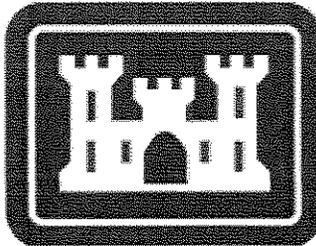


INTERIM RESPONSE ACTION REPORT  
RADIOLOGICAL MATERIAL REMOVAL AND  
DISPOSAL

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:*



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RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

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## LIST OF ACRONYMS AND ABBREVIATIONS

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

## 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 and 15 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 ( $^{226}\text{Ra}$ ). Radium is a naturally occurring radioactive material formed by the decay of uranium and thorium in the environment.  $^{226}\text{Ra}$  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 20<sup>th</sup> 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  $^{226}\text{Ra}$ .

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 20<sup>th</sup> 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 20<sup>th</sup> 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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**APPENDIX A**  
**Daily Quality Control Reports**



**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 Cuzzolino	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	QUANTITY (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.**

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**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		



## 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	QUANTITY (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. Lymeris (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 Servie), 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.**

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**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		



## 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	QUANTITY (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.**

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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**

	<b>Name of Person</b>	<b>Reported To</b>	<b>Incident Description</b>
<b>First Aid</b>	None		
<b>OSHA Recordable</b>	None		
<b>Vehicle Accident</b>	None		
<b>Lost Time</b>	None		



## 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	QUANTITY (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.**

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**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		



## 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	QUANTITY (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.

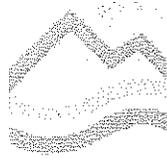
**13. CONSTRUCTION QUALITY CONTROL INSPECTIONS.**

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**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	QUANTITY (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 begin 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 bieron. 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.**

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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		



## 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:**

1 of 3

Great Kills Removal Action.

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	QUANTITY (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.**

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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		



**APPENDIX B**  
**Waste Shipment Documents**

**AR 0000461**

NRC FORM 540

**UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER**  
 (INCLUDE AREA CODE)

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

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

3. SHIPPER: NAME AND FACILITY (SHIPMENT #)  
 T-KY003-109 N/A

4. SHIPPER: NAME AND FACILITY (SHIPMENT #)  
 Janet Baker  
 R & R Trucking  
 PO Box 545  
 Duenweg, MO 64841

5. SHIPPER: NAME AND FACILITY (SHIPMENT #)  
 Don Richey

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

7. CARRIER NAME AND ADDRESS (SHIPMENT #)  
 Don Richey

8. CARRIER NAME AND ADDRESS (SHIPMENT #)  
 Don Richey

9. CARRIER NAME AND ADDRESS (SHIPMENT #)  
 Don Richey

10. CARRIER NAME AND ADDRESS (SHIPMENT #)  
 Don Richey

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)  
 Radioactive material, low specific activity (LSA-II),  
 7, UN3321  
 One steel drum with soil for survey and disposal  
 Non DOT Regulated Material  
 One steel drum with soil for disposal  
 Non DOT Regulated Material  
 One steel drum with soil for disposal

12. DOT LABEL  
 NA

13. TRANSPORT INDEX  
 NA

14. PHYSICAL AND CHEMICAL FORM  
 Solid/Oxide

15. INDIVIDUAL  
 Ra-226

16. TOTAL PACKAGE ACTIVITY IN MBq  
 3.70E+02

17. LS/SCO CLASS  
 LSA-II

18. TOTAL WEIGHT OR VOLUME IN LBS OR M<sup>3</sup>  
 0.212

19. ID NUMBER OF PACKAGE  
 TO-SL-E-09-341

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.

21. SIGNATURE  
 Don Richey

22. TITLE  
 Don Richey

23. DATE  
 4/15/09

24. DATE  
 4/15/09

25. DATE  
 4/15/09

26. DATE  
 4/15/09

27. DATE  
 4/15/09

28. DATE  
 4/15/09

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST  
 [X] YES  
 [ ] NO

4. ORGANIZATION  
 Chemtrec

5. WSDS #  
 CHEN01RAD

6. EPA MANIFEST NUMBER  
 NA

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NET WASTE VOL. (L)	0.636	NET WASTE WEIGHT (kg)	952.5	SPECIAL NUCLEAR MATERIAL (grams)	U-233 NP, U-235 NP, Pu NP	TOTAL	NP
NUMBER OF PACKAGES	3	ACTIVITY (MBq/mCi)					
		ALL NUCLIDES	TRITIUM	C-14	Te-99		
		3.70E+02 MBq	NP	NP	NP		
		1.00E+01 mCi					

4. SHIPPER NAME	Chesse Env. Group
SHIPPER ID NUMBER	N/A
PAGE	1 OF 1 PAGE(S)

5. CONTAINER IDENTIFICATION NUMBER/GENERATOR NUMBER	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m <sup>3</sup> )	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL (μSv/h)		10. SURFACE CONTAMINATION (MBq/100 cm <sup>2</sup> )	11. WASTE DESCRIPTION		12. PHYSICAL DESCRIPTION		13. CHEMICAL DESCRIPTION		14. RADIOLOGICAL DESCRIPTION		15. WASTE CLASS
				ALPHA	BETA-GAMMA		17. ADSORBENT	18. SOLIDIFICATION	19. CHEMICAL FORM / CHELATING AGENT	20. WEIGHT % CHELATING AGENT	21. RADIOLOGICAL DESCRIPTION	22. CHEMICAL FORM / CHELATING AGENT	23. WEIGHT % CHELATING AGENT	24. RADIOLOGICAL DESCRIPTION	
TO-SL-E-09-341/0685	4	0.212	317.5	<3.67E-6	<3.67E-5	<3.67E-6	22	0.212	100	Oxide/NP	NP	NP	3.70E+02	1.00E+01	NA
TO-SL-E-09-342/0685	4	0.212	317.5	<3.67E-6	<3.67E-5	<3.67E-6	22	0.212	100	Oxide/NP	NP	NP	3.70E+02	1.00E+01	NA
TO-SL-E-09-343/0685	4	0.212	317.5	<3.67E-6	<3.67E-5	<3.67E-6	22	0.212	100	Oxide/NP	NP	NP	3.70E+02	1.00E+01	NA

NOTE 1: Container Description Codes. For containers/units requiring disposal in approved packaging containers, the numerical code must be followed by "DP".		NOTE 2: Waste Description Codes. (Check up to three which pertain to the waste.)		NOTE 3: For solidification methods, the waste (parent/daughter) and form must be identified in Item 13. Code 100 is NONE REQUIRED.	
1. Wooden Box or Crate	9. Drum/Canister	20. Chemical	28. Spent/Spill Remediation/Spill	80. Fluo	80. Fluo
2. Metal Box	10. Gas Cylinder	21. Inorganic Ash	30. Concrete for Exchange Media	81. Fluo X	81. Fluo X
3. Plastic Drum or Pail	11. Bulk Unpackaged Waste	22. Bell	31. Air or Ion Exchange Media	82. Other	82. Other
4. Metal Drum or Pail	12. High Integrity Container	23. Gas	32. Waste for Exchange Media	83. Other	83. Other
5. High Integrity Container	13. Other	24. Oil	33. Waste for Exchange Media	84. Other	84. Other
6. Other	14. High Integrity Container	25. Aqueous Liquid	34. Waste for Exchange Media	85. Other	85. Other
7. Other	15. High Integrity Container	26. Solid	35. Waste for Exchange Media	86. Other	86. Other
8. Other	16. High Integrity Container	27. Solid	36. Waste for Exchange Media	87. Other	87. Other
9. Other	17. High Integrity Container	28. Solid	37. Waste for Exchange Media	88. Other	88. Other
10. Other	18. High Integrity Container	29. Solid	38. Waste for Exchange Media	89. Other	89. Other
11. Other	19. High Integrity Container	30. Solid	39. Waste for Exchange Media	90. Other	90. Other
12. Other	20. High Integrity Container	31. Solid	40. Waste for Exchange Media	91. Other	91. Other
13. Other	21. High Integrity Container	32. Solid	41. Waste for Exchange Media	92. Other	92. Other
14. Other	22. High Integrity Container	33. Solid	42. Waste for Exchange Media	93. Other	93. Other
15. Other	23. High Integrity Container	34. Solid	43. Waste for Exchange Media	94. Other	94. Other
16. Other	24. High Integrity Container	35. Solid	44. Waste for Exchange Media	95. Other	95. Other
17. Other	25. High Integrity Container	36. Solid	45. Waste for Exchange Media	96. Other	96. Other
18. Other	26. High Integrity Container	37. Solid	46. Waste for Exchange Media	97. Other	97. Other
19. Other	27. High Integrity Container	38. Solid	47. Waste for Exchange Media	98. Other	98. Other
20. Other	28. High Integrity Container	39. Solid	48. Waste for Exchange Media	99. Other	99. Other
21. Other	29. High Integrity Container	40. Solid	49. Waste for Exchange Media	100. Other	100. Other



