- FINAL -
Radiological Scoping Survey
For
Former Wolff-Alport Chemical Corporation Site
1125-1139 Irving Avenue
Queens, New York 11385

DDC PROJECT NO. BEGS 2008007

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Prepared for:

NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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Acronyms and Abbreviations

cm^2	square centimeters
DCGL	Derived Concentration Guideline Level
DDC	New York City Department of Design and Construction
NYSDEC	New York State Department of Environmental Conservation
DOE	U.S. Department of Energy
dpm	disintegrations per minute
DQO	Data Quality Objective
ESA	Environmental Site Assessment
ESE	Bureau of Environmental Science and Engineering (NYCDOHMH)
ESI	Environmental Site Investigation
FSS	Final Status Survey
FWACC	Former Wolff Alport Chemical Corporation
g	gram
GPS	Global Positioning System
hr	hour
HASP	Health and Safety Plan
HSA	Historical Site Assessment
IAEA	International Atomic Energy Agency
keV	kilo-electron volt
LBA	Louis Berger Associates
LBGR	Lower Bound of the Grey Region
LSC	liquid scintillation counter
m^2	square meters
MOER	Mayor's Office of Environmental Remediation
MDC	Minimum Detectable Concentration
NYCDOHMH	New York City Department of Health and Mental Hygiene
µ	micro
m	milli
MeV	Mega-electron volt
mrem	millirem
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picocurie per gram
QA	Quality Assurance
QC	Quality Control
RAM	radioactive materials
ROPC	Radionuclide of Potential Concern
R	Roentgen
SAMP	Sampling and Analysis Plan
SOR	Sum of the Ratios
SU	survey unit
SVOC	semi-volatile organic compound
TAL	target analyte list
TCL	target compound list
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978
USEPA	U.S. Environmental Protection Agency
WP	Scoping Survey Work Plan
yr	year

EXECUTIVE SUMMARY

On behalf of the New York City Department of Design and Construction (NYCDDC), Louis Berger & Assoc. P.C. (LBA) conducted a Radiological Scoping Survey for the Former Wolff-Alport Chemical Corporation located at 1125-1139 Irving Avenue in Queens, New York (hereinafter referred to as the Site). The Site is located on Block 3725, Lots 31, 33, 42, 44, 46 and 48. The Site is approximately 0.75 acres and is situated in an area characterized by mixed industrial, commercial and residential use. The property information for each block and lot on the Site is listed below:

Block, Lot	Street Address	Current Owner	Current Usage	Size (acres)
3725, 31	Irving Ave/Cooper Ave (Former train tracks)	Abandoned Property	Empty Lot/Construction Material Stockpile	0.01
3725, 33	1133-1139 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (S&M Construction)	0.31
3725, 42	1129 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (Arctic Glacier)	0.21
3725, 44	1127 Irving Avenue	LPL Properties, Inc.	Primo Auto Body	0.06
3725, 46	1125 Irving Avenue	Second A-One, Inc	Mixed (Jarabacoa Deli Grocery Corp; Office; Primo Flat Fix; Mini Shop; Residential)	0.06
3725, 48	15-14 Cooper Avenue	Rudy L Reyes	K & M Auto Repair	0.10

The Site is primarily covered with structures, with an unpaved grassy area that was formerly a railroad thruway. These structures include a 2-story masonry and frame building housing a delicatessen and grocery store, (1125 Irving Avenue, Jarabacoa Deli Grocery Corp), office space and residential apartments with an attached 1-story masonry building housing a tire shop (1125 Irving Avenue, Primo Flat Fix) and mini-ATV shop; a 1-story masonry building with an auto body shop (15-14 Cooper Avenue, K&M Auto Repair) and office space; two (2) 1-story masonry buildings used for warehouse purposes (1133-1139 Irving Avenue, S&M Construction and 1129 Irving Avenue, Arctic Glacier); and a commercial building with an auto repair shop (1127 Irving Avenue, Primo Auto Body).

The Site is bound by Cooper Avenue to the north and west, by a cabinet manufacturer/warehouse (Block 3725, Lot 30) to the east, and by Irving Avenue to the south. The abandoned rail spur behind the Site was heavily overgrown and contained a significant amount of illegally dumped trash. Since the start of this survey, the spur has been de-weeded and is now used to store large steel crane equipment. The Cemetery of the Evergreens borders the Site to the south and east on the opposite side of the rail line. Historical use of the Site consisted of commercial operations, including a gasoline filling station and laundry facilities, as well as industrial and manufacturing operations, including clothing manufacturing and chemical/laboratory facilities. According to historical Sanborn maps on-site buildings were constructed between 1914 and 1936.

According to the August 2007 New York City Department of Health and Mental Hygiene (NYCDOHMH) and New York State Department of Environmental Conservation (NYSDEC) Former Wolff Alport Chemical Corporation Site Final Joint Field Summary Report, included as Appendix D, and historical documents from the Department of Energy (DOE), included as Appendix G, the Wolff-Alport Chemical Corporation (Wolff-Alport) formerly used the Site for the processing of imported monazite sand to extract rare earth elements in the 1940s and 1950s. A by-product of this process was thorium, a radioactive element. The thorium waste disposed by running process liquids into the sewers and may also have been buried onsite until 1947. After 1947, Wolff-Alport was ordered to halt sewer disposal by the now defunct Atomic Energy Commission (AEC), thenceforth Wolff-Alport concentrated thorium onsite and sold the sludge to the federal government. Wolff-Alport is reported to have concentrated the thorium as a precipitate from approximately 1947 to 1954 (DOE Bureau of Radiation Control letter dated September 29, 1987).

In February 1988 a combined investigation between the United States Environmental Protection Agency (USEPA) and NYCDOHMH, Bureau of Environmental Science and Engineering (ESE) revealed that radioactive contamination was present within portions of the buildings and in the adjacent soil and sewers. A subsequent radiation survey conducted by NYSDEC and NYCDOHMH in May 2007 indicated that radiation at the Site was present above the average background levels for New York City, which are typically 50 - 90 millirem per year (mrem/yr). and above the designated limit for radiation exposure average dose received from background sources. This value of 100 mrem/yr is from the NYCDOHMH regulations, NY City Health Code 175.03(d). Although this limit is for exposure to a licensed facility, it can be used as guidance for acceptable exposures to unlicensed or uncontrolled sources of radiation. As a result, it was determined that a formal assessment was needed and USEPA funding under the Brownfields Office with assistance from the Office of Radiation was obtained by NYCDOHMH and the Mayor's Office of Environmental Remediation (MOER) for the Radiological Scoping Survey conducted by LBA through the NYCDDC. A limited Phase II Environmental Site Investigation was conducted concurrently with the Radiological Scoping Survey in order to complete the USEPA grant requirements and was completed under a separate cover. (Phase II Environmental Site Investigation for Former Wolff-Alport Chemical Corporation Site, LBA, August 2010) The Health and Safety Plan, Sampling Analysis and Monitoring Plan (SAMP), Quality Assurance Project Plan, and Work Plan for the Phase II ESI and the Radiological Scoping Survey were reviewed and approved by the USEPA Region 2. Subsequent to the radiological survey and the Phase II investigation, LBA was contracted by NYCDDC to conduct a Phase I ESA of the Site, completed under a separate cover. (Phase I Environmental Site Assessment for Former Wolff-Alport Chemical Corporation Site, LBA, May 2010)

The Radiological Scoping Survey was conducted at discrete times over the period July 2009 to January 2010, with the integrated radon measurements extending until early March 2010. Deviations between the SAMP and this Final Radiological Scoping Survey Report are listed in Appendix I. The survey included the following:

Exterior of buildings

- Gamma radiation measurements on sidewalks, streets and yard areas
- Surface samples and analysis for specific radionuclides
- Subsurface samples and analysis for specific radionuclides
- Subsurface depth profiling of contamination via downhole gamma logging
- Drain and sewer line measurements and sampling

Interior of buildings

- Gamma radiation measurements
- Alpha radiation measurements
- Alpha and beta-gamma contamination surveys
- Surface samples and analysis for specific radionuclides
- Subsurface samples and analysis for specific radionuclides
- Subsurface depth profiling of contamination via downhole gamma logging
- Radon-222 and Radon-220 integrated concentration measurements

Results Summary

The results of the survey are described in detail in Section 3 of this report. They are collectively considered here and a summary of the radiological status of the Site is described below:

Sewers

The sewer under Irving Avenue is internally and/or externally contaminated with thorium extending from the Former Wolff-Alport Chemical Corporation (FWACC) connection point near Cooper Avenue westward to Eldert Street. External contamination is probably due to backfill of sewer installation trenches with FWACC tailings or is due to leakage of contaminated water into the soil from inside the sewer. Internal contamination is obviously due to residual liquid- or sludge-based thorium released from the FWACC. Sewer points downstream from Eldert Street were within normal, background levels because a greater flow of dilution water from other branches occurs at this point. Sewer access points on other streets adjoining the Site (Moffat Street and most of Cooper Avenue) were at background levels except for the two (2) manholes on Cooper Avenue nearest the Site at Irving Avenue and near the K&M Auto Repair Shop.

