements, modifying specific aspects of the *SSHP* as necessary to address field changes that may impact safety;
- Implement and oversee CABRERA's corporate health and safety program, in accordance with the corporate *Health and Safety Manual* (*HSM*; CABRERA, 2005);

- Ensure that the Site Health and Safety Officer (SHSO) is appropriately qualified and trained to implement the *SSHP*. Maintain communication with the SHSO to ensure proper implementation of the *SSHP*, and provide direction on any significant safety issues that arise in the field;
- Assist in the training of field personnel with respect to the identification and mitigation of site-specific hazards and the use of air monitoring instruments, personal protective equipment (PPE), decontamination procedures, and emergency/spill response; and
- Conduct periodic site health and safety inspections.

2.4 Corporate Radiation Safety Officer

The Corporate Radiation Safety Officer (RSO), Mr. Hank Siegrist, CHP, Professional Engineer (PE), is responsible for the acceptance of the portion of this *SSHP* that addresses radioactive material and/or radiological contamination. Specifically, the RSO shall:

- Ensure that the *SSHP* complies with all Federal, State, and local requirements related to the handling and transportation of radioactive and/or radiologically contaminated materials;
- Implement and oversee CABRERA's Corporate *Radiation Safety Program (RSP)*, which includes all issues involving licensed radioactive material;
- Assist in the training of field personnel with respect to the identification and mitigation of site-specific radiation hazards and the use of radiation monitoring instruments, personal dosimetry, and contamination surveys; and
- Conduct periodic site radiation safety inspections.

2.5 Field Operations Lead

The Field Operations Lead (FOL), Mr. Wade Fillingame, will supervise the day-to-day activities of the project team. The FOL reports directly to the PM and is responsible for implementing the *SOP* in accordance with the requirements of this *SSHP*. He has the authority to stop work, if necessary, and take appropriate actions to ensure the health and safety of all field personnel, the environment, and the surrounding community. In addition, the FOL shall:

- Conduct daily plan-of-the-day/safety briefings to provide direction and supervision to field personnel to ensure that the requirements of the work plan are being met, and that health and safety procedures are being followed;
- Ensure that the work zones are established in such a way as to minimize potential health and safety hazards and contamination risks; and
- Maintain close communication with the PM regarding project progress and any problems encountered in the field, including those related to health and safety, coordinating with the PM to initiate corrective actions as necessary.

2.6 Site Health and Safety Officer

Mr. Fillingame will also serve as SHSO for this project. The SHSO is responsible for the day-to-day implementation of the *SSHP*. Like the FOL, the SHSO has the authority to shut down any operation that jeopardizes the health and safety of site personnel, the environment, or the local community. In addition, the SHSO has the following responsibilities:

- Provide onsite training of field personnel to convey *SSHP* requirements;
- Ensure proper implementation of the *SSHP* during field activities, including requirements for PPE and health and safety monitoring;
- Provide daily updates during the morning safety briefings to review applicable activity hazard analyses and alert the field crew to any changed conditions and/or additional safety hazards likely to be encountered that day;
- Maintain site health and safety documentation such as training records, air monitoring equipment calibration forms, air monitoring results, accident report forms, etc., ensuring that the PM and CHSM receive copies of all documentation on a daily basis;
- Maintain communication with the CHSM during field activities and coordinate on any health and safety issues that may arise;
- Investigate any accidents/incidents or "near misses," and coordinate with the CHSM to ensure that all reporting requirements are met; and
- Continuously monitor the work place for unsafe acts or conditions, and initiate corrective actions as necessary.

3.0 HAZARD ASSESSMENT

This section discusses the types of hazards to be considered during implementation of decommissioning activities. These include chemical and radiological hazards, physical hazards, electrical hazards, biological hazards, and temperature extremes.

3.1 Chemical and Radiological Hazards

The RCOC known to be present in the Site is ^{226}Ra. The chemicals that will be brought onsite include gasoline and diesel fuel for refueling excavators and/or powering portable generators used for powering air sampling units.. Material safety data sheets (MSDSs) for these substances are included in Appendix C.

^{226}Ra and its daughter products are the RCOCs that will be encountered during removal activities at the Site. In 2005, the U.S. DOE and the NYPD Counter Terrorism Team detected a radioactive emission near the Site Model Airplane Field while performing an aerial background radiation survey of the New York City metropolitan area. Subsequent surveys by the NPS and USEPA found a total of seven locations of elevated radioactivity in public areas within the Site. The radioactivity in each area was found to be due to radium (Baker, 2007).

Radium emits alpha and gamma radiation. The greatest health risk from radium, however, is from exposure to its daughter product, radon. Radon is a radioactive gas that is common in soils and can collect in homes and buildings. It attaches to dust particles in the air. Inhalation of these radon decay products results in deposition of radiation energy (alpha particles) in surface tissues of the lung and is a known cause of lung cancer. Work during this field effort will be performed outdoors, and radon gas is not expected to be a threat to worker safety.

3.2 Physical Hazards

Physical hazards are a primary safety concern during this project. These hazards include those associated with use of hand tools, heavy equipment (small loader), and material handling.

3.2.1 Hand Tools

Only tools that are in good condition will be used during field activities. Improper and defective tools contribute to accidents. The following safe practices will be observed when using hand tools:

- Use tools in the manner for which they were designed.
- Be sure of footing before using any tool.
- Do not use tools that have split handles, mushroom heads, worn jaws, or other defects.
- Do not use makeshift tools or other improper tools.
- Use spark-proof tools where there are explosive vapors, gases, or residue.

3.2.2 Material Handling

Lifting is a general safety concern at all job sites. To avoid injury, personnel assigned to lift small loads will employ proper lifting techniques such as bending at the knees, keeping the

load close to the body, lifting with the legs, keeping the back straight, and avoiding twisting. Prior to lifting, personnel will assess each load and consider whether a two-person lift or backhoe is necessary, considering the size, weight, and shape of the load.

If a backhoe is used to move 55-gallon drums full of waste, a hook and chain attachment will be required. A load hanging from the backhoe has the potential to swing or fall and cause injury. Since the severity of these types of injuries would be critical without proper controls, the following controls will be implemented to reduce the probability of injury:

- Ensure that the load is properly situated and secured prior to lifting.
- Lower the bucket as far as practicable prior to transporting a load.
- Designate one ground personnel to assist with the positioning of equipment in the work area and have all other personnel vacate the area.
- Establish eye contact between ground personnel and the equipment operator prior to approaching and/or handling the load.

3.3 Fall Hazards

Ground level slips, trips, and falls are potential hazards at all times on a job site. To reduce the likelihood of injury due to these hazards, uneven ground surfaces, curbs, and steps will be marked with yellow tape. Electrical conduit that must traverse foot-traffic areas will be covered with convex molding and secured to the ground. Extra precautions will be taken during field activities to account for the time of year (i.e., possible work during cold weather conditions) in which the work will be performed.

3.4 Heavy Equipment

Only heavy equipment in good condition will be used. Defective equipment and improper use of equipment contribute to accidents. The following safe practices will be observed when using heavy equipment:

- Initial inspection upon delivery of the equipment for properly working safety gear (i.e., headlights, backup alarms, fire extinguishers, unbroken front glass, no leaking hydraulic lines, etc.);
- “Walk-around” inspection prior to using the equipment each shift, to identify potentially unsafe conditions, clearances, or obstacles;
- Documented safety inspections and maintenance logs;
- Control of the presence of ground personnel within the swing radius or path of equipment by use of barricade tape or ropes; and
- Eye contact and hand signals between the equipment operator and ground personnel prior to any personnel entering the swing radius or path for work purposes.

3.5 Temperature Extremes

Fieldwork will be conducted during cold weather months, and the measures presented in this section will be taken to protect against the temperature extremes that may be encountered.

Cold Temperatures:

Exposure to cold temperatures increases the likelihood and potential for worker disorders that could result in injury or illness. Extremely low temperatures may not be the only element necessary to create the potential for cold exposure disorders or conditions; strong wind accompanied by cold temperatures can also lead to these types of disorders or conditions.

The wind chill factor is the cooling effect of any combination of temperature and wind velocity or air movement. The wind chill index presented in Table 3-1 should be consulted when planning for exposure to low temperatures and wind. The wind chill index does not take into account the specific part of the body exposed to cold, the level of activity that affects body heat production, or the amount of clothing being worn.

The human body senses "cold" as a result of both the air temperature and wind velocity. Cooling of exposed flesh increases rapidly as the wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrates the body insulation. For example, when the actual air temperature of the wind is 40 degrees Fahrenheit (ºF) (4.4 ºC) and the velocity is 30 miles per hour (mph), the exposed skin would perceive this situation as equivalent to a still air temperature of 28 ºF (-2.2 ºC).

The generally recognized cold disorders or conditions are:

- Frostbite - The freezing of tissue that most commonly affects the toes, fingers, and face.
- Hypothermia - Systemic hypothermia occurs when body heat loss exceeds body heat gain and the body core temperature falls below the normal 99 °F.