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

AR 0000465

<b>NRC FORM 540</b> <b>UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST</b> SHIPPING PAPER		<b>5. SHIPPER NAME AND FACILITY</b> Chase Environmental Group, Inc. 11450 Watterson Court Louisville, KY 40299		<b>SHIPPER ID #</b> N/A X COLLECTOR PROCESSOR		<b>7. NRC FORM 560 AND 574</b> NRC FORM 560 AND 574 NRC FORM 562 AND 572 ADDITIONAL INFORMATION		<b>PAGE 1</b> OF <b>1</b> PAGE(S) OF <b>1</b> PAGE(S) (None PAGE(S))		<b>8. Manifest Number</b> (Use this number on all continuation pages) TO-2009-013													
<b>1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)</b> 800-424-9300		<b>6. CARRIER NAME AND ADDRESS</b> Janet Baker R & R Trucking PO Box 545 Duennweg, MO 64841		<b>SHIPMENT #</b> N/A		<b>9. CONSIGNEE NAME AND FACILITY ADDRESS</b> Toxco, Inc. 109 Flint Road Oak Ridge, TN 37830		<b>CONTACT</b> RICK LOW Telephone Number (include area code) 865-482-5532		<b>Date</b>													
<b>ORGANIZATION</b> Chemtree		<b>WSDS #: CHEN01RAD</b>		<b>EPA ID #</b> MOR000501973		<b>10. Certification</b>		<b>DATE</b>															
<b>2. LISTING OR REGULATED WASTE NUMBER</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		<b>3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		<b>1. EPA MANIFEST NUMBER</b> NA		<b>11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION</b> (including proper shipping name, hazard class, UN ID number, and any additional information) Radioactive material, Type A package, 7, UN2915 Yellow-III		<b>12. DOT LABEL - RADIOACTIVE</b> Yellow-III		<b>13. TRANSPORT INDEX</b> Solid/Oxide		<b>14. PHYSICAL AND CHEMICAL FORM</b> Solid/Oxide		<b>15. INDIVIDUAL RADIOISOTOPES</b> Ra-226		<b>16. TOTAL PACKAGE ACTIVITY IN MBq</b> 4.81E+02		<b>17. I.S.A.S.C.O. CLASS</b> NA		<b>18. TOTAL WEIGHT OR VOLUME</b> 0.212 m <sup>3</sup>		<b>19. ID NUMBER OF PACKAGE</b> TO-TS-R-09-079	
<b>4. DOT EXPLANATION (MUST REQUIRE A MANIFEST ACCORDING TO 49CFR 171.15)</b> One steel drum with radium needles for Richland		<b>11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION</b> (including proper shipping name, hazard class, UN ID number, and any additional information)		<b>12. DOT LABEL - RADIOACTIVE</b>		<b>13. TRANSPORT INDEX</b>		<b>14. PHYSICAL AND CHEMICAL FORM</b>		<b>15. INDIVIDUAL RADIOISOTOPES</b>		<b>16. TOTAL PACKAGE ACTIVITY IN MBq</b>		<b>17. I.S.A.S.C.O. CLASS</b>		<b>18. TOTAL WEIGHT OR VOLUME</b>		<b>19. ID NUMBER OF PACKAGE</b>					
<b>20. Generator Certification Statement:</b> 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)



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 WEIGHT lb	SPECIAL NUCLEAR MATERIAL (grams)	TOTAL	TO-2009-013	PAGE 1 OF 4 PAGE(S)	SHIPPER ID NUMBER
1	0.212		U-233 NP	U-235 NP	PU NP		Chase Env. Group
ALL NUCLIDES				TRITIUM	NP	NP	N/A
ACTIVITY (MBd/mCi)				C-14	NP	NP	
4.81E+02 MBq				Ts-99	NP	NP	
1.30E+01 mCi				I-129	NP	NP	

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, US/HR msv/hr	10. SURFACE CONTAMINATION MBq/100 cm2			11. WASTE DESCRIPTION (See Note 2)	12. APPROXIMATE WASTE VOLUME IN CONTAINER (m3)	13. SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION			15. RADIOLOGICAL DESCRIPTION			16. WASTE CLASS		
					ALPHA	BETA	GAMMA				CHEMICAL FORM / CHEMICAL AGENT	WEIGHT % CHEMICAL AGENT IF > 0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIOACTIVE PRESENT	RA-226	MBq	mCi		CLASS	
TO-TS-R-09-079/0685	4	0.212					<3.67E-6		36	100	Oxide/NP	NP	Nuclide	4.81E+02	1.30E+01	NA			
Package total														4.81E+02	1.30E+01				

NOTE 1: Container Description Codes. For classification codes requiring approval to proceed structural overpack, the numerical code must be followed by "OP".

NOTE 2: Waste Description Codes. (Choose up to three which preclude by volume.)

NOTE 3: For solidification media that must be placed in approved stability requirements, the numerical code must be followed by "S". For all solidification media, the vendor (manufacturer) and brand name must be identified in Item 13. Code 100 = NONE REQUIRED.

1. Wooden Box or Cradle  
2. Metal Box  
3. Plastic Drum or Pail  
4. Metal Drum or Pail  
5. Metal Tank or Liner  
6. Metal Tank or Liner  
7. Polyethylene Tank or Liner  
8. Polyethylene Tank or Liner  
9. Paper Container  
10. Gas Cylinder  
11. Bulk Unpackaged Waste  
12. Unpackaged Composites  
13. High Integrity Container  
14. Other, describe in Item 8, or additional page

30. Other  
31. Activated Carbon  
32. Soil  
33. Gas  
34. CS  
35. Aqueous Liquid  
36. Fine Solids  
37. Miscellaneous  
38. Cement  
39. Cement (Encapsulated)  
40. Other (Encapsulated)  
41. Other (Encapsulated)  
42. Other (Encapsulated)  
43. Other (Encapsulated)  
44. Other (Encapsulated)  
45. Other (Encapsulated)  
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91. Other (Encapsulated)  
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93. Other (Encapsulated)  
94. Other (Encapsulated)  
95. Other (Encapsulated)  
96. Other (Encapsulated)  
97. Other (Encapsulated)  
98. Other (Encapsulated)  
99. Other (Encapsulated)  
100. None Required

90. Other  
91. Other  
92. Other  
93. Other  
94. Other  
95. Other  
96. Other  
97. Other  
98. Other  
99. Other  
100. None Required

UNIFORM LOW-LEVEL RADIOACTIVE  
WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

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

SHIPPER USE ONLY											2. MANIFEST NUMBER					
1. NAME Chase Environmental Group, Inc.											TO-2009-013					
IDENTIFICATION NUMBER T-KY003-L09											PAGE 1 OF 1 PAGE(S)					
SHIPPING DATE 1/17/2009																
4. GENERATOR IDENTIFICATION NUMBER	5. GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7. PREPROCESSED WASTE (ON MATERIAL) VOLUME (m <sup>3</sup> )	8. MANIFEST NUMBER UNDER WHICH WASTE (as material) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE	10. ORIGINATING COMPACT OR STATE	11. A. SOURCE MATERIAL (kg)	B. SNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m <sup>3</sup> )	AS PROCESSED/COLLECTED TOTAL					
0685	Gateway 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	0.00E+00	0.000	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

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).

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

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

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)

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<sup>3</sup> 80 mCi

F. Calculate the permit fee due using the enclosed fee schedule and enter amount of fee enclosed. \$ 424<sup>00</sup>

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/wsl/wac/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 use 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  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. <u>FUEL CYCLE</u>               |     | 4. <u>INDUSTRIAL</u>             |     |
| a. NUCLEAR POWER REACTOR           | ( ) | a. RESEARCH & DEVELOPMENT        | ( ) |
| b. REACTOR FUEL PRODUCTION         | ( ) | b. MANUFACTURING                 | ( ) |
| c. OTHER (NON-REACTOR)             | ( ) | c. NUCLEAR PHARMACY              | ( ) |
|                                    |     | d. WASTE BROKER                  | ( ) |
|                                    |     | e. OTHER                         | ( ) |
| 2. <u>MEDICAL</u>                  |     | 5. <u>ACADEMIC (NON-MEDICAL)</u> |     |
| a. HOSPITAL/CLINIC                 | ( ) | a. RESEARCH                      | ( ) |
| b. RESEARCH                        | ( ) | b. LABORATORY                    | ( ) |
| c. LABORATORY                      | ( ) | c. REACTOR                       | ( ) |
| d. OTHER                           | ( ) | d. OTHER                         | ( ) |
| 3. <u>GOVERNMENT (NON-MEDICAL)</u> |     |                                  |     |
| a. MILITARY                        | ( ) |                                  |     |
| b. RESEARCH                        | ( ) |                                  |     |
| c. REGULATORY                      | ( ) |                                  |     |
| d. OTHER                           | (X) |                                  |     |

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 [dih461@ecv.wa.gov](mailto:dih461@ecv.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.