At the intersection of Irving Avenue and Cooper Avenue, there is a layer of contamination about 8 feet deep under the intersection that is not detectable from the surface. As discussed in the paragraph above, this layer may have been backfilled external to the sewer during system maintenance or may be due to past leakage of thorium from the sewer into surrounding soil after being discharged from the FWACC.

As a result of these findings any workers involved in excavation activities in the streets or manhole entry (in Irving Avenue, north of Eldert Street) should work under a Site Specific HASP and follow appropriate equipment decontamination procedures. The NYCDOHMH prepared a Worker Factsheet (included as Appendix F) for the NYCDEP which outlined minimum requirements.

Contamination near the Ground Surface

Most of the Site areas to the south, east and west of the original FWACC buildings have somewhat elevated gamma radiation levels due to the presence of a 1- to 4-foot thick layer of contaminated soil. The appearance of the material in the contaminated soil layer is a black or gray, ash-like material, undoubtedly the waste tailings from the FWACC operations. These tailings reside under the asphalt of Irving Avenue and Moffat Street, under the concrete slab of the Arctic Glacier building, and within the surface soils of the rail spur behind the property. The depth of contamination is typically within the top 12" of soil under the pavement or ground surface, with occasional deeper areas down to 4 feet. Cooper Avenue, to the north of the Site, appears to be clean other than the sewer under the Irving Avenue intersection and at a few minor spots in front of the K&M Auto Repair Shop. The elevated readings on Moffat Street appear to drop off to background about 300 feet away from Irving Avenue. More distant measurements away from the city block containing the FWACC were not performed as part of this scoping survey. Future testing for contamination near the ground surface beyond the block of interest is recommended to bound the extents of possible offsite impact.

Deep Contamination

Deeper contamination exists under the original Wolff-Alport Buildings down to 15 to 20 feet or more, with thorium concentrations ranging from 100's to 1100 pCi/g. The upper-most 4 feet of contamination appears to be similar tailings as was observed over the rest of the Site. However, the deeper contamination appears to be a more soluble, leachable form of thorium probably process thorium dissolved in acid. The Department of Energy (DOE) Report on Monazite Sand, included in Appendix G, indicates that sulfuric acid and heat were used by Wolff Alport to break down monazite into its Thorium and Rare Earth components. It is likely that the original FWACC building on Irving Avenue housed kilns and vats used to create liquid-based forms of thorium via extraction from monazite sand. The outlines of the original brick archways through which material entered the process are still visible in the wall between the two Primo Auto Body bays, as shown in Figure 1-4. This is a more highly mobile form of thorium contamination that is unlike the tailings-based, insoluble forms normally seen in most thorium-contaminated sites in the northeast US. As such, further studies of ground water in the vicinity are highly recommended due to the apparent migration of thorium into the deeper layers. However, because in New York City there are no likely ground water users in the vicinity, the performance of additional testing is not considered urgent from a public exposure consideration.

The basement of the delicatessen (Jarabacoa Deli Grocery Corp, 1125 Irving Avenue) on the corner of Cooper Avenue and Irving Avenue is being affected by the adjacent bolus of thorium contamination under the original FWACC Kiln-Vat building. The adjacent contamination is detectable via gamma measurement through the southern brick wall of the basement. A small amount of contamination also appears to exist under the basement slab. It is not clear whether the source of this contamination is migration from the adjacent Kiln/Vat Building or was prior backwash from the sewer system into the sub-slab space. Regardless of the source, this contamination may require remediation based on future property use. Based on the results of this scoping survey, further studies of deep contamination are necessary.

Radon

Integrated radon concentration measurements in the basement of the Jarabacoa Deli Grocery Corp delicatessen at 1125 Irving Avenue conducted over a 3-month period indicated a concentration of 12.7 pCi/liter Rn-220 (thoron) and 1.4 pCi/liter Rn-222 (radon), the former being greater than the USEPA recommended guideline of 4 pCi/liter[1].

Both radon and thoron levels in the 2 bays of Primo Auto Body (1127 Irving Avenue) were well within the 4 pCi/l level probably due to the large amount of air infiltration through these older, poorly-sealed buildings.

Further evaluations of radon and thoron are needed in the occupied areas of 1125 Irving Avenue. In addition, future offsite studies should consider the potential for radon exposure if further building material or ground contamination is found.

Surface Contamination

Surface contamination measurements in the Jarabacoa Deli Grocery Corp delicatessen at 1125 Irving Avenue and Primo Auto Body at 1127 Irving Avenue indicated a few readings on concrete floors with slightly elevated, but acceptable alpha radioactivity levels. One location in Primo Auto Body at 1127 Irving Avenue showed removable alpha contamination slightly higher than the selected radioactive contamination limit for this survey. However, follow-up wipe tests in the immediate area showed no further elevated levels. Direct (fixed) alpha readings showed a few spots above background in the Jarabacoa Deli Grocery Corp delicatessen basement and Primo Auto Body, but the readings were within the selected maximum fixed alpha guideline level. These low-level contamination readings were probably due to foot tracking or water based migration of thorium from soils to the concrete surfaces. Floors in the remainder of the buildings have relatively new concrete or have been painted and have not yet experienced thorium migration or tracking from other parts of the Site. Based on the results of this scoping survey, further surface contamination measurements are not necessary to make decisions regarding remediation.

General Summary

The Site contains relatively high levels of thorium contamination in soil extending to a depth of 20 or more feet directly under the original FWACC buildings (1127 Irving Avenue, Primo Auto Body, and 1125 Irving Avenue, Jarabacoa Deli Grocery Corp; Office; Primo Flat Fix; Mini Shop). The remainder of the city block surrounding the original FWACC building and some of the adjacent streets have underlying contaminated soil in the 1- to 4- foot depth range due to deposition of ash-like waste tailings spread out from the former operation. Future studies should determine the extent and magnitude of offsite contamination.

[1] The USEPA has no specific guideline for thoron levels in homes, therefore the 4 pCi/l level adopted by USEPA Region 2 for both radon or thoron for the cleanup level in homes associated with the Welsbach Superfund Site in Camden, NJ was used as a reference guideline.

The sewer line leading away from the FWACC has internal contamination extending four (4) blocks downstream. Some of the soils external to the sewer line are also contaminated due to sewer leakage or backfill with tailings during past maintenance excavation. There are currently no occupational hazards to workers at the Site though sewer and excavation workers should abide the recommendations previously outlined for Sewers. The Site will need substantial excavation to accomplish remediation, based on future site usage and federal cleanup requirements from similar past sites.

Further studies of ground water in the vicinity are highly recommended due to the apparent migration of thorium into the deeper layers, however these studies are not considered urgent from a public exposure consideration. Beyond further ground water investigation, further testing and remediation will be based on potential future site usage. Based on results from this scoping survey study, further offsite testing is recommended.

1.0 INTRODUCTION

On behalf of the New York City Department of Design and Construction (NYCDDC), Louis Berger & Assoc. P.C. (LBA) conducted a Radiological Scoping Survey for the Former Wolff-Alport Chemical Corporation (FWACC) located at 1125-1139 Irving Avenue in Queens, New York (hereinafter referred to as the Site). The Site is located on Block 3725, Lots 31, 33, 42, 44, 46 and 48. The Site is approximately 0.75 acres and is situated in an area characterized by mixed industrial, commercial and residential use.