Contributing factors to these disorders or conditions are:

- Exposure to humidity,
- High winds,
- Contact with wetness,
- Inadequate clothing, and/or
- Poor worker health.

The presence of dead air space between the warm body and clothing and the outside air is essential. Many layers of relatively light clothing with an outer shell of windproof material maintains body temperature much better than a single heavy outer garment worn over ordinary indoor clothing. The more air cells each clothing layer has, the more efficiently it insulates against body heat loss. Clothing also needs to allow some venting of perspiration. In addition to adequate clothing, whenever possible, full use should be made of windbreaks and heat tents.

Table 3-1: Wind Chill Factors

Temperature (ºF)

Wind Speed (mph)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63	5
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72	10
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77	15
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81	20
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84	25
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87	30
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89	35
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91	40
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93	45
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95	50
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97	55
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98	60

"New" Wind Chill Formula: $T_{(wc)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

Frost Bite Times		30 Minutes		10 Minutes		5 Minutes

3.6 Activity Hazard Analysis

Appendix D addresses the potential hazards, controls, equipment, inspection, and training requirements associated with each site-specific task. There are three site-specific tasks discussed in Appendix D, including:

- Mobilization and Demobilization,
- Radiological Surveys, and
- Soil Removal and Soil/Sampling.

If site observations indicate that actual radiological or chemical conditions are different than expected, then additional controls will be implemented as necessary to ensure worker safety. Any such changes will be communicated to the PM and USACE Points of Contact for review and acceptance prior to implementing. Inspection and training requirements are included by reference from the CABRERA *Health and Safety Manual* (CABRERA, 2005). Health and safety equipment, such as PPE and monitoring instruments, are specified in Sections 4.5 and 4.7, respectively, of this *SSHP*, and are also discussed in the Project SOP (Cabrera, 2008).

4.0 RADIATION SAFETY PROGRAM

The *RSP* presented below will be implemented during field activities to protect workers' health and safety. The *RSP* includes requirements for conducting contamination surveys and occupational monitoring activities. The goal of the *RSP* is to ensure that worker doses are maintained as low as reasonably achievable (ALARA) in accordance with CABRERA SOP *AP-005: ALARA.*

4.1 Radiation Work Permit

The Site is known to be contaminated with radium. Each of the seven elevated gamma activity areas onsite are cordoned off to limit access by the general public. Radiation measurements obtained by NPS and the USEPA indicate general area dose rates of up to 10 milliRoentgen(s) per hour (mR/hr) beta-gamma in an area just off the road (Wetlands Rd.) leading to the model airplane field (Baker, 2007). The controls described in this *SSHP* for radiological work and support zone delineation, PPE, air and personnel monitoring, decontamination, and waste disposition will be implemented to limit the spread of contamination and ensure worker and public health and safety. In addition, a Radiation Work Permit (RWP) will be generated to establish task-specific radiological controls for this project. The RWP serves as a tool in protecting workers from the radiation hazards per CABRERA SOP, *AP-012: Radiation Work Permits*. In this permit, the levels of PPE will be detailed per CABRERA SOP, *AP-010: Personal Protective Equipment*, as well as the levels of radioactive materials expected and other pertinent information.

4.2 Acceptable Levels of Surface Contamination

The contamination surveys and occupational monitoring discussed below will be performed and the results recorded to ensure compliance with the dose limits and goals set forth in the U.S. Nuclear Regulatory Commission (NRC), Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors* (NRC, 1974);

Table 4-1 presents the acceptable surface contamination levels that will be used to determine whether equipment and tools used on the job site may be released for unrestricted use. This table is equivalent to Table 3-5 of the USACE *Radiation Protection Manual* (USACE, 1997), and Table 1 of the NRC *Regulatory Guide 1.86* (NRC, 1974). The *Regulatory Guide 1.86* values will be used by CABRERA for all unrestricted release of equipment and tools from the Site.

Since the radionuclide of concern at this Site is radium, the contamination limits applicable to this removal action will be 20 disintegrations per minute per 100 square centimeters (dpm per 100 cm^2) removable alpha activity and 300 dpm/100 cm^2 total alpha activity.

4.3 Contamination Surveys and Instrumentation

Contamination surveys will be conducted on equipment and personnel leaving the RCA. Contamination surveys will be accomplished using direct frisk and loose contamination (smear) survey methods in accordance with CABRERA SOP *OP-001: Radiological Surveys*. The direct frisk method is performed using calibrated, source-checked instrumentation capable of detecting alpha, beta, and gamma radiations. The loose contamination survey method employs a contamination collection smear that removes loose contamination over a surface area of approximately 100 cm^2 on potentially contaminated equipment surfaces. The smear samples are analyzed with a calibrated field laboratory instrument capable of detecting alpha radiation.

The following types of instruments will be used to perform the scan surveys and smear counts:

- A Ludlum Model 44-9 Geiger Mueller tube detector and Model 3 scaler/ratemeter will be used for direct frisking of personnel and equipment. The limits presented in Table 4-1 for radium (i.e., 100 dpm/100 cm^2 average alpha and 300-dpm/100 cm^2 maximum alpha) will be used.
- A Ludlum 43-10-1 sample counter and Model 2929 alpha-beta scaler or equivalent will be used to analyze smears for radium. The limit presented in Table 4-1 for radium (in bold) of 20 dpm/100 cm^2 alpha will be used.

Table 4-1: Acceptable Surface Contamination Levels for Tools and Equipment Leaving the Controlled Area

Radionuclide[a]	Acceptable Surface Contamination Levels (DPM/100 cm^2)		
	Removable[b, e]	Average[b, c]	Maximum[b, d]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-221, I-125, I-129	**20**	**100**	**300**
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000	3,000
U-Natural, U-235, U-238, and associated decay products	1,000 α	5,000 α	15,000 α
Beta-Gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	1,000 β γ	5,000 β γ	15,000 β γ

[a] Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, disintegrations per minute (dpm) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each object.

[d] The maximum contamination level applies to an area not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionately and the entire surface should be wiped.

The minimum detectable activity (MDA) of these instruments will be verified in the field to ensure that they are less than the applicable release criteria. Survey and counting instruments are source-checked on a daily basis, and the performance of instruments used to count smears is tracked on a control chart. The daily source count will be handled in accordance with CABRERA SOP *OP-009: Use and Control Of Radioactive Check Sources*. Calibration and use of the instruments is described in CABRERA SOP *OP-020: Operation of Contamination Survey Meters* and CABRERA SOP *OP-021: Alpha-Beta Counting Instrumentation*.

4.4 Equipment Decontamination

Equipment that comes into contact with contaminated material will be decontaminated, as necessary, prior to release from the Site. Potentially contaminated tools and equipment will be decontaminated and released in accordance with CABRERA SOPs *OP-018: Decontamination of Equipment and Tools* and *OP-004: Unconditional Release of Materials from a Radiological Controlled Areas*.

Stainless steel bowls, trowels, and other sampling/excavation equipment will be wiped with a damp paper towel prior to first use and between sampling locations to prevent cross-contamination among samples. Paper waste generated during this process will be surveyed, and if radiation is not detected above applicable regulations and requirements, the items will be disposed of with other non-contaminated site-generated wastes (i.e., solid waste). No decontamination fluids will be generated during the decontamination process.

Following the final decontamination, equipment and tools will be surveyed for radiological contamination, if necessary, to determine their release status. The decontaminated equipment will be surveyed as described in Section 4.3, and observed count rates will be compared to the unrestricted release requirements presented in Table 4-1. Equipment and tools will be released from the site only if they meet the unrestricted release criteria.

4.5 Handling of Volumetric Soil Samples

Volumetric soil samples will be collected as described in the *SOP*, then labeled, packaged, and prepared for shipment to the analytical laboratory. To reduce the risk of spreading contamination, personnel involved with the collection of these samples will wear disposable gloves and observe proper handling techniques in accordance with OP-005: *Volumetric and Material Sampling*. Personnel will wipe the outside surfaces of each filled sample container with a damp paper towel to remove potential gross contamination. The containers will then be surveyed for removable contamination by collecting a smear sample and counting it using a Ludlum Model 43-10-1/2929 smear counter, or equivalent, to ensure that unrestricted release requirements have been met and that no additional decontamination is required.

4.6 Personnel/PPE Decontamination

Disposable booties and other used PPE will be surveyed for radiological contamination, cleaned if possible to remove radioactivity, then removed and placed in bags for daily disposal. Acceptable contamination limits are defined in Table 4-1. If radiation is detected below applicable regulations and requirements, the bag(s) will be disposed of with other non-contaminated site-generated wastes. If radiation is detected above acceptable criteria, the bag(s) will be appropriately labeled and stored in 55-gallon steel drums and will remain at the Site to await disposal along with potentially contaminated soils. Efforts will be made to minimize the generation of contaminated waste to the extent practical.

To minimize the risk of exposure through incidental ingestion of contaminated particles, personnel will use handi-wipes or paper towels to practice good personal hygiene, washing hands and other exposed skin prior to eating, drinking, or smoking. Absolutely no smoking, eating, or drinking is allowed within the RCA. Personnel will frisk their hands and feet (i.e., soles of shoes) using a Ludlum 44-9 GM tube detector and model 3 scaler/ratemeter prior to exiting a RCA to minimize the transfer of contamination to clean areas.