AR 0000471



UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS

NET WASTE VOL. (gals)	NET WASTE WEIGHT (lb)	SPECIAL NUCLEAR MATERIAL (grams)	
0.088	0.042	U-233 NP	U-235 NP
ACTIVITY (MBq/mCi)		TOTAL	
TRITIUM C-14		U-233 NP	U-235 NP
NP		NP	

2. MANIFEST NUMBER: TO-2009-013

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME: Chase Env. Group

SHIPPER ID NUMBER: N/A

5. CONTAINER IDENTIFICATION NUMBER/GENERATOR NUMBER	6. CONTAINER DESCRIPTION (See item 1)	7. VOLUME (m <sup>3</sup> )	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL		10. SURFACE CONTAMINATION (MBq/100 cm <sup>2</sup> )	11. WASTE DESCRIPTION			12. CHEMICAL DESCRIPTION			13. WASTE CLASS		
				ALPHA	BETA-GAMMA		11. WASTE DESCRIPTION (See item 2)	12. SOLVENT	13. CHEMICAL FORM / CHELATING AGENT	14. WASTE TYPE (F, S, L, H, P)	15. RADIOLOGICAL DESCRIPTION				
TO-TS-R-09-079/0685	4	0.212	35	<3.67E-6	<3.67E-5		36	0.212	100	Oxide/NP	NP	Nuclide Ra-226	4.81E+02	1.30E+01	NA
										Package total			4.81E+02	1.30E+01	

NOTE 1: Container Description Codes. For containers with multiple codes, the codes must be followed by "or".

NOTE 2: Waste Disposition Codes. (Choose up to three when production by volume.)

1. Unleaded Gas or Gas	16. Demolition	31. Spent Oil	46. Fibers	61. Other	76. Other	91. Other
2. Lead Box	17. Solid	32. Carbon Ion Exchange Resin	37. Filter Media	62. HI DRI	77. Chemical Sludge	92. Other
3. Plastic Drum or Pail	18. Gas Cylinder	33. Mixed Bed Ion Exchange Resin	38. Activated Carbon	63. HI DRI	78. Chemical Sludge	93. Other
4. Metal Drum or Pail	19. High Pressure Gas Cylinder	34. Organic Liquid (except Oil)	39. Activated Material	64. Solidified Waste	79. Chemical Sludge	94. Other
5. Metal Tank or Drum	20. High Pressure Gas Cylinder	35. Organic Solid	40. Activated Material	65. Solidified Waste	80. Other	95. Other
6. Concrete Tank or Drum	21. High Pressure Gas Cylinder	36. Inorganic Solid	41. Activated Material	66. Solidified Waste	81. Other	96. Other
7. Polyethylene Tank or Drum	22. High Pressure Gas Cylinder	37. Other	42. Activated Material	67. Solidified Waste	82. Other	97. Other
8. Shipping Tank or Drum	23. High Pressure Gas Cylinder	38. Other	43. Activated Material	68. Solidified Waste	83. Other	98. Other
	24. High Pressure Gas Cylinder	39. Other	44. Activated Material	69. Solidified Waste	84. Other	99. Other
	25. High Pressure Gas Cylinder	40. Other	45. Activated Material	70. Solidified Waste	85. Other	100. Other

**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.<sup>1</sup>

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: ~~75 cubic feet~~ 0.38 m<sup>3</sup>

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

SIGNATURE:  DATED: 17 Jan 2009

**SECTION B:**

BROKER: \_\_\_\_\_  
(Company Name)

PERMIT NUMBER: \_\_\_\_\_

VOLUME OF WASTE IN THIS SHIPMENT: \_\_\_\_\_

BY: \_\_\_\_\_ TITLE: \_\_\_\_\_  
(Printed Name)

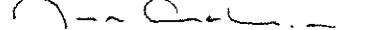
SIGNATURE: \_\_\_\_\_ DATED: \_\_\_\_\_

**SECTION C:**

CARRIER: R+R Trucking  
(Company Name)

VOLUME OF WASTE IN THIS SHIPMENT: 0.38 m<sup>3</sup>

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

SIGNATURE:  DATED: 1/17/09

DOH RHF-31D  
dated 3/01

<sup>1</sup> 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:emc@emc.com

PHONE (800) 562-6121  
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  
Manager  
Environmental Management & Controls, Inc.

AR 0000475



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 Guffey*

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 10/2010

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER

EMC  
3106 S Faith Home Road  
Turlock, Ca 95380  
FIRST RESIDENT NUMBER 8400  
SHIPMENT NUMBER 09-W-NZ

EMERGENCY TELEPHONE NUMBER (Include Area Code) 209-678-5782 nights  
OR Day phone 8-5 (209)667-1102

Thomas Gray & Associates  
3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST  
6 metal boxes  
4 metal drums

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT?  
YES  
NO  
Seal # 1204-1206 A

5. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)  
UN2915 Radioactive Material, Type A Package, 7 Seal #172158  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7  
UN2915 Radioactive Material, Type A Package, 7 Seal #172159  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7 Seal #172160  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7  
UN2915 Radioactive Material, Type A Package, 7 Seal #172161  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7  
UN3321 Radioactive Material, Low Specific Activity (LSA-II), 7

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

7. INCURRER - Name and Address  
US Ecology  
1/4 Mile West Area 200 East Area  
Richland, WA 99352

8. GENERATOR INFORMATION  
US Ecology  
1/4 Mile West Area 200 East Area  
Richland, WA 99352

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

10. SHIPPER INFORMATION  
EMC  
3106 S Faith Home Road  
Turlock, Ca 95380

11. MANIFEST NUMBER  
01974

12. DOT LABEL  
Yellow III

13. TOTAL PACKAGE ACTIVITY IN SHEETS  
580.52 (15.96) mCi  
249.380111 MBq (6.740003) mCi  
2960 (80) mCi  
2960 (80) mCi  
30754.71084 MBq (831.2084011) mCi  
45015.65928 MBq (1216.640821) mCi  
36394.47835 MBq (983.63455) mCi  
671.3058555 MBq (18.1434015) mCi  
95.11886 MBq (2.57078) mCi  
123.95 MBq (3.35) mCi

14. TOTAL WEIGHT OR VOLUME (GROSS) ID NUMBER  
510.7536  
1650.1968  
3538  
518.9184  
1144  
512.568  
1903.3056  
4196  
1944.1296  
4286  
1788.9984  
3844  
514.3824  
1134  
3531.7296  
7795  
2436.7392  
5372

15. INDIVIDUAL RADIONUCLIDES  
Ra226  
Ra226, Cs137, K685, Ni63, Pm147, Re187, Th232  
Ra226  
Ra226  
Ra226, Co57, Ge68, Th232  
Ra226, Re187, Th232, Pm147, K685, Co60, Cs137, Ge68  
Co67, Ge68, Ra226, Th232  
Ra226  
Ra226, Ra228  
Ra226, NaI Th

16. CHEMICAL FORM  
solid/oxides  
solid/oxides

17. LHAZARD CLASS  
n/a  
LSA-II  
n/a  
n/a  
LSA-II  
LSA-II  
n/a  
LSA-II  
n/a  
LSA-II  
LSA-II

18. DATE  
3-8-10  
3-8-10

19. AUTHORIZED SIGNATURE  
Gaye Neilson  
Gaye Neilson

20. DATE  
3-9-10

Received Date 3-9-10

April 21, 2009

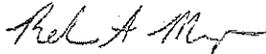
Mr. Wade Fillingame  
Cabrera Services, Inc.  
107 New Ridge Road  
Oak Ridge, TN 37830

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

**NRC FORM 340**

**UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER**

1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE) **800-424-9300**

2. ORGANIZATION **Chemtec**

3. WSDS #: **CHEMORAD**

4. EPA MANIFEST NUMBER **NA**

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

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

7. SHIPPER ID # **NA**

8. MANIFEST NUMBER (Use this number on all continuation pages)  
**TO-2009-091**

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

10. DATE **4/15/09**

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)  
**Radioactive material, low specific activity (LSA-II), 7, UN3321**

12. DOT LABEL **NA**

13. TRANSPORT INDEX **NA**

14. PHYSICAL AND CHEMICAL FORM **Solid/Oxide**

15. AUTHORIZED SIGNATURE **[Signature]**

16. TITLE **Technician**

17. DATE **4/15/09**

18. TOTAL WEIGHT OR VOLUME **0.212 m<sup>3</sup>**

19. ID# OF PACKAGE **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)

*809105*



**APPENDIX C**  
**Photographic Log**

**AR 0000481**

### 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 <sup>1/3</sup> drums total)
C-15	1/8/2009	APP-01	Waste soil in drum (1 <sup>1/3</sup> 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