The Site is primarily covered with structures, with an unpaved grassy area that was formerly a railroad thruway. These structures include a 2-story masonry and frame building housing a delicatessen and grocery store (1125 Irving Avenue, Jarabacoa Deli Grocery Corp), office space and residential apartments with an attached 1-story masonry building housing a tire shop (1125 Irving Avenue, Primo Flat Fix) and mini-ATV shop; a 1-story masonry building with an auto body shop (15-14 Cooper Avenue, K&M Auto Repair) and office space; two (2) 1-story masonry buildings used for warehouse purposes (1133-1139 Irving Avenue, S&M Construction and 1129 Irving Avenue, Arctic Glacier); and a commercial building with an auto repair shop (1127 Irving Avenue, Primo Auto Body). Site block, lot, address, owner, usage and tenant information is detailed in the table below:

Block, Lot	Street Address	Current Owner	Current Usage	Size (acres)
3725, 31	Irving Ave/Cooper Ave (Former train tracks)	Abandoned Property	Empty Lot/Construction Material Stockpile	0.01
3725, 33	1133-1139 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (S&M Construction)	0.31
3725, 42	1129 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (Arctic Glacier)	0.21
3725, 44	1127 Irving Avenue	LPL Properties, Inc.	Primo Auto Body	0.06
3725, 46	1125 Irving Avenue	Second A-One, Inc	Mixed (Jarabacoa Deli Grocery Corp; Office; Primo Flat Fix; Mini Shop; Residential)	0.06
3725, 48	15-14 Cooper Avenue	Rudy L Reyes	K & M Auto Repair	0.10

The Site is bound by Cooper Avenue to the north and west, by a cabinet manufacturer/warehouse (Block 3725, Lot 30) to the east, and by Irving Avenue to the south. The abandoned rail spur behind the Site was heavily overgrown and contained a significant amount of illegally dumped trash. Since the start of this survey, the spur has been de-weeded and is now used to store large steel crane equipment. The Cemetery of the Evergreens borders the Site to the south and east on the opposite side of the rail line. Historical use of the Site consisted of commercial operations, including a gasoline filling station and laundry facilities, as well as industrial and manufacturing operations, including clothing manufacturing and chemical/laboratory facilities. According to historical Sanborn maps on-site buildings were constructed between 1914 and 1936.

According to the August 2007 New York City Department of Health and Mental Hygiene (NYCDOHMH) and New York State Department of Environmental Conservation (NYSDEC) Former Wolff Alport Chemical Corporation Site Final Joint Field Summary Report, included as Appendix D, and historical documents from the Department of Energy (DOE), included as Appendix F, the Wolff-Alport Chemical Corporation (Wolff-Alport) formerly used the Site for the processing of imported monazite sand to extract rare earth elements in the 1940s and 1950s. A by-product of this process was thorium, a radioactive element. The thorium waste disposed by running process liquids into the sewers and may also have been buried onsite until 1947, After 1947, Wolff-Alport was ordered to halt sewer disposal by the now defunct Atomic Energy Commission (AEC), thenceforth Wolff-Alport concentrated thorium onsite and sold the sludge to the federal government. Wolff-Alport is reported to have concentrated the thorium as a precipitate from approximately 1947 to 1954. (DOE Bureau of Radiation Control letter dated September 29, 1987)

In February 1988 a combined investigation between the United States Environmental Protection Agency (USESPA) and NYCDOHMH, Bureau of Environmental Science and Engineering (ESE) revealed that radioactive contamination was present within portions of the buildings and in the adjacent soil and sewers. A subsequent radiation survey conducted by NYSDEC and NYCDOHMH in May 2007 indicated that radiation at the Site was present above average background levels for New York City of 50 - 90 millirem per year (mrem/yr) and above the designated limit for radiation exposure to the general public of 100 mrem/yr above the average dose received from background sources. (NYCDOHMH Information on Radiation Survey at the Former Wolff-Alport Chemical Corporation 1127-1129 Irving Avenue, Queens, NY, September 5, 2007) The NYCDOHMH limit of 100 mrem/yr is from the NYC Health Code 175.03(d), and is applicable to licensed facilities. As a result, it was determined that a formal assessment was needed and USEPA funding under the Brownfields Office with assistance from the Office of Radiation was obtained by NYCDOHMH and the Mayor's Office of Environmental Remediation (MOER) for the Radiological Scoping Survey conducted by LBA through the NYCDDC. A limited Phase II Environmental Site Investigation was conducted concurrently with the Radiological Scoping Survey in order to complete the USEPA grant requirements and was completed under a separate cover. (Phase II Environmental Site Investigation for Former Wolff-Alport Chemical Corporation Site, LBA, August 2010) The Health and Safety Plan, Sampling Analysis and Monitoring Plan, Quality Assurance Project Plan, and Work Plan were reviewed and approved by the USEPA Region 2. Subsequent to the radiological survey and the Phase II investigation, LBA was contracted by NYCDDC to conduct a Phase I ESA of the Site, completed under a separate cover. (Phase I Environmental Site Assessment for Former Wolff-Alport Chemical Corporation Site, LBA, May 2010)

1.1 Purpose and Objective

In May 2007, the New York State Department of Environmental Conservation (NYSDEC) and the New York City Department of Health and Mental Hygiene (NYCDOHMH) tested the Site and found slightly elevated radiation levels. These radiation levels did not indicate immediate health concerns for current building occupants or people passing by. However, more testing was deemed necessary to fully understand the nature of the radioactivity and the rough extent of contamination.

This radiological survey was performed in accordance with a Sampling and Analysis Plan (SAMP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP) and Work Plan approved by the U.S. Environmental Protection Agency (USEPA). The survey was performed with coordination, support and technical review from multiple agencies, including the New York City Department of Design and Construction (DDC), the NYCDOHMH, the NYSDEC, and the USEPA. This survey is considered scoping in nature, and it is intended to identify locations where radiation dose rates are above background levels, and to determine the presence of radioactive contamination in structures, surface soil, subsurface soil, and sewers; it is not expected to provide a full characterization of the Site.

1.2 Site Background

In an effort to produce a city-wide ground level radiation background map, the NYCDOHMH, Bureau of Environmental Science and Engineering (ESE) completed vehicle-based background radiation survey throughout the city. (NYCDOHMH and NYSDEC, August, 2007) During a portion of the survey, gamma activity was detected above background levels on Irving Avenue between Cooper Avenue and Moffat Street on the Brooklyn/Queens border. Gamma radiation measurements peaked at approximately 1.5 milliRoentgen per hour (mR/hr) in the street in front of 1129 Irving Avenue. Local gamma radiation background is typically 0.01 mR/hr.

On September 29, 1987, NYCDOHMH was informed by DOE via letter that the Former Wolff-Alport Chemical Corporation was based at 1127 Irving Avenue. Documents produced by the U.S. Department of Energy (DOE) indicate the owners of Wolff-Alport sold large amounts (approximately 53,000 lbs, in addition to 238 drums) of thorium oxalate as well as thorium nitrate (400 lbs) to the DOE and its predecessors. (DOE, September 1987, DOE, Memorandum on Monazite Sand)

According to federal records, Wolff-Alport operated at this location from approximately 1920 to about 1954. About 1940, the company began importing Monazite sand from the Belgian Congo through the rail spur located in back of the property. Monazite sand is rich in thorium and other rare earth elements which the company wished to extract. The monazite sand was brought to the Site, metals were extracted, and waste materials disposed of in the sewer and possibly by burial on-site. In 1947, the now-defunct AEC ordered Wolff-Alport to halt sewer disposal of thorium waste. From approximately 1947 to 1954, Wolff-Alport reportedly concentrated the thorium as a precipitate for sale to the AEC. However, some residuals, consisting of high concentrations of thorium, may be present on-site. The waste tailings tend to appear as black or gray ashy material. (DOE, September 1987, DOE, Memorandum on Monazite Sand)

1.3 Site Description

The Site is located at 1125-1139 Irving Avenue (also known as 1514 Cooper Avenue) in Queens, New York. The Site occupies Block 3725, Lots 31, 33, 42, 44, 46 and 48. The Site is located in a mixed industrial, commercial, and residential area and is approximately 0.75 acres.