4.7 Occupational Monitoring

Occupational monitoring will consist of airborne radioactivity monitoring and radiation dosimetry based on prior survey results in the areas of interest.

Air monitoring will be conducted in accordance with CABRERA *OP-002: Air Sampling and Analysis* to measure personnel exposure to airborne radioactivity. Air monitoring will include the collection of air samples in the general work area as discussed in Section 6.0. Engineering controls will be utilized should airborne activity approach 10% of derived air concentration (DAC).

Respiratory protection and/or DAC-hr tracking will be utilized should airborne levels exceed 10% of DAC and 12 DAC-hrs per exposed individual in any 7 day period. Airborne Radioactivity Area signs will be posted in this event.

5.0 TRAINING AND MEDICAL SURVEILLANCE

This section contains a discussion of the training requirements for personnel performing work on this project. Copies of training certificates are kept in the CABRERA corporate office (East Hartford, CT) and are available upon request.

5.1 Basic OSHA Training

All field workers will have 24- or 40-hour HAZWOPER training in accordance with 29 CFR 1910.120 (OSHA, 2005a), and at least three days of documented field experience under the direct supervision of a trained experienced supervisor. The FOL will have an additional 8 hours of specialized supervisory training. All field workers will attend an annual 8-hour HAZWOPER refresher course if their initial training is more than one year old.

5.2 Site-Specific Health and Safety Training

Site-specific health and safety training will be conducted prior to field activities for all project personnel and site visitors. The designated SHSO will review the *SSHP*, *SOP*, and other associated responsibilities with other field team members and afford them the opportunity to ask any questions. A record of this training will be maintained by the SHSO. The FOL will review the work plan with the project team and assign specific responsibilities, ensuring that all personnel understand the importance of adhering to the health and safety requirements presented in this *SSHP* during project implementation. Project personnel will sign the form provided in Appendix F prior to the commencement of work to acknowledge that they have received this training.

5.3 Radiation Worker Training

All field personnel assigned to this project must complete the CABRERA Radiation Worker Training or equivalent, as determined by the RSO, prior to engaging in work activities at the Site. A score of 80% must be achieved on the examination to demonstrate successful completion of the course.

5.4 First Aid and CPR Training

At least one person on the job site will be certified to provide First Aid and cardiopulmonary resuscitation (CPR). The training will be equivalent to that provided by the American Red Cross.

5.5 Blood Borne Pathogen Training

Any person who has received first aid and/or CPR, and who may be called upon to provide emergency service to an injured/unconscious co-worker will have completed awareness level training in controlling exposures to blood borne pathogens (BBPs). This training will consist of the following:

- Review of the BBP standards,
- Description of the risks of exposure and how BBPs are transmitted,
- Methods of protection against exposure and procedures for decontamination, and

- Post-exposure procedures.

5.6 Respiratory Protection Training

In accordance with 29 CFR 1910.134 (OSHA, 2005b), all Site personnel required to use respiratory protection devices will receive equipment-specific training. This training covers the use, limitations, inspection, maintenance, and cleaning of respiratory protection devices required under this *SSHP*. Prior to commencing operations requiring respiratory protection, the SHSO will ensure that all affected personnel are medically cleared, appropriately trained, and fit-tested to work in respirators.

5.7 Hearing Conservation Training

Powered equipment generally will produce sound levels greater than 85 decibels adjusted (dBA). Hearing protection will be required where exposure may occur for several hours during the day. For individuals with documented threshold shifts, use of hearing protection is mandatory whenever powered equipment or other devices are used which produce sound levels over 85 dBA. The SHSO will conduct noise monitoring during asphalt and concrete drilling operations to determine whether hearing protection is necessary and, if so, the appropriate hearing protection will be provided.

5.8 Hazard Communication

In order to comply with OSHA *Hazard Communication Standard (HCS)* described in 29 CFR 1910.1200 (OSHA, 2005d), the following will apply to all commercial products containing hazardous substances that are brought onsite:

- Any hazardous materials brought onsite will comply with the requirements of the CABRERA Hazard Communication Program, as presented in CABRERA's corporate safety procedure *HSM-002, Hazard Communication.* This program will be made available to all site personnel.
- MSDSs will be maintained at the operations base for each hazardous product used onsite.
- All containers not supplied with adequate hazard labeling will have a hazard communication label affixed to the container displaying the health and physical hazards of the material.
- Employees working with hazardous substances will be trained in accordance with the requirements of 29 CFR 1910.1200.
- An inventory of all hazardous substances used onsite will be maintained.
- Personnel, including contractors, using hazardous substances will be informed of the hazards and the location of appropriate MSDS.

5.9 Fall Protection Training

The SHSO will ensure that one or more of the fall protection/prevention systems outlined in CABRERA's corporate safety procedure *HSM-012, Fall Protection* is provided at **all** locations where fall hazards of 6 ft (2 meters) or greater exist. These locations include, but are not limited to, excavations, unprotected elevations, ladders, scaffolds, boom lifts, floor holes, wall openings, formwork, rebar tying, and all other locations and operations where potential fall hazards exist. In addition, the SHSO will ensure that all personnel designated to use fall protection will be appropriately trained in its proper use.

5.10 Daily Safety Meetings

The SHSO will conduct daily safety meetings to review the day's work plan, associated activities, and any anticipated hazards. This daily orientation will be required for all individuals scheduled to work that day. Attendee names and topics of discussion will be documented and maintained on a form such as the Daily Safety Meeting Form contained in Appendix E.

5.11 Medical Surveillance

The purpose of the medical surveillance program is to ensure suitable job placement of employees, to monitor potential health effects of hazards encountered in the work place, and to maintain and promote good health through preventative measures. Medical surveillance, in accordance with OSHA requirements presented in 29 CFR l910.120(f) (OSHA, 2005e), is required for all personnel involved in project field activities. The CHSM will ensure that project personnel are medically cleared for their anticipated duties. All personnel assigned onsite work will provide documentation that demonstrates compliance with the OSHA medical surveillance requirements. Documents that will be made available include the employee's most recent medical clearance and respirator clearance forms.

6.0 AIR MONITORING PROGRAM

Ambient air monitoring will be conducted at the Site to measure the concentrations of various airborne contaminants. Air monitoring data is primarily used to verify that controls are effectively preventing harmful exposures to chemicals and/or controlling internal exposures of radiation to project personnel to within allowed regulatory limits. Air monitoring data is also useful for documenting fugitive emissions and indicating when Site activities or work practices require modification. The results of air monitoring will be conveyed to project personnel by the SHSO. Radiological air monitoring will be conducted as per CABRERA *OP-002, Air Sampling and Analysis* and Section 4.7, *Occupational Monitoring*, of this document. All samples will be logged, documented, and archived.

6.1 Work Area Monitoring

General work area monitoring will be conducted using low-volume air samplers to measure ambient airborne radioactivity in areas where work is being performed. Baseline air samples will be collected prior to the commencement of excavation to measure background radioactivity. Thereafter, samples will be collected routinely during fieldwork to monitor potential worker exposure to radioactive particulates released by the disturbance of surface dust and/or intrusive activities. Low volume air samplers will be placed upwind and downwind of the perimeter of the active excavations. Following the collection of air samples, the filter media may need to be stored for at least 24 hours to allow the short-lived radon progeny to decay prior to collection of final count data. Air samples will then be counted using a Ludlum Model 43-10-1 for sufficient time to achieve the required minimum detectable concentration (MDC) goal for ^{226}Ra.

7.0 PERSONAL PROTECTIVE EQUIPMENT

In accordance with 29 CFR l910, Subpart I (OSHA, 2005c), all PPE will be provided, used, and maintained in a sanitary and reliable condition. PPE will be selected to properly and appropriately fit the employee, and will be of construction, design, and material to provide employees protection against known or anticipated hazards. Personnel will be provided with training on the selection, use, and limitations of PPE in accordance with the standard. Any concerns regarding the use of appropriate PPE will be brought to the attention of the SHSO, who is responsible for ensuring that the necessary PPE is available onsite.

All personnel performing activities onsite will use the appropriate level of protection. The SHSO will make the final determination for PPE levels based on site conditions and planned activities. It is anticipated that the activities described herein will be conducted in modified construction attire (regular work clothes with boot covers, gloves, hard hats, and safety glasses, as necessary). Every effort will be taken to avoid contact with potentially contaminated material. Additional PPE will be recommended if it is determined that contamination of work clothing or bare skin is likely. Typical PPE ensembles are described below.

7.1 Construction Attire

Construction attire (CA) can be worn in areas where there are no inhalation concerns and the potential for contamination is virtually nonexistent. CA consists of the following clothing:

- Sleeved shirt, at least 4 inches - the SHSO may upgrade this requirement to long sleeved shirts should there be potential for scratches from plants and trees, or exposure to skin irritants;
- Long pants, with no tatters that can be hooked by machinery;
- Steel-toed shoes or boots;
- Work gloves when handling materials; and
- Access to hearing protection.