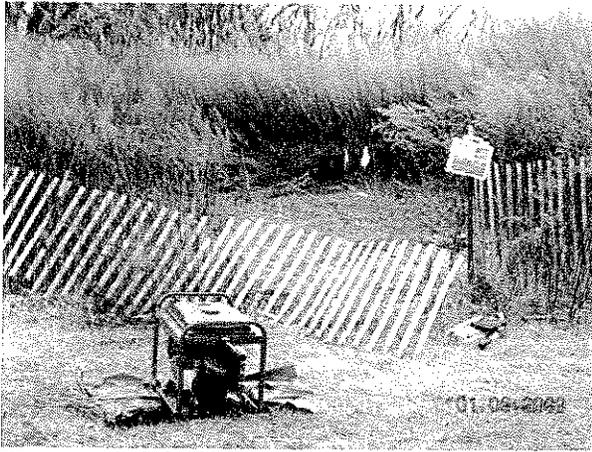
AR 0000482



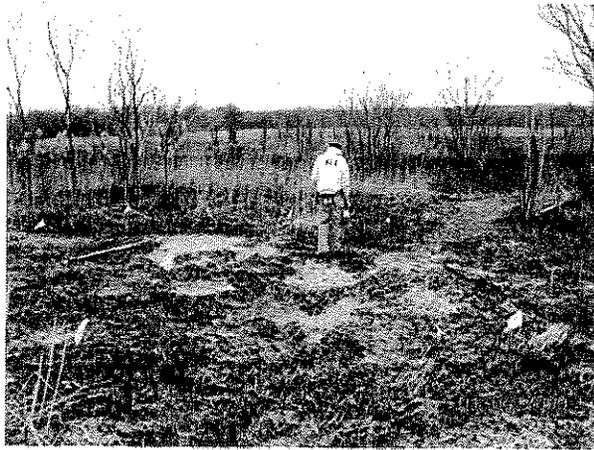
Photograph C-1. BBF-01 Pre-excavation



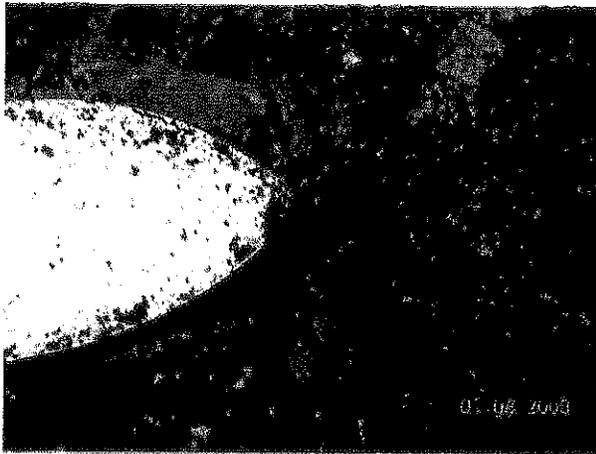
Photograph C-2. APP-01 Pre-excavation



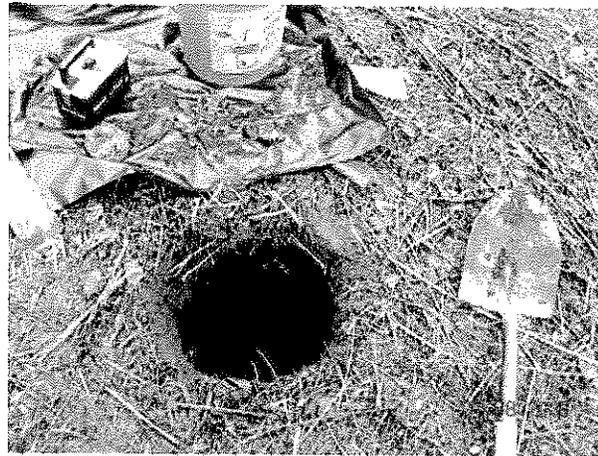
Photograph C-3. BBF-01 Pre-excavation Prep



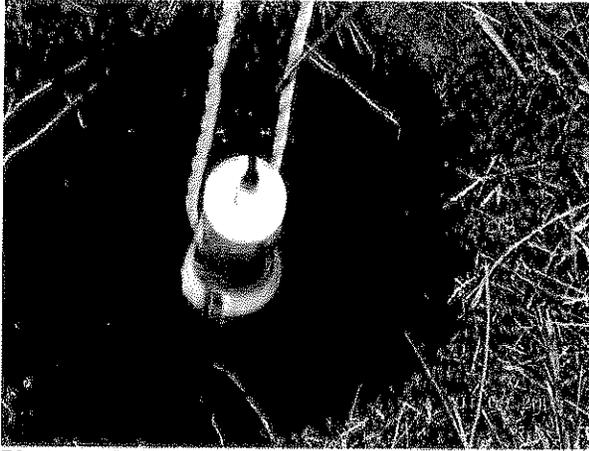
Photograph C-4. Burn Area Survey



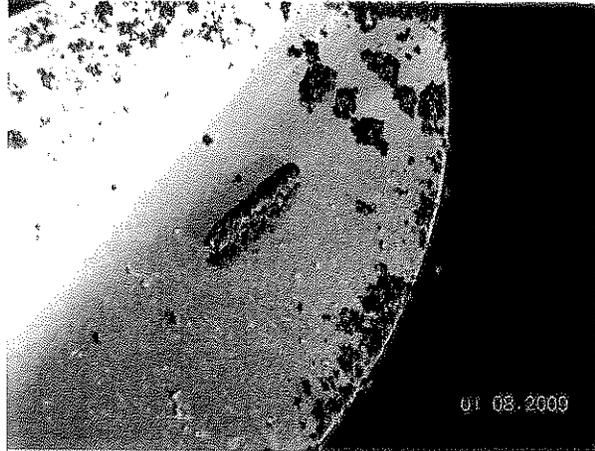
Photograph C-5. BBF-01 Source in soil



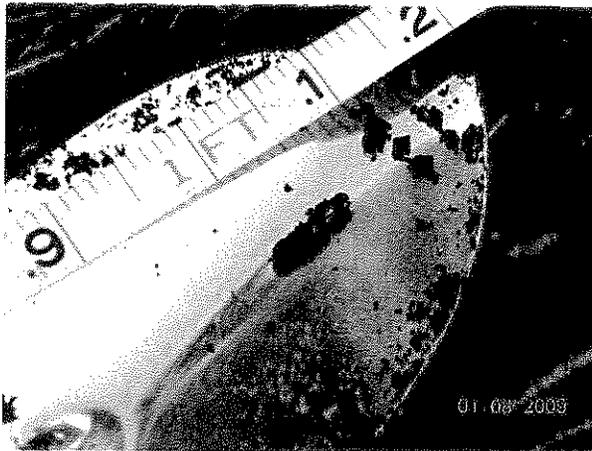
Photograph C-6. BBF-01 Excavation



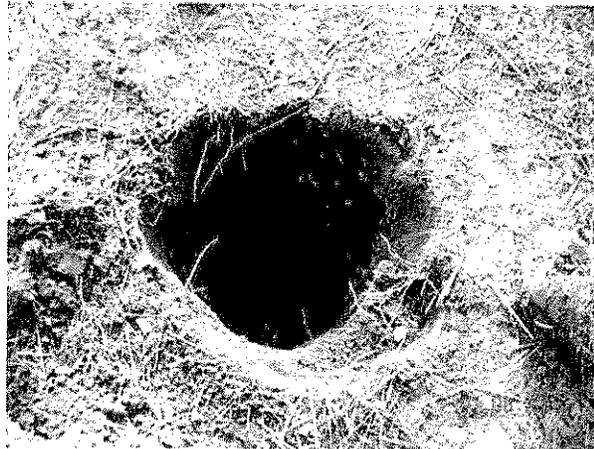
Photograph C-7. BBF-01 Excavation Survey



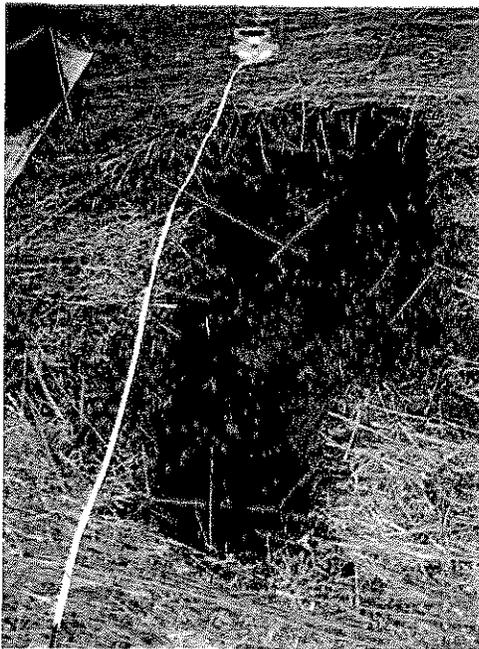
Photograph C-8. BBF-01 Radium Source (10 mCi)



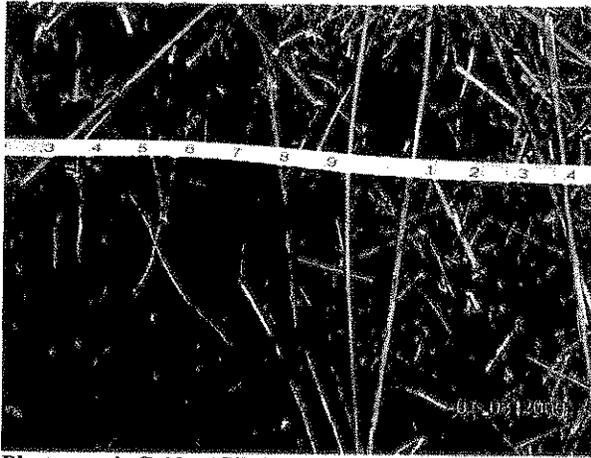
Photograph C-9. BBF-01 Radium Source (10 mCi)