The Site is primarily covered with structures, with an unpaved grassy area that was formerly a railroad thruway. These structures include a 2-story masonry and frame building housing a

delicatessen and grocery store, (1125 Irving Avenue, Jarabacoa Deli Grocery Corp) office space and residential apartments with an attached 1-story masonry building housing a tire shop (1125 Irving Avenue, Primo Flat Fix) and mini-ATV shop,; a 1-story masonry building with an auto body shop (15-14 Cooper Avenue, K&M Auto Repair) and office space; two (2) 1-story masonry buildings used for warehouse purposes (1133-1139 Irving Avenue, S&M Construction and 1129 Irving Avenue, Arctic Glacier); and a commercial building with an auto repair shop (1127 Irving Avenue, Primo Auto Body). The property information for each block and lot on the Site is listed below:

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3725, 48	15-14 Cooper Avenue	Rudy L Reyes	K & M Auto Repair	0.10

The Site is bound by Cooper Avenue to the north and west, by a cabinet manufacturer/warehouse (Block 3725, Lot 30) to the east, and by Irving Avenue to the south. The abandoned rail spur behind the Site was heavily overgrown and contained a significant amount of illegally dumped trash. Since the start of this survey, the spur has been de-weeded and is now used to store large steel crane equipment. The Cemetery of the Evergreens borders the Site to the south and east on the opposite side of the rail line. Figure 1-1 shows an aerial view of the triangular-shaped property, bordered by Irving Avenue, Cooper Avenue, and the abandoned rail spur/empty lot behind the buildings. Figure 1-3 shows the same property, with a view of the surrounding area. An area map is shown in Figure 1-2.

Figure 1-1 – Aerial Photo of Former Wolff-Alport Location – 2007
(http://maps.live.com)

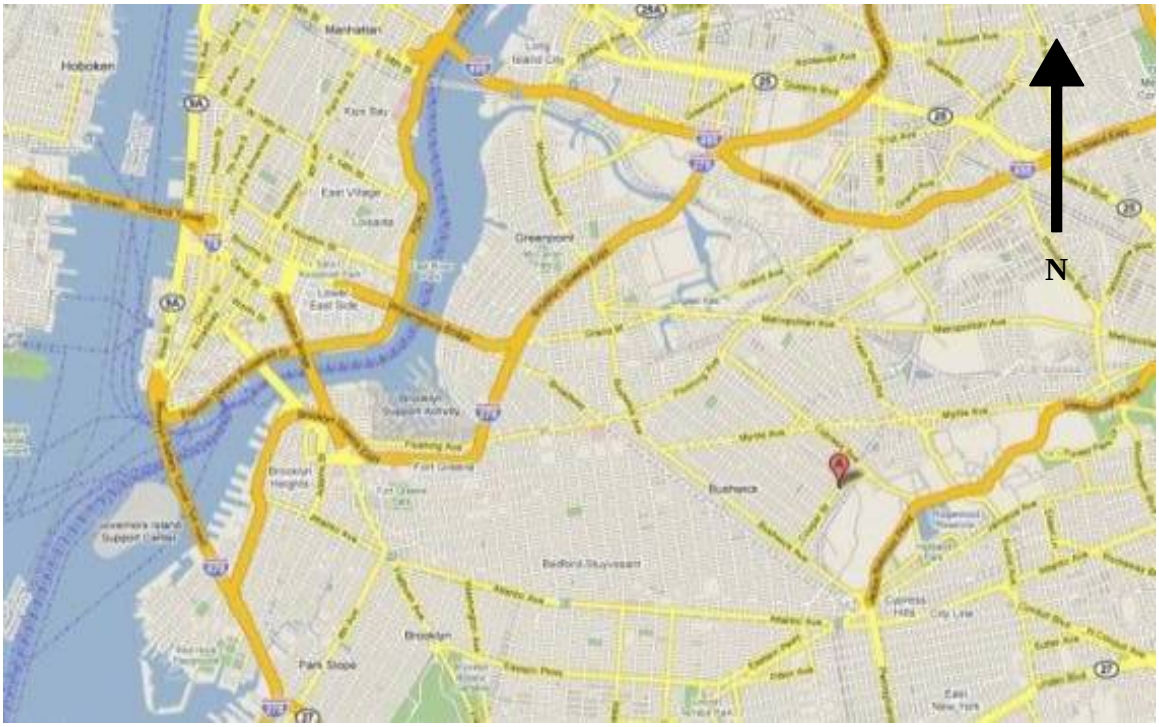

Figure 1-2 – Area Map
(ref: Google maps)

Figure 1-3 – Aerial Photo of FWACC Location and Surroundings– 2008
(Note the white, triangular-shaped building)
(http://maps.live.com)

1.4 Former Site Use

Wolff-Alport terminated operations at the Site in approximately 1954. Land use records after 1954 are limited. In 1988, the building was occupied by Lynda Knitwear. In late 2000, the building was used by the current rental occupants, Primo Auto Body.

A 1954 aerial photo of the Site is shown in Figure 1-5 along with the present view taken from the same angle. The kiln/vat area is believed to have been located in the area that is now the Primo Auto Body car storage bay (Survey Unit A-2), as shown in Figure 1-5. As will be shown later in this report, the kiln/vat area (Survey Unit A-2) has the highest and deepest levels of thorium contamination in soil.

The yard area to the south of the Kiln-Vat Building (in Figure 1-5) is now the Primo Auto Body work area. This yard may have been used for the loading or unloading of thorium-bearing material from the Kiln-Vat Building through arched portals, the outline of which can still be seen in the wall of the present structure, as shown in Figure 1-4.

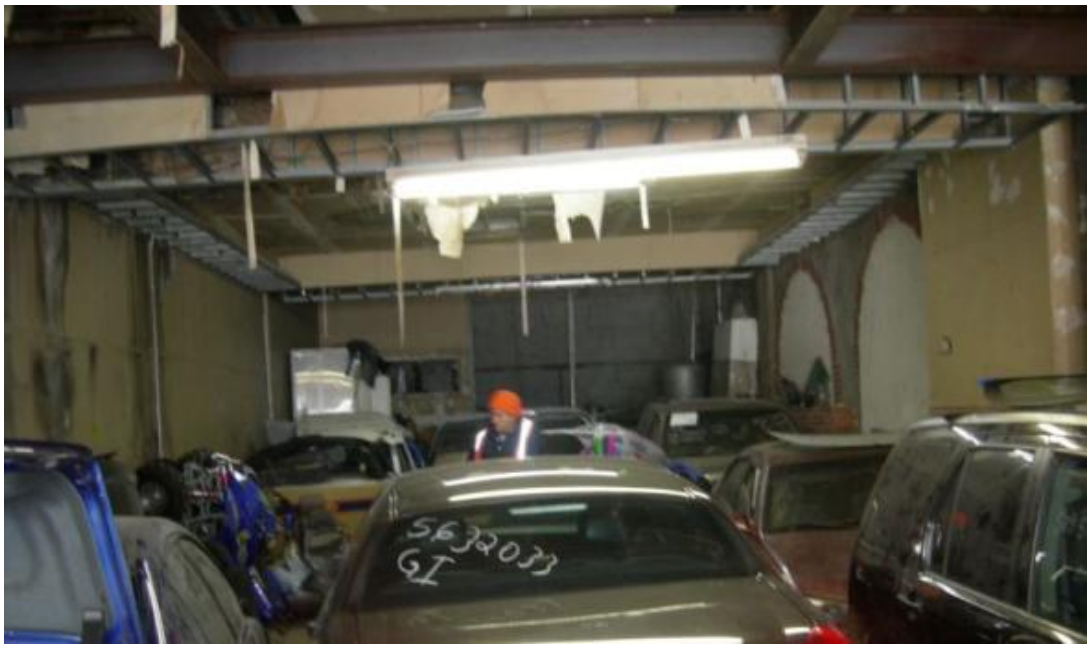

Figure 1-4 – Former Kiln / Vat Building Interior - Note Archways Leading to the Former Yard Area. Area with Highest Levels of Thorium Contamination Detected.
(This Building Is Presently The Primo Auto Body Storage Bay.)

The southern-most yard seen in Figure 1-5 is believed to have been an exterior staging area for the FWACC, potentially with piles of monazite and tailings. The gamma readings in this part of the present building as well as the subsurface samples indicate background to moderate levels of radioactivity under the slab, probably residual monazite and tailings from the former storage yard.