7.2 Level D Protection

Level D protection will be worn over CA whenever there is a potential for minimal contamination and no airborne contaminants. Level D protection may include any or some combination of the following:

- Disposable coveralls and/or boot covers;
- Latex or nitrile surgical gloves;
- Chemical-resistant gloves;
- Safety glasses;
- Splash shield, when working with contaminated liquids;
- Rubber outer boots, either over leather safety shoes or with an integral safety toe; and

- Hardhat, whenever there is a potential for overhead hazards.

7.3 Level C Protection (Respiratory Protection Included)

Respiratory protection will be required during activities that have the potential to generate airborne radioactivity greater than the action levels presented in Section 6.0. Respiratory protection will also be required during activities such as torch-cutting that have the potential to generate metal fumes. In these situations, Level C respiratory protection consisting of a full-face mask with an air-purifying respirator (APR) will be used. The SHSO and SRSL will monitor these activities closely, and may implement upgrades to engineering controls and/or PPE requirements (i.e., to Level B supplied air respirators), especially in poorly ventilated areas, based on relevant monitoring data.

7.4 Respirator Change-Out Program

Airborne radioactive dust and metal fumes are the only anticipated hazards that would dictate the use of respirators. When respirators are used during site operations, the cartridges will be changed out at least daily. The SHSO will continue to monitor site conditions and contaminant loadings, and may make adjustments to the change-out schedule as necessary to ensure worker health and safety.

8.0 GENERAL SITE SAFETY PROCEDURES

This section contains general site safety information applicable to the fieldwork.

8.1 General

Hazards due to normal site activities can be reduced by using common sense and by following safe practices. The following practices are expressly forbidden:

- Running and horseplay;
- Smoking, eating, drinking, applying cosmetics, or chewing gum or tobacco within any potentially contaminated area; and
- Ignition of flammable materials in the work zone without the proper Hot Work Permit. Equipment will be bonded, grounded, and explosion resistant, as appropriate.

Hazard assessment is a continuous process; personnel must be constantly aware of their surroundings and of the chemical and physical hazards that are or may potentially be present. Team members will be familiar with the physical characteristics of each site including wind direction, site access, and the location of communication devices and safety equipment.

8.2 Project Site Controls

The Site is a public park so there is the possibility that work will occur while members of the general public are in the area. These persons will be asked to remain at a safe distance from active work, especially during the operation of heavy machinery. At no time will members of the general public or other unauthorized personnel be allowed to enter the active work areas. All questions will be directed to the designated Government POC, MS. Kathleen Cuzzolino, or the NPS Public Affairs Officer, Mr. Brian Feeney, including any potential inquiries by the media.

Exclusion zones will be established around each of the active excavation areas. These zones will include the existing snow fence barriers established by the NPS around each area, and will be expanded and delineated by "rad rope" and/or caution tape to ensure visitors maintain a safe distance from site activities. Entering the exclusion zones will be restricted to radiation worker-trained personnel under the control of CABRERA's FOL, and authorized visitors accompanied by CABRERA's SHSO. Persons entering the exclusion zone will be required to wear the specified PPE and abide by the SSHP, RPP, and applicable Radiation Work Permits. Exiting from the exclusion zone will only be through specified areas, in accordance with contaminant reduction procedures described in the RSP (see Section 4.0). However, the exclusion zone boundaries may be adjusted by the SHSO based on changes in field conditions or equipment needs.

Site visitors will be required to meet with CABRERA's FOL to receive a briefing on the day's planned activities and applicable health and safety topics, and, if possible, attend the Daily Safety Meeting held for all workers (see Section 5.10). A log of all visitors to the site will be maintained.

8.3 Sanitation

Project sanitation needs will be addressed by the use of existing lavatories in nearby buildings and park facilities. Bottled drinking water will be brought onsite to meet the field team's daily drinking water demand.

8.4 First Aid

A 16-unit First Aid kit will be maintained at the work site, along with other emergency equipment as identified in Section 9.2. All injuries requiring First Aid will be immediately reported to the SHSO and treated as described in Section 9.3. Any employee who becomes ill resulting from possible exposure to site hazards will immediately notify the SHSO, who will make arrangements for medical consultation.

9.0 EMERGENCY RESPONSE PROCEDURES AND EQUIPMENT

The purpose of this section is to address potential emergency situations and to provide guidelines for emergency response procedures.

9.1 Emergency Recognition

The types of potential emergencies that may occur on this project include:

- Physical injuries to site personnel such as sprains, broken bones, severe lacerations;
- Exposure to site contaminants or hazardous materials;
- Electrical or brush fires; and
- Animal or insect bites.

9.2 Emergency Equipment

To facilitate timely emergency response, the following emergency equipment will be available and maintained onsite:

- 16-unit First Aid kit,
- BBP kit,
- Fire extinguisher,
- Eye wash, and
- 2-way radios and/or cellular telephones.

All workers will be informed about the location of the emergency equipment and the names of personnel who are trained in its proper use.

9.3 First Aid and Medical Treatment Procedures

In the event of an emergency, personnel who have been trained and certified in First Aid may administer general onsite treatment. General treatment procedures include:

- Remove the injured or exposed person(s) from immediate danger.
- Assess the nature and extent of the injury.
- Notify the SHSO.
- Render First Aid and decontaminate affected personnel, if necessary.
- Call an ambulance for transport to local hospital, if necessary.
- Evacuate other personnel onsite to a safe place if necessary, until the SHSO determines that it is safe for work to resume.
- Report any accident to the SHSO immediately.

Only personnel who have been certified in First Aid may administer onsite treatment. If it is determined that medical treatment is required, the SHSO or other personnel knowledgeable about the accident and Site contaminants will accompany the victim to the hospital.

9.4 Hospitals

Routes and telephone numbers to the local hospital is provided in Appendix B of this plan.

9.5 Emergency Alert Procedures

If, during the performance of this project, conditions in or around the work area pose imminent danger, personnel will leave the area and immediately notify the appropriate emergency response personnel. Emergency response numbers are provided in Appendix B and will be posted at the jobsite and in each site vehicle. All project personnel will review the emergency notification numbers, as well as the emergency plans and evacuation procedures prior to commencement of site activities.

9.6 Severe Weather

In the event of adverse weather conditions occurring onsite, such as lightning, heavy snow, extreme temperatures, or high winds, the FOL will instruct the workers to discontinue outdoor field operations. These natural phenomena complicate work activities and increase risk to all site personnel. The following actions should be taken in the event of lightning:

- Stop work.
- Bring all workers to safe areas indoors.
- Place all equipment in a secure location.
- Verify that all doors are locked and windows closed.
- Shut down and disconnect all electrical equipment to protect it from electrical surges and abrupt power loss.

10.0 RECORDKEEPING

Each employee working onsite is responsible for providing the following recordkeeping information. These records will be maintained at the CABRERA corporate office and will be made available upon request.

- Signed Statement of *SSHP* Acknowledgment (See Appendix F).
- Personnel training certificates for:
  - 24-hr or 40-hr HAZWOPER training,
  - Current 8-hr HAZWOPER refresher,
  - CABRERA Radworker training,
  - First Aid/CPR training (if applicable), and
  - BBP Training (if applicable).
- Medical approval forms for site work and respirator clearance.

The following documents will be incorporated into the project file:

- Accident Investigation Reports - In case of an accident or employee injury onsite, a written accident report will be completed and forwarded to the SHSO within 48 hours.
- Revisions to the *SSHP* - The SHSO, in consultation with the CHSM, will document recommended changes to the *SSHP*. Revisions approved by the CHSM and the RSO will become part of the *SSHP* and will be distributed to all essential personnel.

11.0 REFERENCES

Baker, 2007. *Preliminary Assessment Report for Potential Radiological Contamination at Great Kills Park*. Michael Baker, Jr, Inc. August 2007.

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NRC, 1974. *Regulatory Guide 1.86: Termination of Operating Licenses for Nuclear Reactors.* U.S. Nuclear Regulatory Commission. Washington, D.C. June 1974.

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OSHA, 2005c. *Personal Protective Equipment*. Code of Federal Regulations Title 29, Part l910, Subpart I. U.S. Department of Labor, Occupational Safety and Health Administration. Washington, D.C. July 1, 2005.

OSHA, 2005d. *Hazard Communication Standard*. Code of Federal Regulations Title 29, Part 1910.1200. U.S. Department of Labor, Occupational Safety and Health Administration. Washington, D.C. July 1, 2005.

OSHA, 2005e. *Personal Protective Equipment*. Code of Federal Regulations Title 29, Part l910, Subpart I. U.S. Department of Labor, Occupational Safety and Health Administration. Washington, D.C. July 1, 2005.

USACE, 1997. *Radiation Protection Manual.* EM 385-1-80. U.S. Army Corps of Engineers.

May 30, 1997.