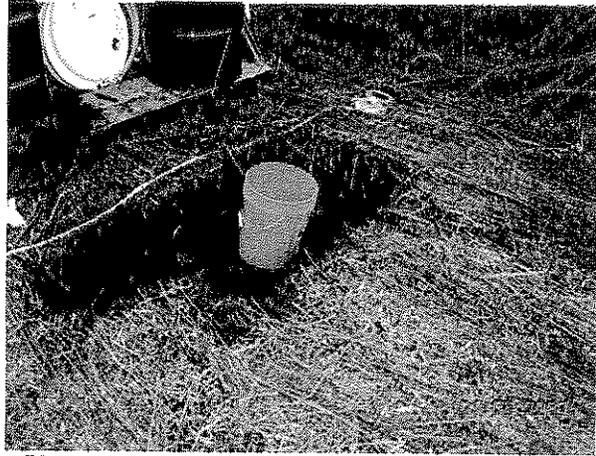
Photograph C-10. BBF-01 Final Excavation Extents



Photograph C-11. APP-01 Final Excavation Extents



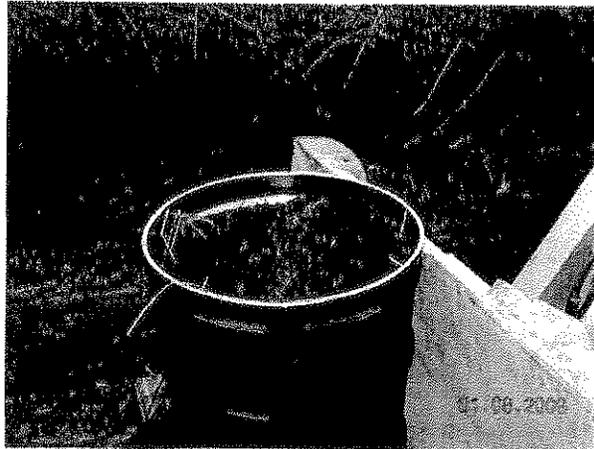
Photograph C-12. APP-01 Excavation length - 6ft



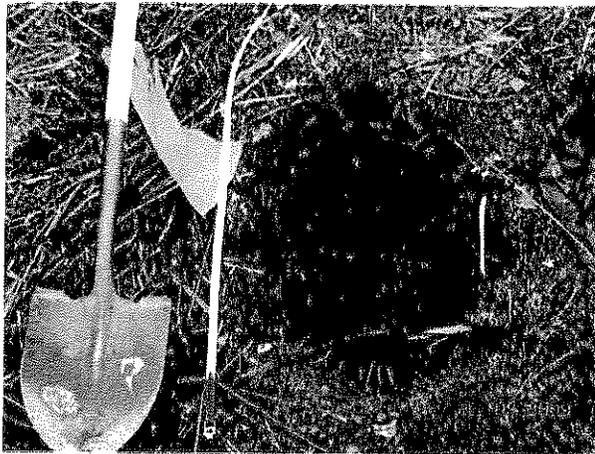
Photograph C-13. APP-01 Final Excavation Extents



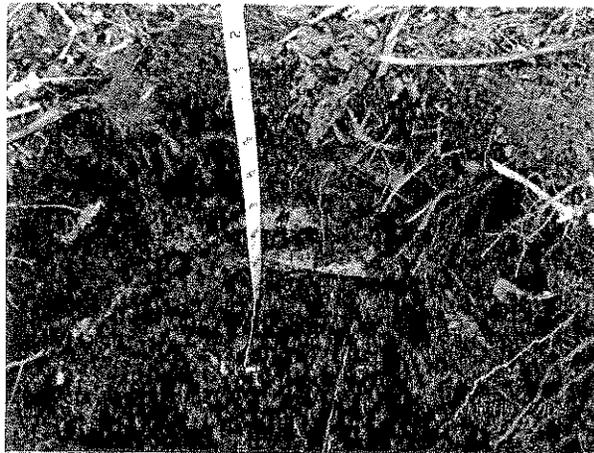
Photograph C-14. Soil in drum (1 1/3 drums total)



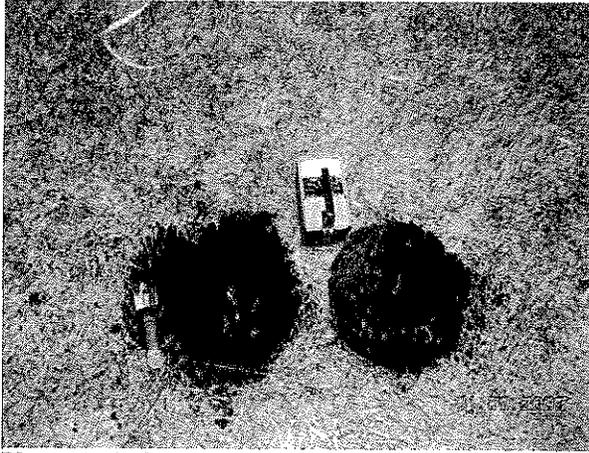
Photograph C-15. Soil in drum (1 1/3 drums total)



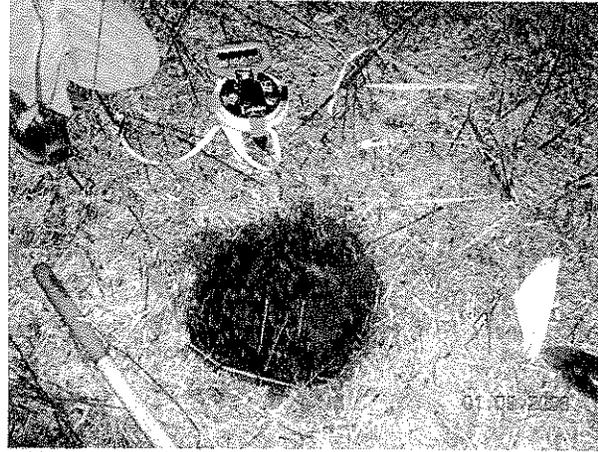
Photograph C-16. SLR-01 Final excavation extents



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



Photograph C-18. APF-01 Final excavation extents



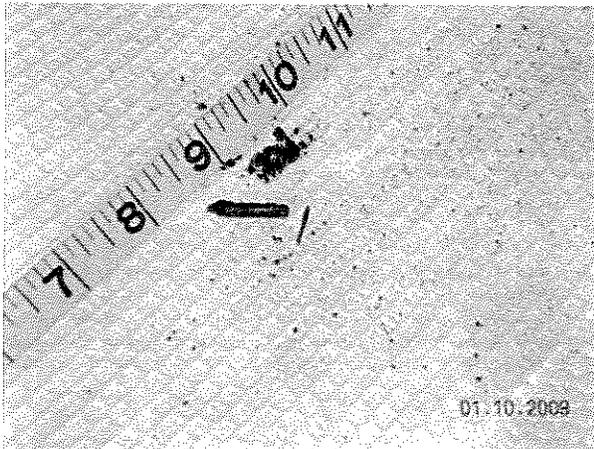
Photograph C-19. SLR-02 Final excavation extents



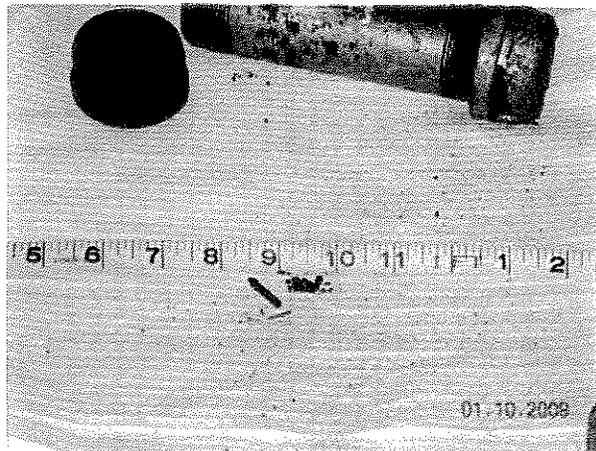
Photograph C-20. SLR-03 Final excavation extents



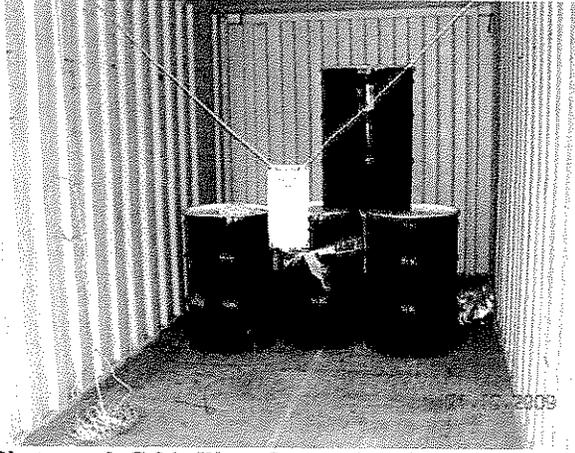
Photograph C-21. SLR-03 Final excavation extents