The "other FWACC Buildings" in Figure 1-5 have unknown uses. However, soil contamination presently exists under both of these areas.

The building on the corner of Irving Avenue and Cooper Avenue (now a delicatessen, Jarabacoa Deli Grocery Corp, 1125 Irving Avenue) is directly adjacent to the Kiln-Vat Building. There is no record of its use during the operation of the FWACC. The construction of its basement is obviously older than the age of the FWACC, thus underlying contamination due to deposited tailings is not expected. However, as will be shown later in this report, migration of thorium has occurred from the soil under the Kiln-Vat Building into the soil under the present 1125 Irving Avenue, Jarabacoa Deli Grocery Corp delicatessen.

The complete history of the Site and adjacent sites is detailed in the Phase I ESA completed concurrently with this report (LBA, May 2010).

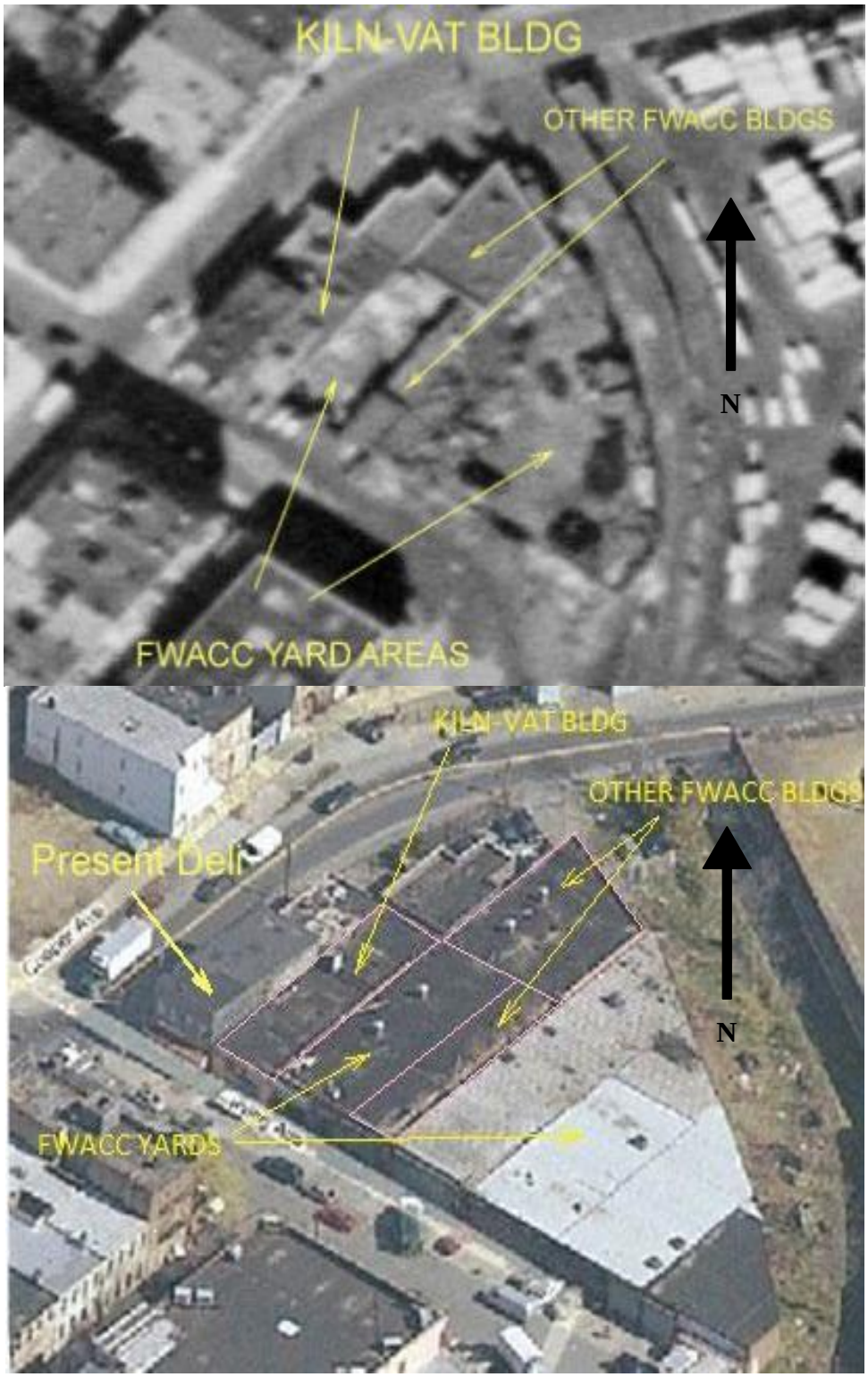

Figure 1-5 – 1954 and 2007 Aerial Photos of the Former Wolff-Alport Location

1.5 Current Site Use

The FWACC operations buildings still remain on Site, as shown on Figure 1-5. Newer buildings appear to have been added over the former FWACC yard areas with various access ways between the old and new portions sealed or created. The property details and current usage are shown below:

Block, Lot	Street Address	Current Owner	Current Usage	Size (acres)
3725, 31	Irving Ave/Cooper Ave (Former train tracks)	Abandoned Property	Empty Lot/Construction Material Stockpile	0.01
3725, 33	1133-1139 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (S&M Construction)	0.31
3725, 42	1129 Irving Avenue	Arctic Glacier Losquadro, Inc.	Warehouse (Arctic Glacier)	0.21
3725, 44	1127 Irving Avenue	LPL Properties, Inc.	Primo Auto Body	0.06
3725, 46	1125 Irving Avenue	Second A-One, Inc	Mixed (Jarabacoa Deli Grocery Corp; Office; Primo Flat Fix; Mini Shop; Residential)	0.06
3725, 48	15-14 Cooper Avenue	Rudy L Reyes	K & M Auto Repair	0.10

Most of the present buildings are now used for storage of commercial materials with limited/short term entry by individuals. The one exception is in the working area of Primo Auto Body, (1127 Irving Avenue) where individuals spend their entire working day in the building while completing various auto repairs and body work.

2.0 APPROACH TO THE SCOPING SURVEY INVESTIGATION

A Sampling and Monitoring Plan (SAMP) was approved by USEPA Region 2 on May 21, 2009 and outlined the methodology used to perform the Scoping Survey (for radiological contaminants) and a Phase II ESI (for potential non-radiological contaminants). Deviations between the SAMP and this Final Radiological Scoping Survey Report are listed in Appendix I.

The Radiological Scoping Survey efforts described herein are the first steps in a site survey process. There are few records relating to specific locations of radioactive material use and storage on-site; therefore, the goal of the Scoping Survey is to more accurately determine the magnitude and locations of residual radioactivity. The data provided herein can be used to plan further, more in-depth investigations and to begin the initial steps of remedial planning.

The objective of the Phase II ESI was to assess the potential presence of subsurface chemical contamination possibly resulting from former Site operations. The Phase II ESI chemical sampling was performed concurrently with the radiological assessment activities. It focused on non-radioactive contaminants that may be present in the underlying soil and groundwater. The Phase II ESI activities were performed in accordance with the *Draft DER 10 Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2002) and were complete under a separate cover (Phase II Environmental Site Investigation, LBA, August 2010).

2.1 Radionuclides of Potential Concern

The Radionuclides of Potential Concern (ROPC) for this Scoping Survey were determined from general knowledge of the constituents of monazite sand: the thorium-232 decay series and to a lesser extent, the uranium-238 decay series. The Radionuclides of Potential Concern are listed in Tables 2.1 and 2.2.

The list of radionuclides includes both alpha and beta/gamma emitters as well as radon-222 (Rn-222) and radon-220 (Rn-220).