CABRERA STANDARD OPERATING PROCEDURES (PROVIDED ON ACCOMPANYING CD)

AP-005: *ALARA*

HSM-002: *Hazard Communication*

HSM-004: *Lockout/Tagout*

HSM-012: *Fall Protection*

OP-001: *Radiological Surveys*

OP-002: *Air Sampling and Analysis*

OP-004: *Unconditional Release of Material from Radiological Control Areas*

OP-005: *Volumetric and Material Sampling*

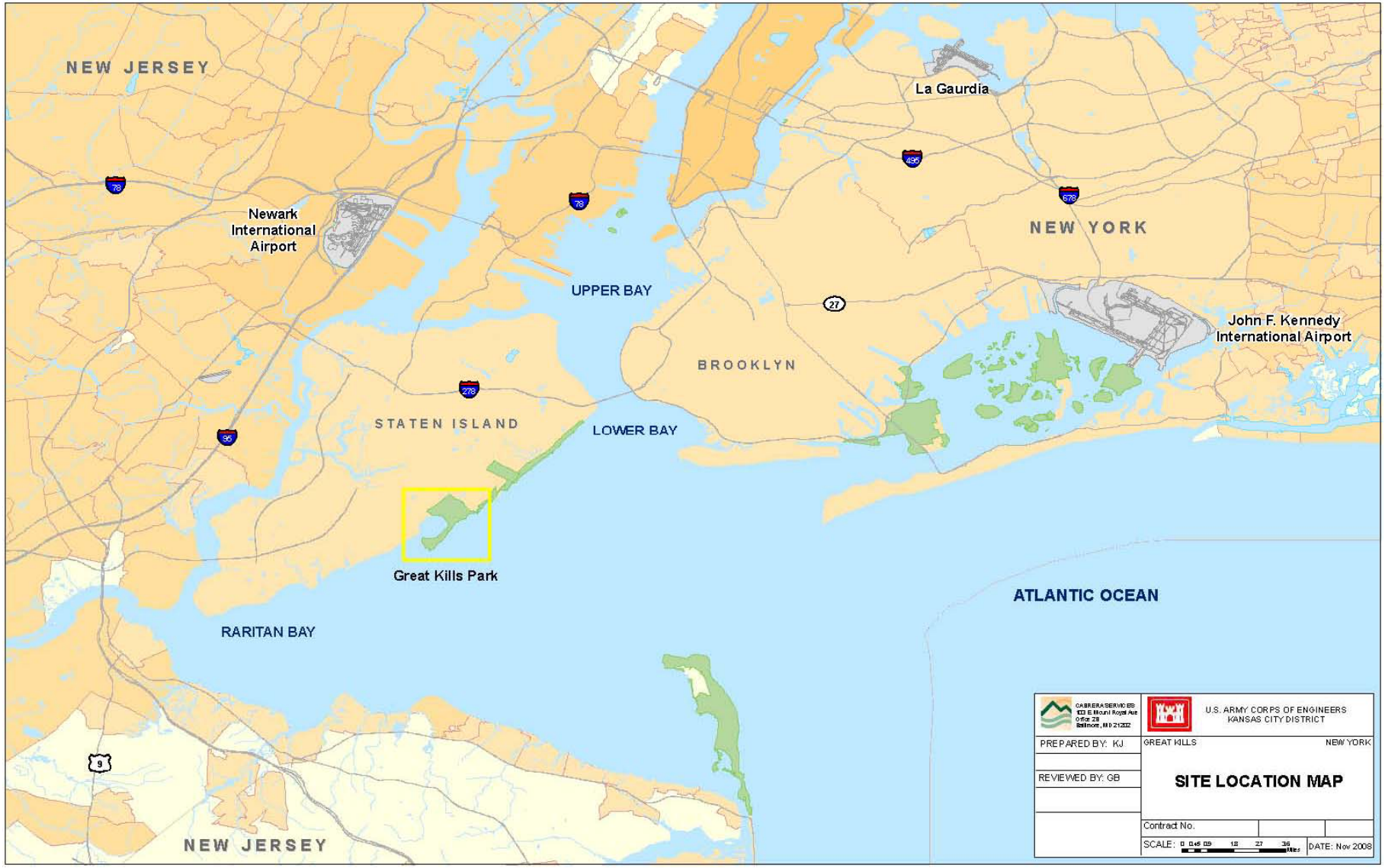
OP-009: *Use and Control Of Radioactive Check Sources*

OP-018: *Decontamination of Equipment and Tools*

OP-020: *Operation of Contamination Survey Meters*

OP-021: *Alpha-Beta Counting Instrumentation*

APPENDIX A
SITE LOCATION MAP


NEW JERSEY
La Gaurdia
Newark International Airport
UPPER BAY
NEW YORK
John F. Kennedy International Airport
BROOKLYN
STATEN ISLAND
LOWER BAY
Great Kills Park
ATLANTIC OCEAN
RARITAN BAY
NEW JERSEY
U.S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT
PREPARED BY: KJ
GREAT KILLS
NEW YORK
REVIEWED BY: GB
SITE LOCATION MAP
Contract No.
SCALE:
DATE: Nov 2008

APPENDIX B
EMERGENCY INFORMATION

Site Contacts and Emergency Telephone Numbers
Directions to Staten Island University Hospital

SITE CONTACTS & EMERGENCY TELEPHONE NUMBERS

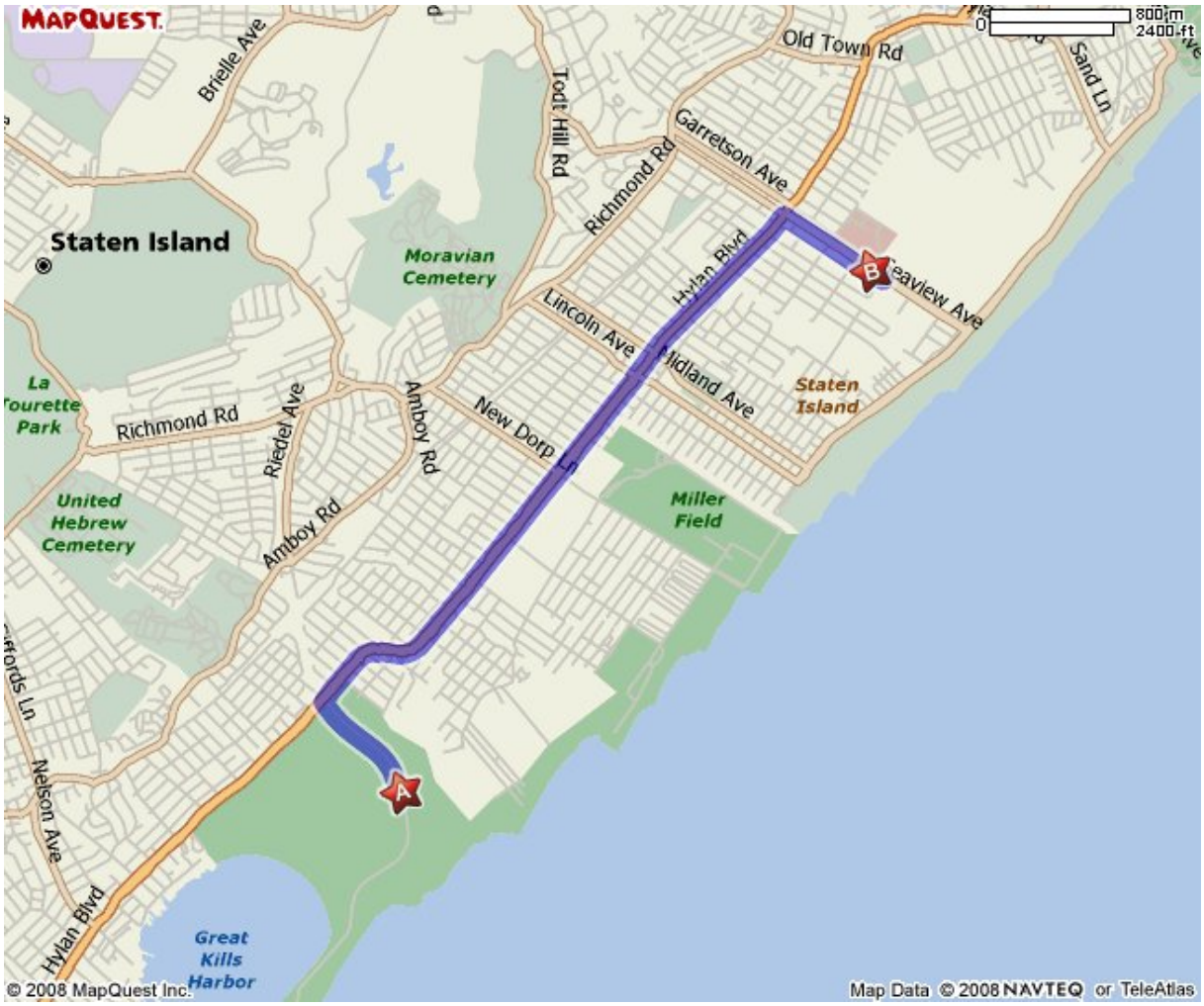
Position	Name	Company/Agency	Primary Number	Secondary Number
		CABRERA		
Project Manager	Kim Nelson	CABRERA	(301)467-3777	NA
Corporate Health and SafetyManager	Paul Schwartz	CABRERA	(860) 569-0095	NA
Corporate RSO	Hank Siegrist	CABRERA	(860) 569-0095	(860) 416-0196
FOL /SHSO	Wade Fillingame	CABRERA	(865)300-5789	
USACE POC	Tom Gibison	USACE	(215)656-6625	(215)964-2258
NPS POC	Kathleen Cuzzolino	NPS	(718)354-4609	
Alternate NPS POC	Dave Taft		(347)539-0247	
USACE Onsite POC	Gus Lymberis	USACE	(917)790-8481	
PAO	Brian Feeney	NPS	(718)354-4606	
US Park Police		NPS	7183383988	