Photograph C-22. Radium Sources



Photograph C-23. Radium Sources



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



**APPENDIX D**  
**Post Excavation Gamma Walkover Survey Result Maps**

**AR 0000489**



**Legend**

**HOT SPOT LOCATION**

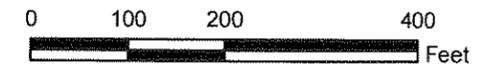
- ⊗ REMEDIATED
- ⊙ NO ACTION

**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 survey  
 CPM = Counts per minute

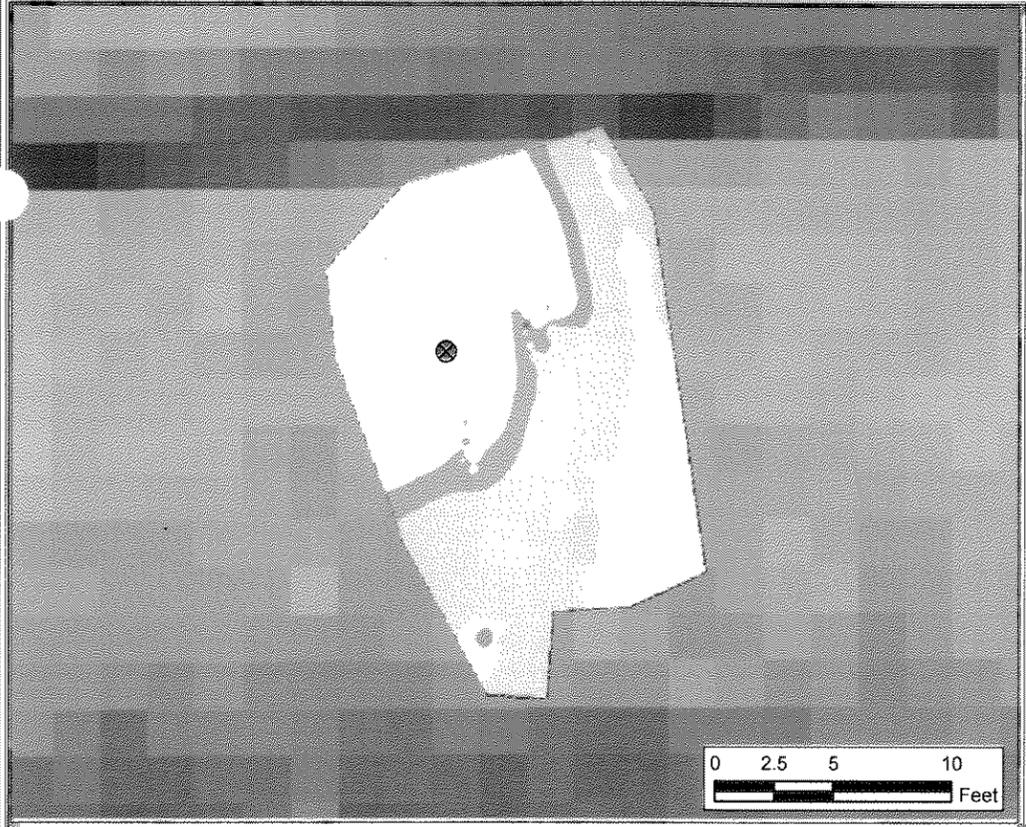


**APF-01  
 POST EXCAVATION  
 GAMMA WALKOVER SURVEY RESULTS**

**RADIOACTIVE MATERIAL REMOVAL  
 GREAT KILLS PARK  
 STATEN ISLAND, NEW YORK**

05/10	CABRERA Project No. 08-3800.07	FIGURE
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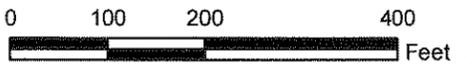
Cabrera Services  
 103 E. Mount Royal Ave.  
 Baltimore, MD 21202



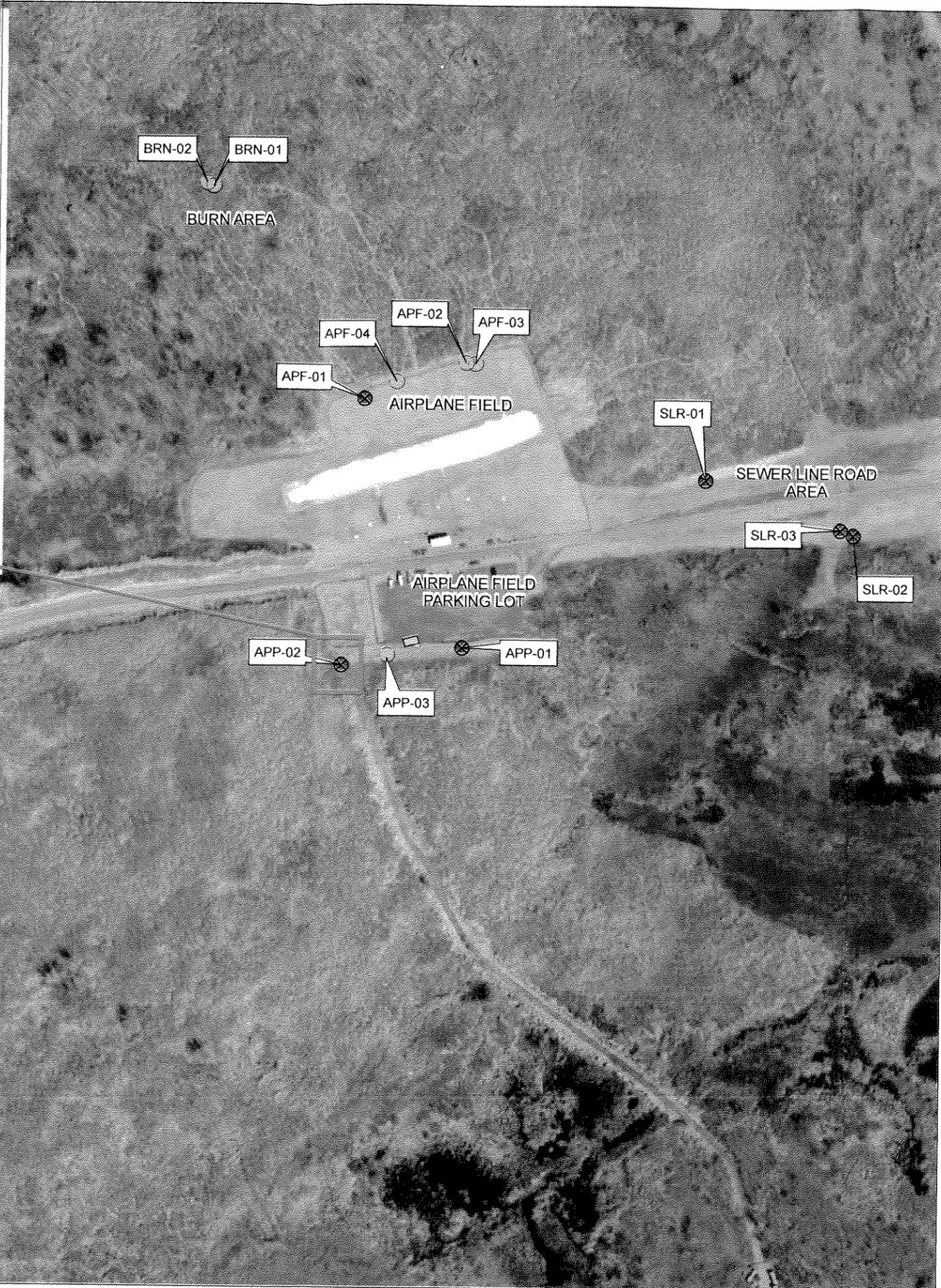
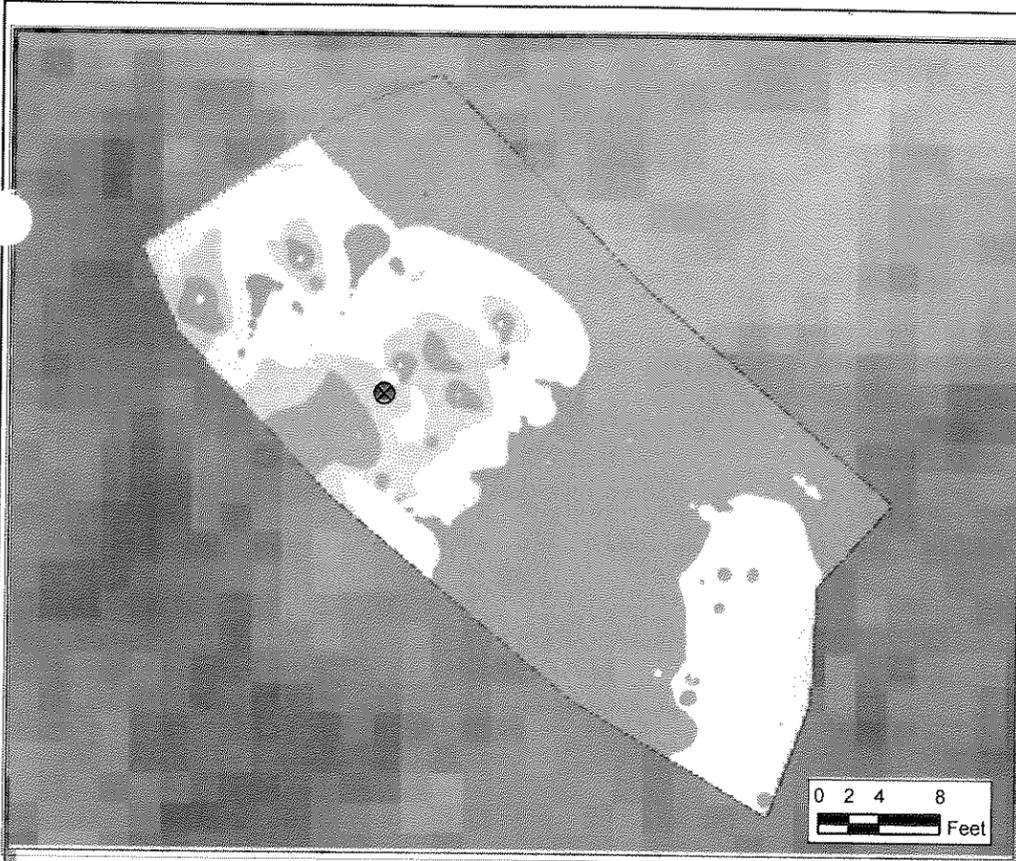
- Legend**
- HOT SPOT LOCATION**
- ⊗ REMEDIATED
  - NO ACTION