Table 2.1 - Radionuclides of Potential Concern – Thorium-232 Series

Nuclide	Name	Half-Life	Principal Emissions	Comments	Source of Radionuclide
Th-232	Thorium-232	1.4 E+10 yr	Alpha: 4 MeV		Monazite Sand
Ra-228	Radium-228	5.8 yr	Beta: 0.06 MeV		Decay of Th-232
Ac-228	Actinium-228	6.1 hr	Beta: 1.2 – 2.1 MeV, Gamma: 0.2 – 1.6 MeV	Gamma energies used to determine presence of Th-232	Decay of Th-232
Th-228	Thorium-228	1.9 yr	Alpha: 5.4 MeV, Gamma: low abundance		Decay of Th-232
Ra-224	Radium-224	3.6 days	Alpha: 5.5 MeV, Gamma: low abundance		Decay of Th-232
Rn-220	Radon-220	55 seconds	Alpha: 6.3 MeV, Gamma: low abundance	Rn-220 is a gas	Decay of Th-232
Po-216	Polonium-216	0.15 second	Alpha: 6.8 MeV, Gamma: low abundance		Decay of Th-232
Pb-212	Lead-212	10.6 hr	Beta: 0.16 – 0.57 MeV, Gamma: 0.01 – 0.3 MeV		Decay of Th-232
Bi-212	Bismuth-212	60 min	Alpha: 6.1 Mev, Beta: 1.6 – 2.2 MeV, Gamma: 0.04 – 1.6 MeV	36% alpha decay to Tl-208, and 64% beta decay to Po-212	Decay of Th-232
Po-212	Polonium-212	< 1 second	Alpha: 8.8 MeV		Decay of Th-232
Tl-208	Thallium-208	3 min	Beta: 1.3 – 1.8 MeV, Gamma: 0.5 – 2.6 MeV	Gamma energies used to determine presence of Th-232	Decay of Th-232
Pb-208	Lead-208	stable	None	Shown for completeness of the decay chain – not radioactive.	Decay of Th-232

Table 2.2 - Radionuclides of Potential Concern – Uranium-238 Series

Nuclide	Name	Half-Life	Principal Emissions	Comments	Source of Radionuclide
U-238	Uranium-238	4.5 E+9 yr	Alpha: 4.2 MeV		Pitchblende Ore, Monazite Sand
Th-234	Thorium-234	24.14 d	Beta: 0.19 MeV		Decay of U-238
Pa-234m	Protactinium	1.17 m	Beta: 2.29 MeV, Gamma: 0.765, 1.001 MeV		Decay of U-238
U-234	Uranium-234	2.47 E+6 yr	Alpha: 4.77 MeV, Gamma: low abundance		Decay of U-238
Th-230	Thorium-230	8.0 E+4 yr	Alpha: 4.68 MeV, Gamma: low abundance		Decay of U-234
Ra-226	Radium-226	1602 yr	Alpha: 4.78 MeV, Gamma: 0.186 MeV		Decay of Th-230
Rn-222	Radon-222	3.82 d	Alpha: 5.49 MeV, Gamma: low abundance	Rn-222 is a gas	Decay of Ra-226
Po-218	Polonium-218	3.05 m	Alpha: 6.0 MeV, Gamma: none		Decay of Ra-226
Pb-214	Lead-214	26.8 m	Beta: 0.65, 0.71 MeV, Gamma: 0.295, 0.352 MeV		Decay of Ra-226
B-214	Bismuth-214	19.7 m	Beta: 1.51, 1.0, 3.26 MeV, Gamma: low abundance		Decay of Ra-226
Pb-210	Lead-210	21 y	Beta: 0.016, 0.061 MeV, Gamma: 0.047 MeV		Decay of Ra-226
Po-210	Polonium-210	138.4 d	Alpha: 5.3 MeV, Gamma: low abundance		Decay of Pb-210
Pb-206	Lead-206	Stable		Shown for completeness of the decay chain – not radioactive.	---

2.2 Potential Non-Radiological Contaminants

Former Site operations included the extraction of rare earth elements and radioactive materials from Monazite sand, however, the Wolff-Alport Chemical Corporation may have also utilized other potential contaminants on-site. The purpose of the Phase II ESI sampling was to assess whether contamination resulting from former Site operations may be present in the underlying soil and groundwater. Specific potential contaminants were unknown at the time of the survey; therefore, the soil samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs, and target analyte list (TAL) metals (i.e., full TCL/TAL analysis). Groundwater samples were not collected due to hydrology and topography limitations. The results of these studies are included in the Phase II Environmental Site Investigation submitted as a separate report (LBA, August 2010).

2.3 Applicable Regulatory Criteria

The primary purpose of both the Scoping Survey and the Phase II ESI is to gather information on the levels of contaminants at the Site. In addition, there may be sufficient information to make preliminary recommendations relating to the acceptability of the Site for current and/or future use. Those decisions on acceptability will be based on the regulatory criteria listed in this section. Measurements and analyses must be made at the necessary sensitivity to ensure compliance with regulatory criteria of NYCDOHMH and USEPA listed below.

2.3.1 Decommissioning Regulatory Criteria (Radiological Contaminants)

There are several applicable references associated with acceptable levels of residual contamination, commonly termed “Release Limits” or “Release Criteria.” Those that may be considered during eventual remedial efforts at the Site are listed below:

NYSDEC

The New York State Department of Environmental Conservation (NYSDEC) regulates radioactive waste disposal and effluent concentrations in 6 NYCRR Part 380. However, Part 380 does not address surface or soil contamination directly.

NYCDOHMH

Article 175 of the NYC Health Code, “Radiation Control.” Including Section 3, *Standards for the Protection Against Radiation* (§175.03) and Radioactive Surface Contamination Limits in Appendix D of §175.03. These surface contamination limits are approximately similar to those shown in the NYS Health Departments Code Rule 38 Table 5 and the USNRC’s Regulatory Guide 1.86. While none of these have specific regulatory application to a site such as the FWACC, Appendix D of §175.03 is used as an approximation of the surface contamination criteria that may be used upon eventual site remediation. It is beyond the scope of this initial investigation to derive site-specific criteria.

USEPA

40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings which is used as a cleanup guideline for its Superfund sites such as the Welsbach/GGM site in Camden, NJ and the US Radium site in Orange, NJ. Typically, a 5 pCi/g Derived Concentration Guideline Level (DCGL) is applied separately to total thorium (the sum of Th-232 + Th-230 concentrations) and to total radium (the sum of Ra-228 + Ra-226 concentrations). Because gamma spectroscopy was used for soil analysis during this project, the radium-226 concentration via Bi-214 was used as an estimate of the Th-230 concentration and the Ac-228 concentration was used as an estimate of the Th-232 concentration. This 5 pCi/g above background guideline for soil was used during this survey for the purposes of discussion.

40 CFR 192 does not specify *in situ* (wet) or dried soil; however, since the limits are specified over a 100 square meter land area, it implies an in situ concentration. therefore, the value of 5 pCi/g used in this survey is considered as *in situ* (wet). In the data tables, the wet concentrations are listed, but the actual wet and dry masses are provided so the dry concentrations can be calculated, if desired.

Note: 40 CFR 192.20, "Implementation for Guidance" states:
"When considering the potential for health risks caused by human exposure to known or suspected carcinogens, alternate concentration limits pursuant to paragraph 192.02(c)(3)(ii) should be established at concentration levels which represent an excess lifetime risk, at a point of exposure, to an average individual no greater than between 10^{-4} and 10^{-6}."

These guidelines are summarized in the following tables:

Table 2.3 - Radioactive Contamination Guidelines

Agency / Reference	Alpha Total (dpm/100cm^2)	Alpha Removable (dpm/100cm^2)	Beta/Gamma Total	Beta/Gamma Removable (dpm/100cm^2)
NYCDOHMH §175.03 - Release of Materials or Facilities	2,500 (Max) 500 (Avg)*	100	0.2 mR/hr**	1,000

Notes: * Averaged over 1 m^2
** Measured at 1 cm from the surface
dpm/100 cm^2 = disintegrations per minute per 100 centimeters^2, a unit of contamination
mR/hr = milliRoentgen per hour (radiation exposure rate)

Table 2.4 - Radioactive Concentration and Radiation Dose Guidelines

Agency / Reference	Thorium or Radium Concentration in Soil (above background)	Dose Rate or Exposure Rate (above background)
NRC 10 CFR 20.1402 – dose after decommissioning < 25 mrem/yr	Not listed	Gamma < 25 mrem/yr
UMTRCA (USEPA)	5 pCi/g in first 15 cm 15 pCi/g at > 15 cm (above background)	0.02 mR/hr

UMTRCA = Uranium Mill Tailings Radiation Control Act of 1978
NRC = U. S. Nuclear Regulatory Commission
mrem/yr = millirem per year
mR/hr = milliRoentgen per hour

2.4 Measurement Methodology

The 2009 USEPA approved FWACC SAMP contains an in-depth discussion of the measurement methodologies used. The radiological Scoping Survey includes the following:

- Interior and exterior scans and fixed point readings for gamma radiation;
- Interior alpha contamination survey (fixed point direct readings and smears) at selected locations;
- Building material samples (if interior readings indicate potential contamination);
- Drain and sewer line measurements and sampling;
- Surface and subsurface soil samples, internal and external to buildings;
- Subsurface depth profiling of contamination via downhole gamma logging;
- Radon/thoron measurements inside buildings.