Emergency Number
(Police/Fire/Ambulance)

911

Staten Island University Hospital

475 Seaview Ave
Staten Island, NY 10305
(718) 226-9000



1. Start out going NORTH on BUFFALO ST toward HYLAN BLVD. 0.1 mile
2. Turn RIGHT onto HYLAN BLVD. 2.9 mile
3. Turn RIGHT onto SEAVIEW AVE. 0.5 mile
4. Make a U-TURN at OLYMPIA BLVD onto SEAVIEW AVE. 0.1 mile
5. Turn RIGHT onto S. Union Ave. 1.0 mile
6. Arrive at 475 Seaview Ave Staten Island, NY 10305

Total Distance: 3.96 Miles **Estimated Total Time:** 10 minutes

APPENDIX C
CHEMICAL INFORMATION

CITGO No. 1 Diesel Fuel, All Grades

Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 3758
Tulsa, OK 74102-3758

MSDS No. AG1DF

Revision Date 03/20/2003

IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Hazard Rankings

	HMIS	NFPA
Health Hazard	* 1	0
Fire Hazard	2	2
Reactivity	0	0

* = Chronic Health Hazard

Emergency Overview

Physical State Liquid.

Color Clear to light amber. **Odor** Characteristic, kerosene-like.

WARNING!
Combustible liquid; vapor may cause flash fire.
Harmful or fatal if swallowed - can enter lungs and cause damage.
Mist or vapor can irritate the respiratory tract.
Liquid contact can cause eye or skin irritation.
May be harmful if inhaled or absorbed through the skin.
Overexposure can cause central nervous system (CNS) depression and/or other target organ effects.
Diesel engine exhaust can cause upper respiratory tract irritation and reversible pulmonary effects.
Spills may create a slipping hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details

SECTION 1: IDENTIFICATION

Trade Name	CITGO No. 1 Diesel Fuel, All Grades	**Technical Contact**	(918) 495-5940 or (918) 495-5933
Product Number	Various	**Medical Emergency**	(918) 495-4700
CAS Number	8008-20-6	**CHEMTREC Emergency (United States Only)**	(800) 424-9300
Product Family	Fuels.		
Synonyms			

SECTION 2: COMPOSITION

This product may be composed, in whole or in part, of any of the following refinery streams:

Kerosene [CAS No.: 8008-20-6]
Hydrodesulfurized Kerosine (Petroleum) [CAS No.: 64742-81-0]
Hydrodesulfurized Middle Distillate (petroleum) [CAS No.: 64742-80-9]
Straight-run Middle Distillate (Petroleum) [CAS No.: 64741-44-2]
Hydrodesulfurized Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 68333-25-5]
Light Catalytic Cracked Distillate (Petroleum) [CAS No.: 64741-59-9]

This product contains the following chemical components:

Component Name(s)	CAS Registry No.	Concentration (%)

CITGO Gasolines, All Grades Unleaded
Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210

MSDS No.	UNLEAD
Revision Date	05/23/2005

IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Hazard Rankings

	HMIS	NFPA
Health Hazard	* 2	1
Fire Hazard	3	3
Reactivity	0	0

* = Chronic Health Hazard

Emergency Overview

Physical State	Liquid.		
Color	Transparent, clear to amber or red.	Odor	Pungent, characteristic gasoline.

DANGER:
Extremely flammable liquid; vapor may cause flash fire or explosion.
Vapor may travel considerable distance to source of ignition and flash back.
Use Only as a Motor Fuel. Do Not Siphon by Mouth.
Harmful or fatal if swallowed - Can enter lungs and cause damage.
High concentrations of vapor reduce oxygen available for breathing and may cause suffocation.
May be harmful if inhaled or absorbed through the skin.
Mist or vapor may irritate the eyes, mucous membranes, and respiratory tract.
Liquid contact may cause eye and skin irritation.
Overexposures may cause central nervous system (CNS) depression and target organ effects (See Section 3).
Harmful or fatal if swallowed - Can enter lung and cause damage.
Inhalation overexposure can increase the heart's susceptibility to arrhythmias (irregular beats).
Contains Benzene - Cancer Hazard.
Long term exposure to gasoline vapor has caused cancer in laboratory animals.
Avoid Spills. Spills may present both a physical and an environmental hazard.

Protective Equipment

Minimum Recommended
See Section 8 for Details

SECTION 1. PRODUCT IDENTIFICATION

Trade Name	CITGO Gasolines, All Grades Unleaded	**Technical Contact**	(800) 248-4684
Product Number	Various	**Medical Emergency**	(832) 486-4700
CAS Number	Mixture.	**CHEMTREC Emergency (United States Only)**	(800) 424-9300

APPENDIX D
ACTIVITY HAZARD ANALYSES

Task 1: Mobilization/Demobilization

Task Or Step	Hazards	Controls
Manual material handling	Strains and sprains from manually lifting and moving.	Proper lifting techniques will be used such as keeping straight back, lifting with legs; personnel will avoid twisting back, will use mechanical equipment, or get help from others.
	Hands or fingers caught between objects; abrasions and lacerations. Puncture wounds from stepping on sharp objects.	Personnel shall be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions shall be taken to avoid contact. Personnel shall wear work gloves and avoid placing hands between solid objects. Appropriate footwear shall be worn at all times.
Placement and storage of chemical supplies	Fire.	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 feet (ft) of the fuel storage area, in construction equipment, and strategically in the construction area.
Filling gasoline tanks, using spray paint, markers, etc.	Exposure to chemicals used on the job.	Material Safety Data Sheets shall be available for all hazardous materials used on the job site. Personnel using hazardous materials will be instructed on proper storage and use.
Housekeeping - organization of site supplies	Slips, trips, falls, abrasions.	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow, and mud will be cleared from foot-traffic areas to reduce slip hazards.
Working in unfamiliar terrain	Slip, trips, falls over tools, vegetation, or uneven surfaces.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained.
Use of electrical services including use of generators	Electrical hazards.	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Elevated parts of machinery, ladders, and antennas will be kept at least 10 ft from overhead electric lines. Qualified electricians will make all electrical installations. A lockout/tagout program will be used for equipment maintenance.
Setting up work areas using specific tools	Hand tools, manual and power.	Tools shall be inspected prior to use. Damaged tools will be tagged out-of service until repaired by a qualified person. Tools will be used only for their intended purpose. All power circuits used for hand tools will be protected by a ground fault circuit interrupter (GFCI). Eye protection will be worn at all times when hand tools are used.
Working in and around heavy equipment such as man-lift	Striking and being struck by operating equipment, loads, falling objects, and pinch points.	Workers shall stay out of the swing area of all equipment and from under loads. No personnel shall ride on the equipment unless seats are provided. Workers exposed to traffic hazards will wear traffic/reflector vests. Vehicles will be checked during maintenance and cribbed if wheels need to be changed.
Working in extreme weather	Inclement weather, lightning, poor visibility, heat/cold stress.	Workers shall be briefed and cognizant of heat and cold stress symptoms. Fluids will be available to workers. Work rest periods will be established according to American Conference of Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines. Work shall cease during sleet, heavy snow, or high winds.