- 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



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	



**Legend**

**HOT SPOT LOCATION**

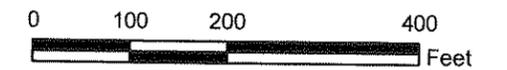
- ⊗ REMEDIATED
- NO ACTION

**POST EXCAVATION GWS**

**CPM**

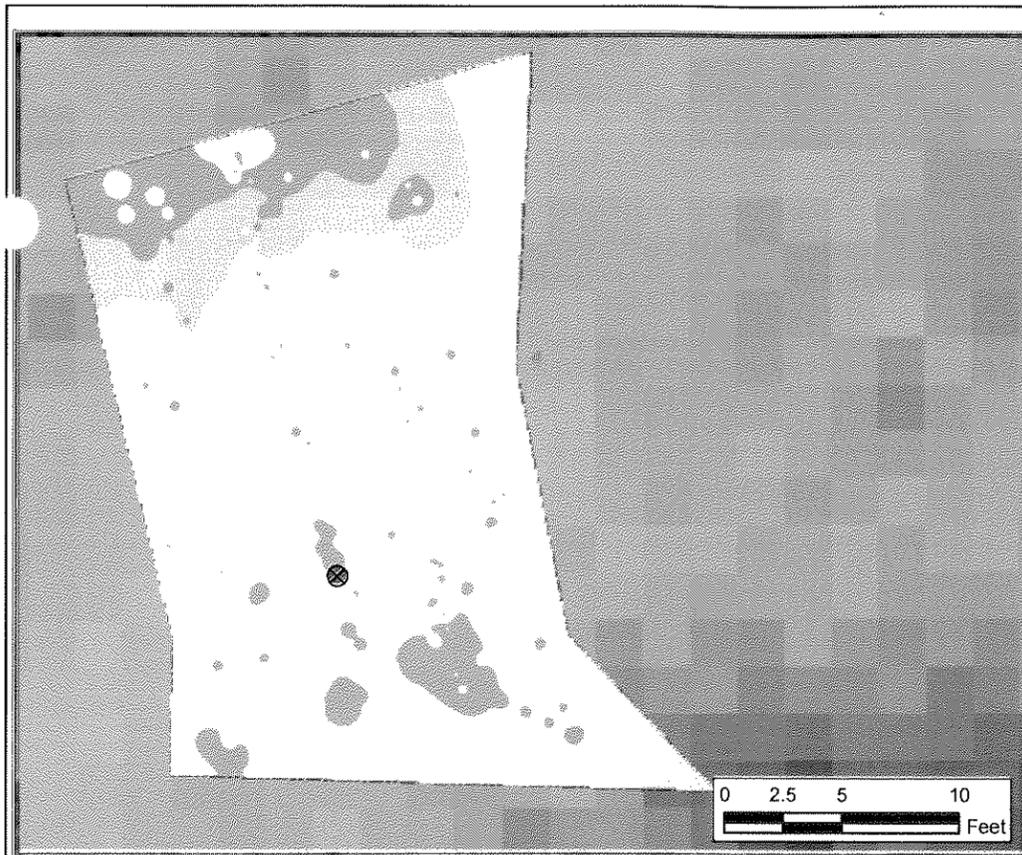
- 18,000 - 30,000
- 30,000 - 40,000
- 40,000 - 50,000
- 50,000 - 80,000
- 80,000 - 100,000

GWS = Gamma walkover survey  
 CPM = Counts per minute



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

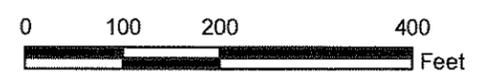
Cabrera Services  
 103 E. Mount Royal Ave.  
 Baltimore, MD 21202



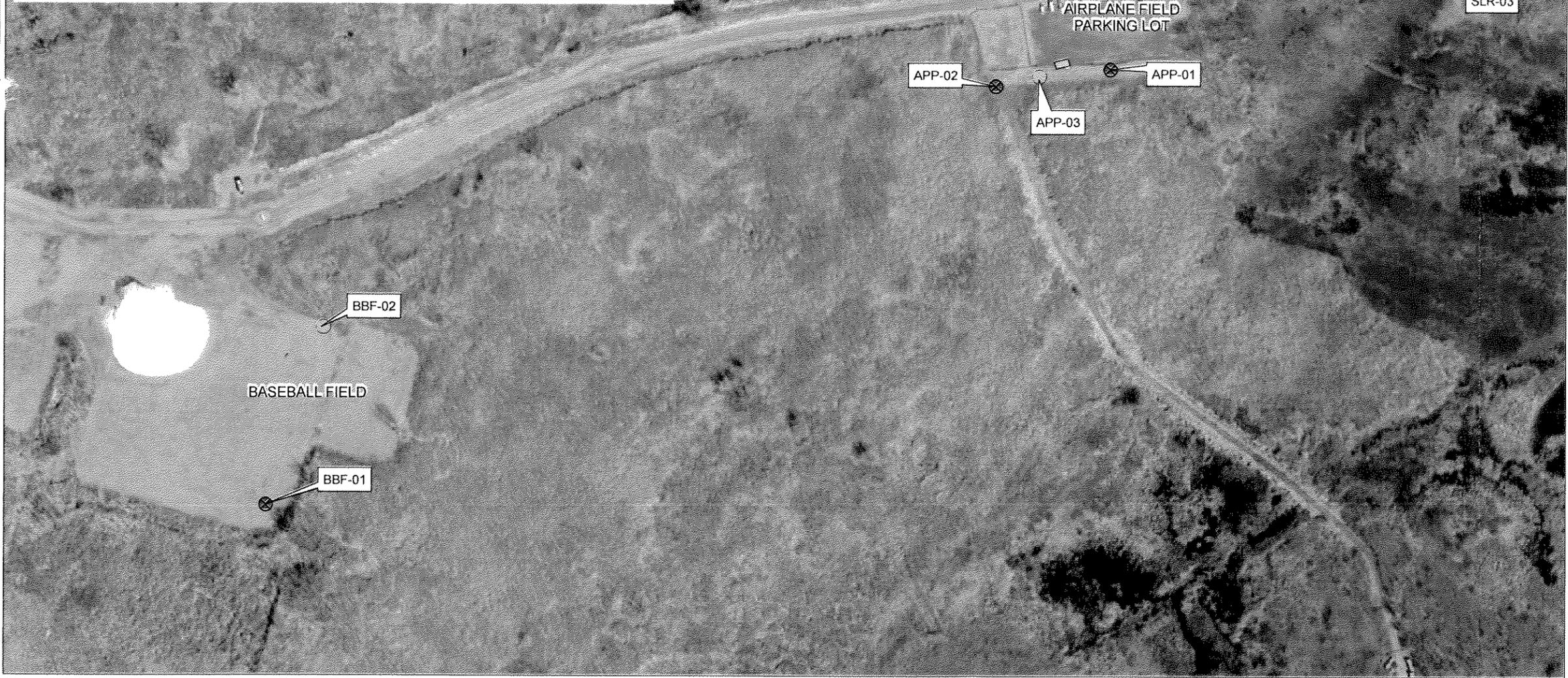
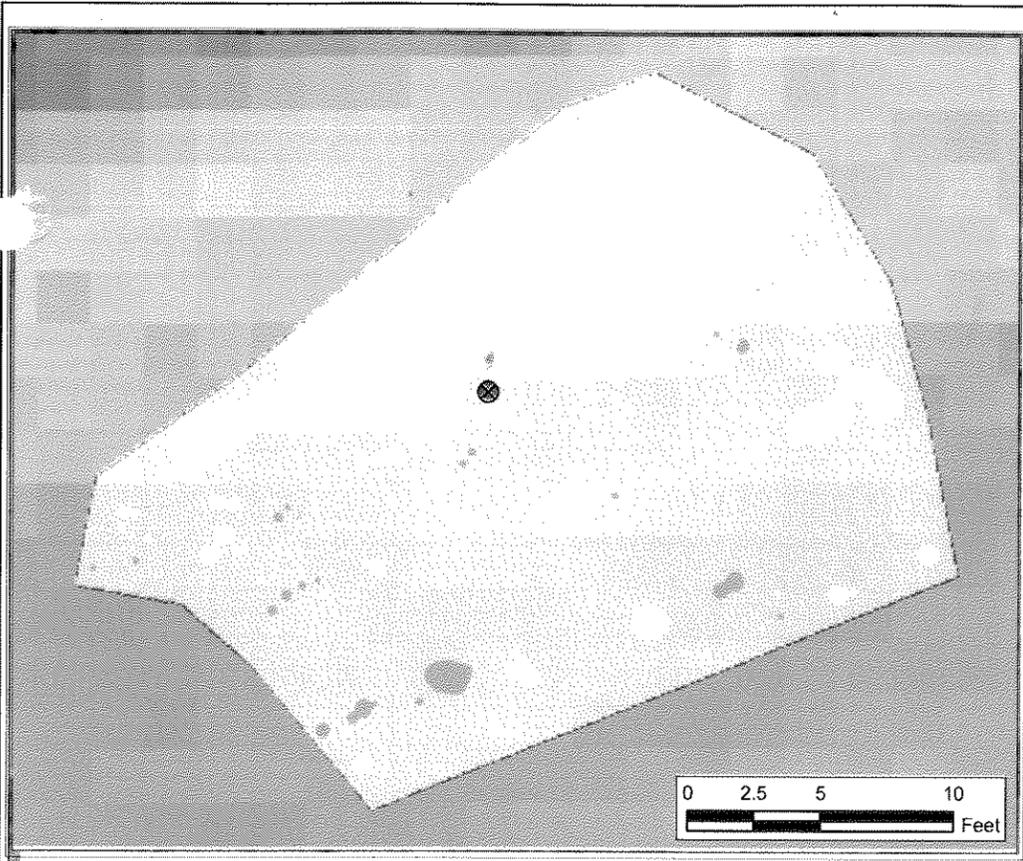
**Legend**  
**HOT SPOT LOCATION**  
 ⊗ REMEDIATED  
 ○ NO ACTION