Table 2.5 describes the instruments used for the field investigation.

Table 2.5 – Field Radiological Investigation Equipment

Field Investigation Equipment				
Instrument No.	**Use**	**Model No.**	**Serial No.**	**Date of Last Calibration**
Meter A	Gamma radiation surveys	Ludlum 2221	73685	5/11/2009
Probe A		Ludlum 44-10	068744	5/11/2009
Meter B	Downhole gamma logging	Ludlum 2221	73685	11/11/2009
Probe B		Ludlum 44-62	165709	11/11/2009
Meter C	Misc. alpha, beta, gamma surveys / frisking	Ludlum 3	138997	6/4/2009
Probe C		Ludlum 44-9	141724	6/4/2009
Meter D	Direct Alpha Contamination Surveys	Ludlum 2350	105641	11/27/2009
Probe D		Ludlum 43-5	78658	7/3/2009
Meter E	Gamma radiation surveys	Ludlum 2360	141322	7/20/2009
Probe E		Ludlum 44-10	68744	7/20/2009
Meter F	Gamma radiation surveys	Ludlum 12S	77640	6/16/2009

Survey sequence:

Based on access to various portions of the Site, the general process was to first perform the sewer surveys (July 23-24, 2009) and the external gamma readings (August 13, November 19, 2009, and November 30, 2009). Based on these results, exterior boring locations were recommended (August 28, 2009), and exterior surface samples and subsurface samples were obtained (November 12, 2009 and November 19, 2009), along with downhole gamma profile surveys. When access to the buildings was granted, interior gamma surveys and contamination surveys were conducted (November 19, 2009, November 30, 2009, and December 15, 2009). Based on these results, interior subsurface samples were obtained, along with downhole gamma profile surveys (December 15, 2009 and December 16, 2009). Alpha track detectors to measure radon exposure were placed in three (3) locations from November 30, 2009 to March 8, 2010: the 1125 Irving Avenue Jarabacoa Deli Grocery Corp delicatessen basement, the ground floor of Primo Auto Body Storage Bay and the ground floor of the Primo Auto Body Work Shop at 1127 Irving Avenue.

2.5 Survey Areas

The FWACC EPA approved SAMP specified three (3) exterior survey areas and six (6) interior areas. During performance of the survey, the borders of these areas were adjusted somewhat to better fit the physical delineations on Site. A seventh survey area was also added to separate the

two slab-on-grade buildings (1125 Irving Avenue, Primo Flat Fix and 15-14 Cooper Avenue, K & M Auto Repair) on Cooper Avenue from the delicatessen area (1125 Irving Avenue, Jarabacoa Deli Grocery Corp) which had a below-grade basement. The exterior survey areas, B-1 through B-3, and the interior survey areas, A-1 through A-6, are described in Table 1 and are shown in Figure 2-1.

Due to occupant work activities and their material storage within Primo Auto body, not all areas were completely accessible for the survey. However, enough area was available to collect sufficient amounts of data for the purposes of this scoping survey.

Table 2.5 – Former Wolff Alport Chemical Corporation –Survey Area List

Survey Areas	Description	Address	Approx. Width (ft)
A-1	Jarabacoa Deli Grocery Corp (basement)	1125 Irving Ave	25
A-2	Primo Auto Body, (storage area)	1127 Irving Ave	20
A-3	Primo Auto Body (body shop)	1127 Irving Ave	25
A-4	S&M Construction (warehouse)	1129 Irving Ave	20
A-5	Arctic Glacier Losquadro, Inc. (warehouse)	1129 Irving Ave	35
A-6	Arctic Glacier Losquadro, Inc. (warehouse)	1129 Irving Ave, 1133-39 Irving Ave	75 40
A-7	Primo Flat Fix, Mini Shop, K & M Auto Repair (interior areas)	1125 Irving Ave, 15-14 Cooper Ave	
B-1	Cooper Avenue and K & M Auto Repair (lot)		Exterior
B-2	Rail Spur behind FWACC		Exterior
B-3	Irving Avenue and Moffat Street Area		Exterior
C	Sewers		Exterior

Figure 2-1 – FWACC Scoping Survey Areas (Final Layout)

2.6 Team Members

The scoping survey was jointly planned by LBA with technical assistance from certified health physicists Dennis Quinn of DAQ, Inc. and Ted Rahon of CoPhysics Corporation (CoPhysics).

Project Manager

Name:	Rhine Almonacy (LBA)
Work Telephone:	212-612-7951
Mobile:	973-418-1267

Corporate Health and Safety Manager

Name:	Brian Murphy (LBA)
Work Telephone:	212-612-7900
Mobile:	484-788-9673

Project Safety Officer (PSO):	Joshua Cupriks (LBA)
Work Telephone:	212-612-7954
Mobile:	646-772-2261
Project Health Physicist:	Dennis Quinn (DAQ)
Work Telephone:	845-223-1960
Mobile	845-891-5761
Laboratory Analysis:	CoPhysics Corporation 1 Commercial Dr. Florida, NY Attn: Theodore Rahon office: 845-783-4402 mobile: 914-260-1293
Drilling:	Zebra Environmental Corp. 30 N. Prospect Ave. Lynbrook, NY 11563 516-596-6300

2.6.1 Primary Decision Maker

This investigation was a scoping survey and not a full characterization as per USEPA approval. The primary decision cannot be made without a more extensive site characterization.

2.6.2 Resources

Accutest Laboratories of Dayton, NJ, NY Certification # 10983 – Groundwater sample analysis

CoPhysics Corporation of Orange Co., NY, Radioactive Materials License NYS 2691-3949 - Radiological planning and surveys, gamma spectroscopic analyses of collected samples

DAQ, Inc. of Hopewell Junction, NY - Radiological planning and surveys, reporting

Landauer, Inc of Glenwood, IL – Analysis and procurement of radon measurement devices (alpha track detectors)

Louis Berger Associates, P.C. of New York, NY – Environmental oversight, sampling and reporting

Zebra Environmental Lynbrook, NY– Drilling, geoprobe operations

3.0 RESULTS AND DISCUSSION

The radiological scoping survey was conducted on the Site and in the vicinity of the Site. The survey was conducted at discrete times over the period July 2009 to January 2010, with the integrated radon measurements extending until early March 2010. The survey included the following:

Exterior of buildings:

- Drain and sewer line measurements and sampling
- Gamma radiation measurements on sidewalks, streets and yard areas
- Surface samples and analysis for specific radionuclides
- Subsurface samples and analysis for specific radionuclides
- Subsurface depth profiling of contamination via downhole gamma logging

Interior of buildings:

- Gamma radiation measurements
- Alpha radiation measurements
- Alpha and beta-gamma contamination surveys
- Surface samples and analysis for specific radionuclides
- Subsurface samples and analysis for specific radionuclides
- Subsurface depth profiling of contamination via downhole gamma logging
- Radon-222 and Radon-220 integrated concentration measurements

Survey sequence:

Based on access to various portions of the Site, the general process was to first perform the sewer surveys (July 23-24, 2009) and the external gamma readings (August 13, November 19, 2009, and November 30, 2009). Based on these results, exterior boring locations were recommended (August 28, 2009), and exterior surface samples and subsurface samples were obtained (November 12, 2009 and November 19, 2009), along with downhole gamma profile surveys. When access to the buildings was granted, interior gamma surveys and contamination surveys were conducted (November 19, 2009, November 30, 2009, and December 15, 2009). Based on these results, interior subsurface samples were obtained, along with downhole gamma profile surveys (December 15, 2009 and December 16, 2009). Alpha track detectors to measure radon exposure were placed in three (3) locations from November 30, 2009 to March 8, 2010: the 1125 Irving Avenue Jarabacoa Deli Grocery Corp delicatessen basement, the ground floor of Primo Auto Body Storage Bay and the ground floor of the Primo Auto Body Work Shop at 1127 Irving Avenue.