Task 2: Radiological Surveys

Task Or Step	Hazards	Controls
Perform radiological surveys	Physical Hazards: Slip, trips, and falls over tools, vegetation, or uneven surfaces.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. General housekeeping practices will be implemented to keep tools and supplies out of foot-traffic areas. Site personnel shall conduct survey activities in groups of two.
	Biological Hazards: Poisonous plants, insects, or snakes.	Personnel will review recognition of poisonous plants, insects, or snakes typical of this area and use appropriate measures as required.
	Inclement Weather: Snow, ice, lightning, heavy rain.	If present, ice, snow, and mud will be cleared from foot-traffic areas to reduce slip hazards. No work shall be conducted outside during periods of lightning, high winds, or heavy precipitation. Personnel shall review and understand emergency procedures for severe weather.
	Heat/Cold Stress.	Workers shall be briefed and cognizant of heat and cold stress symptoms. Fluids will be available to workers. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Foot Injury.	Safety shoes/boots meeting American National Standards Institute (ANSI) specifications are required. Muddy areas must be entered with care as buried objects may pose tripping and/or puncture hazards
	Chemical Hazards.	Material Safety Data Sheets shall accompany all chemicals brought onsite. Unidentified or suspect containers encountered in the work areas shall be avoided. Appropriate PPE shall be worn when working with chemicals or chemical contaminants to minimize exposure.
	Sun Burn.	Sun block will be used as appropriate. Direct exposure to sun for long periods of time will be avoided.
	Vehicle Traffic.	Work areas will be clearly barricaded and appropriate signs displayed. Traffic will be rerouted as necessary. Persons working near roadways or directing traffic will wear high-visibility vests.
	Radiation Hazards.	Personnel shall be trained in general radiation protection requirements. Personnel shall abide by site-specific radiological control practices and PPE requirements specified in the Radiation Work Permit. Radiation sources shall be kept in a locked fire-safe container when not in use. Personnel, smear sample containers, and equipment leaving the controlled zone will be surveyed to ensure that radiological contamination levels are not exceeded. Air monitoring will be conducted during survey activities to measure airborne contaminants and ensure the adequacy of PPE.
	Poor Visibility.	Sufficient illumination shall be maintained in the work areas.
	Housekeeping.	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and free of trash.
	Electrical Hazards.	Extension cords will be properly rated for intended use. Ladders will be kept at least 10 ft from overhead electric lines. Qualified electricians will make all electrical installations. A lockout/tagout program will be used for equipment maintenance or when work around open circuits is necessary.

Task 2: Radiological Surveys (continued)

Task Or Step	Hazards	Controls
Perform radiological surveys	Hand Tools, manual and power.	Tools shall be inspected prior to use. Damaged tools will be tagged out-of service until repaired by a qualified person. Tools will be used only for their intended purpose. Eye protection will be worn at all times when hand tools are used.
	Striking and being struck by operating equipment, loads, falling objects, and pinch points.	Workers shall stay out of the swing area of all equipment and from under loads. Hard hats will be worn whenever overhead work is being performed or other overhead hazards are present.
	Working at elevations.	Fall protection will be employed anytime work is performed at elevations greater than six feet from the ground. Working from ladders is discouraged and should be performed only if 3-point contact can be maintained.

Task 3: Volumetric and Soil/Sediment Sampling

Task Or Step	Hazards	Controls
Sample Collection	Intrusive Activities.	Control measures for general intrusive activities apply. Contact the appropriate authorities to ensure that no utility interferences will be encountered during intrusive activities. Ensure that appropriate UXO safety oversight is provided.
	Use of augers, coring equipment, and hand tools.	Hand tools shall be inspected daily and before each use. Tools that are damaged shall be removed from service. Personnel shall work in a manner and at a pace to reduce strains and overexertion. If power tools are used, personnel shall not wear loose fitting clothing or jewelry. Noise monitoring shall be conducted, as necessary, to determine whether hearing protection is required. Work gloves shall be worn to prevent pinches and abrasions. Safety glasses or goggles shall be worn to prevent eye injury.
	Physical Hazards: Slip, trips, and falls over tools, vegetation, or uneven surfaces.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. General housekeeping practices will be implemented to keep tools and supplies out of foot-traffic areas. Site personnel shall conduct sampling activities in groups of two.
	Biological Hazards: Poisonous plants, insects, or snakes.	Personnel will review recognition of poisonous plants, insects, or snakes typical of this area and use appropriate measures as required.
	Inclement Weather: Snow, ice, lightning, heavy rain.	If present, ice, snow, and mud will be cleared from foot-traffic areas to reduce slip hazards. No work shall be conducted outside during periods of lightning, high winds, or heavy precipitation. Personnel shall review and understand emergency procedures for severe weather.
	Heat/Cold Stress.	Workers shall be briefed and cognizant of heat and cold stress symptoms. Fluids will be available to workers. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Foot Injury.	Safety shoes/boots meeting ANSI specifications are required. Muddy areas must be entered with care as buried objects may pose tripping and/or puncture hazards.
	Chemical Hazards.	Material Safety Data Sheets shall accompany all chemicals brought onsite. Unidentified or suspect containers encountered in the work areas shall be avoided. Appropriate PPE shall be worn when working with chemicals or chemical contaminants to minimize exposure. Respirators may be used in situations where friable material is disturbed or where a high concentration of dust is present.

Task 3: Soil/Sediment Sampling (continued)

Task Or Step	Hazards	Controls
Sample Collection	Sun Burn.	Sun block will be used as appropriate. Direct exposure to sun for long periods of time will be avoided.
	Vehicle Traffic.	Work areas will be clearly barricaded and appropriate signs displayed. Traffic will be rerouted as necessary. Persons working near roadways or directing traffic will wear high-visibility vests.
	Radiation Hazards.	Personnel shall be trained in general radiation protection requirements. Personnel shall abide by site-specific radiological control practices and PPE requirements specified in the Radiation Work Permit. Personnel, sample containers, and equipment leaving the controlled zone will be surveyed to ensure that radiological contamination levels are not exceeded. Air monitoring will be conducted during sample collection to measure airborne contaminants and ensure the adequacy of PPE.
	Poor Visibility.	Sufficient illumination shall be maintained in the work areas.
	Housekeeping.	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and free of trash.
	Electrical Hazards.	Extension cords will be properly rated for intended use. Ladders will be kept at least 10 ft from overhead electric lines. Qualified electricians will make all electrical installations. A lockout/tagout program will be used for equipment maintenance or when work around open circuits is necessary.

APPENDIX E
DAILY SAFETY MEETING FORM

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

DAILY SAFETY TOOLBOX MEETING

Project Name:		Project #:
Location:		Date/Time:
General Scope of Work:		
Emergency Telephone Numbers		
Police:	Fire:	Ambulance:
Other (UXO, Facility, etc.):		
Name:	Phone #:	
Name:	Phone #:	
Name:	Phone #:	
Days Work Tasks		
Task 1:		Task 2:
Task 3:		Task 4:
Task 5:		Task 6:
Training Requirements:		
SAFETY AND HEALTH INFORMATION		
Job Safety Analysis completed for this work?	[ ] Yes	[ ] No
Permits Required:	Confined Space [ ] Yes[ ]No; # _____	
Radiation Hazards:		
Chemical Hazards (Include marking paint, decon agents, etc.):		
Physical Hazards:		
Work Control Methods (JHA, Work Plan, monitoring, etc.):		
PPE:		
Special Equipment (Global Positioning Systems (GPS), etc.):		
Types of Communications:		
Special Topics:		

Lessons Learned from Previous Day:
Questions & Feedback from Attendees:

Meeting Conducted by	Print Name	Sign Name	Company
Cabrera Field Lead:			
Radiological Lead:			
Safety and Health Rep.			

MEETING ATTENDEES		
Print Name	**Signature**	**Company**

APPENDIX F
TRAINING ACKNOWLEDGEMENT FORM

GREAT KILLS PARK REMOVAL AND DISPOSAL
SITE SAFETY AND HEALTH PLAN

Great Kills Park
Staten Island, New York

I acknowledge that I have read the *Great Kills Park Site Safety and Health Plan* and understand the material presented.

Printed Name	Signature	Training Date

INFORMATION ON RADIATION AT GREAT KILLS PARK , STATEN ISLAND, NEW YORK

This fact sheet includes information on the discovery, investigation, and removal of radioactive materials, in the form of radium, found below ground in areas of Great Kills Park. The purpose is to provide information on what was found, the potential health effects associated with this material, and what the National Park Service continues to do to make sure the Park remains a safe place for NPS staff, Park visitors, and the environment. Additional information and updates will be provided as they become available and as more work is planned.

What is Radium?

Radium is a naturally occurring element that is radioactive. It is constantly formed by the decay of two elements, uranium and thorium, which exist naturally in rock and soil. The amount of a radioactive element reduces naturally by the decay process, measured as the length of time it takes for half of the quantity to decay, also known as a "half-life". Radium's half-life is quite long (on the order of 1,600 years). During the radium decay process, radiation is released as x- and gamma rays as well as alpha and beta particles.

Naturally-occurring radium is found in very low levels in soil and rock throughout the environment. Small quantities of naturally-occurring radium are also present in building materials such as granite, cement, and clay brick. Radium can be taken up by plants and can also be found in groundwater. The human body contains traces of radium associated with naturally-occurring uranium which may be present in the foods we eat.

In the United States, we are exposed to many sources of radiation every day. On average, we each receive a radiation dose of approximately 1 millirem per day (a unit of measure for radiation dose) from naturally-occurring radioactive elements in our bodies and the environment, from cosmic (sun) rays, as well as from man-made exposures, primarily from medical diagnosis (like x-rays) and treatment. On average, radiation from natural sources is responsible for about eighty percent of the radiation U.S. residents receive annually.

Can Radium be Harmful?

Radium has been responsible for causing cancer in workers who painted watch dial faces. They wetted their paint brush tips by mouth to make a fine point to apply the paint. By doing so, they ingested small amounts of radium. A potentially harmful decay product from radium is radon gas, which is known to cause lung cancer in uranium miners, and can become concentrated in homes in certain areas of the country. The use of radium sources for beneficial medical treatment is no longer considered safe because of their tendency to leak. In fact, improper handling and disposal of radium sources can be harmful to the public. This is why the Park Service is restricting access to portions of Great Kills Park.