**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 survey  
 CPM = Counts per minute



<b>BBF-01</b> 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		



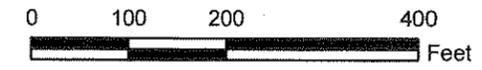
**Legend**  
**HOT SPOT LOCATION**

- ⊗ REMEDIATED
- NO ACTION

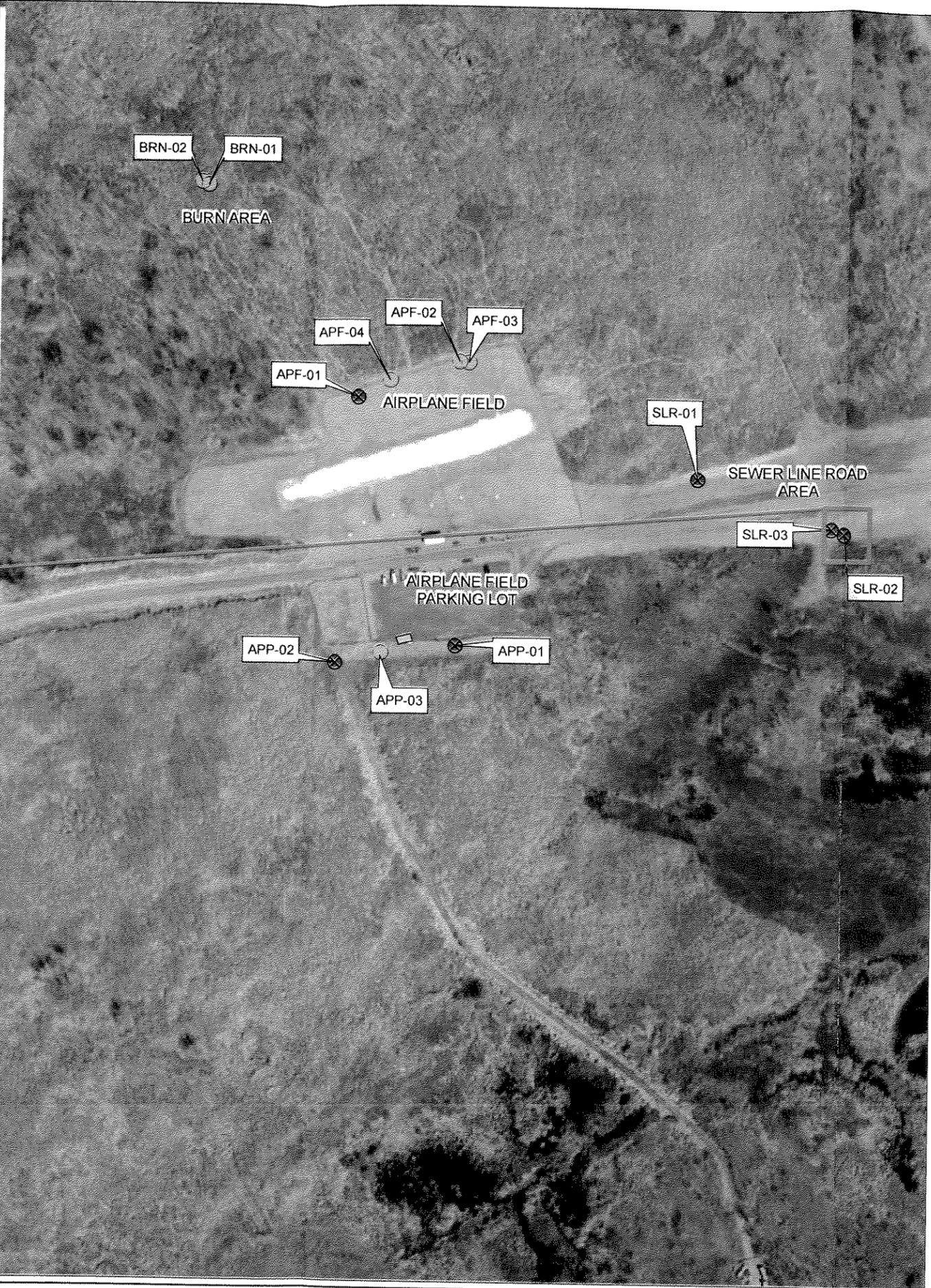
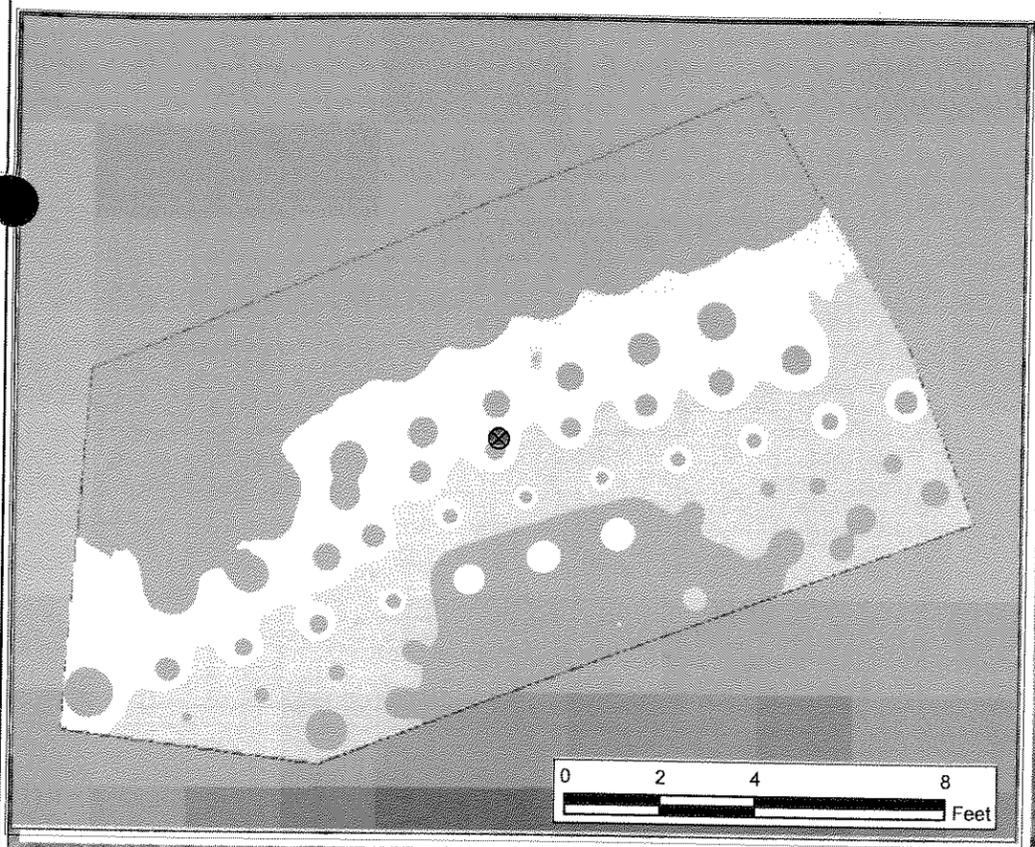
**POST EXCAVATION GWS**  
**CPM**

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

GWS = Gamma walkover survey  
CPM = Counts per minute



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		



**Legend**

**HOT SPOT LOCATION**

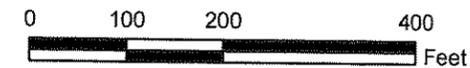
- ⊗ REMEDIATED
- NO ACTION

**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 survey  
 CPM = Counts per minute



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



**APPENDIX E**  
**Project Plans and Deliverables**  
**(On CD)**

**AR 0000497**