How Did Radium End up at Great Kills?

Great Kills Park is partially built on "made" land brought to the site in the 1940s to fill low-lying areas. Sand and sediment dredged from the nearby waters were brought in, and then topped with sanitary landfill material and incinerator ash transported from elsewhere in New York City. All of this fill material was then covered with topsoil. It is believed that the radium came from discarded medical treatment sources that were included in the sanitary fill material brought to the site in the 1940s. Radium present in these items has probably leaked over time, resulting in contamination of soil directly surrounding the sources.

What is Being Done to Remove the Radium?

The sources of radium at Great Kills have been found buried more than a foot below the ground surface. Once they were identified, they were removed from the site for proper storage and disposal at an out-of-state facility. Plans are underway to identify, isolate, and remove any remaining sources of radium and soil around them. Radiation surveys of the Park are being conducted to establish the full extent of the radium in public areas of the Park.

Am I at Risk from Exposure to Radium at Great Kills?

There is a very low risk of significant exposure to radiation from buried radium sources under current conditions. Exposure, and ultimately risk, depends on the amount of time and how close you are to the actual source of the radiation. The soil that covers the radium sources in the Park acts as a natural shield, which greatly reduces the radiation levels at the surface. As an added precaution, these areas have been fenced off to ensure recreational users and Park employees are aware of them. Under current conditions, a Park employee or a visitor to the Park might receive a dose of a few millirem above background levels.

For perspective, that would be equivalent to taking several cross-country airplane flights. This level is low when compared to exposure levels currently allowable under various government regulations.

Where Can I Obtain More Information about Radium and Radiation?

Information about radiation and radium in general can be found from the following sources:

- Agency for Toxic Substances and Disease Registry (ATSDR)- http://www.atsdr.cdc.gov/tfacts144.html
- The National Institutes of Health (http://www.nih.gov/health/chip/od/radiation/)
- Argonne National Laboratory http://www.ead.anl.gov/pub/doc/NaturalDecaySeries.pdf,
- Health Physics Society http://hps.org/publicinformation/asktheexperts.cfm

If you have any questions or concerns about radiation in Great Kills Park, please contact
XXXXXXXXXXXXXX

Radium Chemical Co. Needles and Tubes (ca. 1940s - 1950s)

This velvet-lined black leatherette case contains example (dummy) radium needles and tubes of the type distributed by the Radium Chemical Company of New York City. It would have been used by a salesman to show a prospective buyer the various alternatives.

Needles were intended to be inserted directly into the diseased tissue, whereas tubes were used for intracavity therapy, or superficial therapy wherein they were placed on the surface of the body.

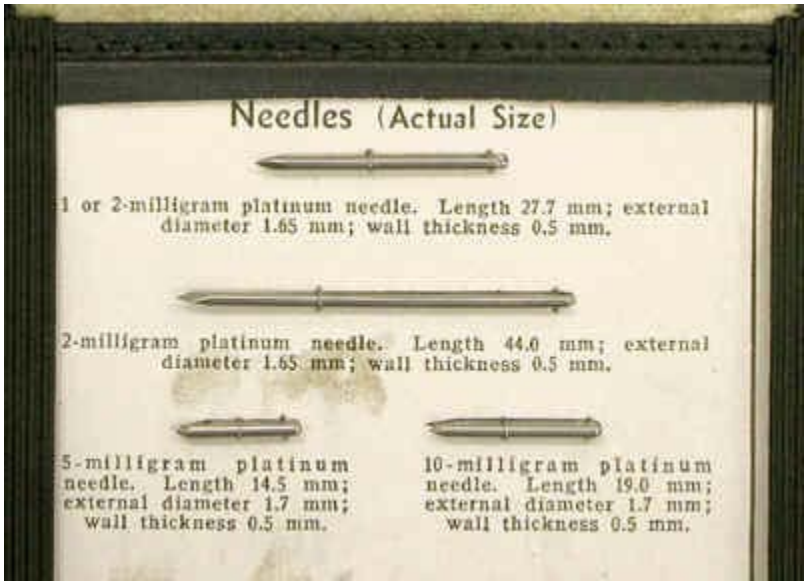
The text in the case is self explanatory. Note however that a reference to 1, 2, 5, 10 etc milligrams refers to the amount of radium-226 that the needle or tube was designed to hold. For what its worth, one milligram of Ra-226 is essentially the same as one millicurie of Ra-226. As a rule, approximately one milligram of radium was used per cc of irradiated tissue. The examples in this case are made of platinum and gold but other materials were also used, e.g., steel, and monel metal.

Needles and tubes were either "American Type" or "European Type." With "American Type" needles and tubes, the radium was sealed directly inside. "European Type" needles and tubes, on the other hand, would hold smaller containers called cells in which the radium was sealed. If damaged, the American type devices were more likely to leak, but they could hold more radium than a European type device of the same outer dimensions.

Needles

These are "American Type" needles.

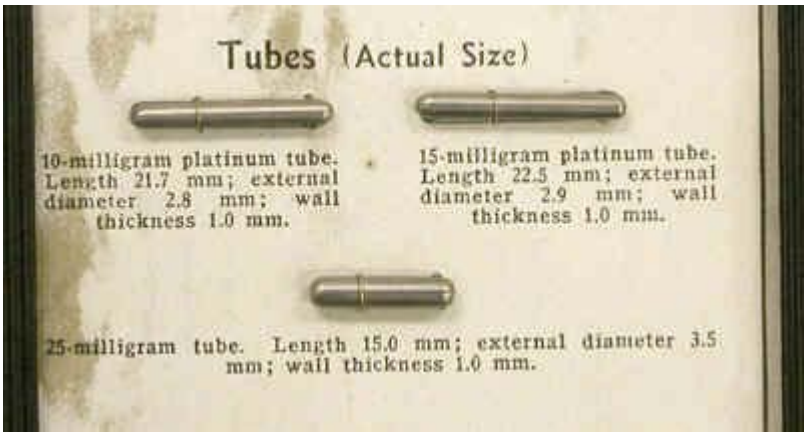
Although it is difficult to see, the top two needles in the photo to the right have Trocar points (three flat sides). The bottom two needles have conical points.



The eyelets for the thread in the top two needles are standard Rainure eyelets (the hole is at the bottom end of a groove). The bottom two needles use Bulldog eyelets (a simple hole drilled

through the end of the tube).

Tubes

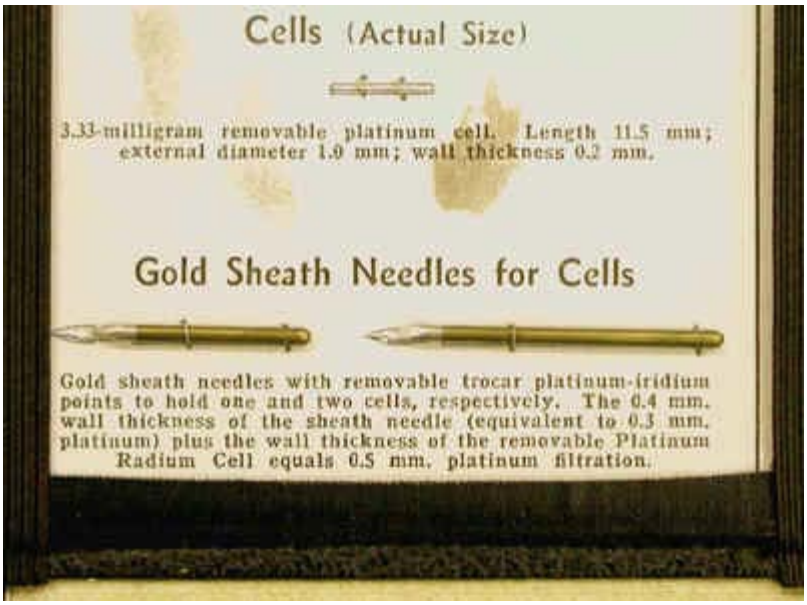


The tubes in the photo are "American Type."

Needles were somewhat more versatile than tubes, but as the text indicates, the tubes would hold more radium.

While it can't be seen in the photo, the top two tubes use standard Rainure eyelets while the bottom tube employs a bulldog eyelet .

Gold Sheath Needles



The two needles in the photo to the right are "European Type" needles which would contain one or more cells. Unfortunately, the cell in the display case is missing. If present, it would look like a solid metal wire or tube. It would not have a point or eyelet.

The trocar tips are identified as being "platinum-iridium." As a rule, this meant 90% platinum and 10% iridium.

They have bulldog eyelets.

Donated by a kind friend

References

R. Paterson. The Treatment of Malignant Disease by Radium and X-rays. Edward Arnold & Co. London. 1948.

Union Miniere du Haut Katanga Radium Department. Radium. Brussels. No date. ca. 1928-1930.

X-Ray and Radium Industries Limited catalog. No date. ca. 1950s.