3.1 Sewer Measurements

Sewer measurements were performed on July 23-24, 2009. They consisted of gamma measurements using a Ludlum 44-10 scintillation probe suspended approximately 3 feet above the bottom of each manhole. Also the gamma radiation level at 3 feet above the street level was

measured. Results are shown in Table 3.1, and the locations of the sewer measurement points are shown in Figure 3-1. Because the readings in manhole #M-1 in the intersection of Cooper Avenue and Irving Avenue showed the highest gamma level of the manholes tested, a composite sample of gravel from the bottom and scrapings from the wall was also collected. In an attempt to determine the source of the elevated readings, 2 of the manholes (M-1 and I-1) were gamma logged. The gamma reading and depth data are shown in Table 3.1a.

Figure 3-1 – Sewer Measurement Locations

Discussion:

All sewer access points under Irving Avenue on the 3 nearest blocks downstream from Cooper Avenue to Eldert Street had elevated gamma radiation levels. Points downstream from Eldert Street were within normal, background levels. Sewers on other streets adjoining the Site (Moffat Street and most of Cooper Avenue) were also at background levels except for the two (2) manholes on Cooper Avenue, nearest the Site.

The highest levels measured were approximately 400 to 600 µR/hr in manholes M-1 and C-1 under the intersection of Cooper Avenue and Irving Avenue. The depth profile of the M-1 gamma readings in Table 3.1a showed that the source of the readings was not the bottom of the sewer but was the walls. In order to determine if the source of the readings is a "bathtub ring" of contamination inside the sewer riser or is contaminated soil backfilled around the sewer riser, a composite sample consisting of wall scrapings and bottom gravel was removed from the interior of M-1 and analyzed. The results of the analysis (shown in Table 3.2) indicate an elevated level of thorium (81.3 pCi/g) which is probably not elevated enough to cause the high gamma levels observed. The source of these readings will have to be investigated further in future studies. Manhole I-1 had a similar depth profile, but with less magnitude than M-1 (see Table 3.1.a).

The 164 µR/hr gamma reading 3-feet above the road surface at manhole M-2 (the last line of Table 3.1) was due to the extensive layer of thorium-bearing material under the asphalt in front of Primo Auto Body. This material will be discussed in later sections.

Health and Safety Note: The radiation levels encountered were not hazardous to health but are an indication of deposited thorium. Such levels would not be acceptable for the building of homes or growing of vegetables, but they would be acceptable for workers to access the sewer for short periods of maintenance. A site-specific health and safety plan would be required for any excavation work at the Site. NYCDOHMH factsheet regarding worker safety is attached as Appendix F.

Additionally, a few measurements were also conducted at two (2) possible sludge hold-up points several miles downstream at the "weir" under the intersection of Nicholas Street, Scott Street, and Troutman Streets and at the "regulator" at the corner of Metropolitan and Onderdonk Avenues, Brooklyn, near the discharge point into Newton Creek. No obvious elevated levels were observed. However, these measurements were limited to suspending the gamma detector into the large subterranean space there. Such a measurement would not detect underwater contamination there. Underwater measurements and the collection of samples in such large, difficult areas were beyond the scope of this survey. If there is concern over thorium being deposited in sludge hold-up points, then actual sludge samples should be collected and analyzed in future studies.

Table 3.1 - Sewer Gamma Readings

Meas. No.	Access Point ID	3 feet above road surf. (uR/hr)	In manhole ~3 feet from bottom (uR/hr)	Approx Manhole Depth (ft)	Comments
July 23, 2010 Surveys:					
1	M-1	10	479	8	water flowing
2	M-1A	8	15	3	No sewage line input to this grating
3	C-1	10	605	8	water flowing
4	I-1	9	75	8	high water flow
5	I-2	12	500	8	water flowing
6	I-3	8	182	10	water flow - moderate to low, sediment visible
7	I-4	8	120	11	water flow - moderate to low, sediment visible
8	C-3	7	45	8	almost no water
9	C-2	8	15	10	almost no water
10	C-3A	7	17	10	no water
11	C-4	9	7	8	water present; separate sewer system
12	M-3	8	17	8	almost no water, sediment visible
13	Reg-1	6	8	6	Regulator - Metropolitan & Onderdonk Ave.
14	Reg-2	6	6	6	Regulator - Metropolitan & Onderdonk Ave.
15	Reg-3	6	8	6	Regulator - Metropolitan & Onderdonk Ave.
16	Weir-1	7	16	20	St. Nicholas, Scott, & Troutman- upstream of weir
17	Weir-2	11	18	20	St. Nicholas, Scott, & Troutman- downstream of weir
July 24, 2010 Surveys:					
18	I-5	8	62	13	Readings increased with depth; max at bottom, at water surface ~90 uR/hr
19	I-6	8	57	14	Between Covert & Schaefer
20	I-7	7	63	15	Intersection Covert & Irving
21	I-8	8	61	16	Between Covert & Eldert
22	I-9	8	17	16	Intersection Eldert & Irving
23	I-10	8	14	16	Between Halsey & Eldert
24	M-2	164	26	9	6' x 6' section of asphalt opened

Table 3.1a - Manhole M-1 and I-1 Gamma Log Depth Profiles

Manhole	Depth of Reading (ft)	Gamma Reading (µR/hr)	Comment
M-1	0	39	
M-1	3	192	
M-1	5	479	3 ft from bottom
M-1	6	493	
M-1	8	403	just above water
I-1	0	23	at road surface
I-1	4	33	½ way down
I-1	5	75	3 ft from bottom
I-1	8	57	near water

3.2 Exterior Gamma Measurements

The exterior areas were divided into three (3) survey units, B-1 through B-3 (Cooper Avenue and 15-14 Cooper Avenue), K & M Auto Repair (lot), Rail Spur behind FWACC, and Irving Avenue and Moffat Street Area, respectively) as shown in Figure 2-1.

Gamma scans were performed with a Ludlum 44-10 scintillation probe with a Ludlum 2360 or 2350 digital ratemeter. A Trimble GPS XH unit coupled to the ratemeter via serial port was used to determine geographic positioning and collect the count rate data from the ratemeter. Some of the readings were recorded manually without the GPS unit due to the need to minimize time spent in the street and to provide data in the shadows of the buildings where the GPS satellite signal was not visible. The results are shown in Figure 3-2 in units of micro-R/hr (µR/hr), where a background reading would be in the range of 6 – 10 µR/hr.

The gamma readings shown in Figure 3-2 are color-coded based on magnitude: pink and orange indicating radioactivity levels that would certainly exceed remediation guidelines, yellow indicating suspect areas that would need subsurface soil sampling to determine if higher levels exist deeper than is detectable from the surface; blue indicating levels slightly above background but acceptable, and green indicating levels within the range of normal background radiation.

Discussion:

There are extensive, elevated gamma readings at the portion of Irving Avenue in front of the FWACC building. This indicates contaminated soil under the asphalt. At the intersection of Cooper Avenue and Irving Avenue, these readings drop off to background (i.e., the points shown are blue). However, as will be shown in the subsurface survey section, there is a layer of contamination about 8 feet deep under the intersection that is not detectable from the surface. This layer may have been deposited during sewer line excavation and maintenance or may be due to past leakage of thorium from the sewer after being discharged from the FWACC.

The field team extended the survey of Irving Avenue (B-3) down into Moffat Street to trace the elevated readings observed there. These elevated readings on Moffat Street appear to drop off to background about 300 feet away from Irving Avenue. This also indicates contaminated soil under the Moffat Street asphalt.

Cooper Avenue appears to be clean other than under the Irving Avenue intersection and at a few minor spots in front of the K&M Auto Repair Shop (15-14 Cooper Avenue).

The soil under the rail spur immediately behind the FWACC building (1125 Irving Avenue Jarabacoa Deli Grocery Corp and 1127 Irving Avenue, Primo Auto Body) shows elevated gamma readings also indicating extensive soil contamination. The adjoining rail spur adjacent to the neighboring warehouse appears to be relatively clean even though it is only a few feet from the FWACC rail spur.

The gamma readings discussed above were the basis for collecting soil samples and performing a subsurface investigation as discussed in later sections of this report.

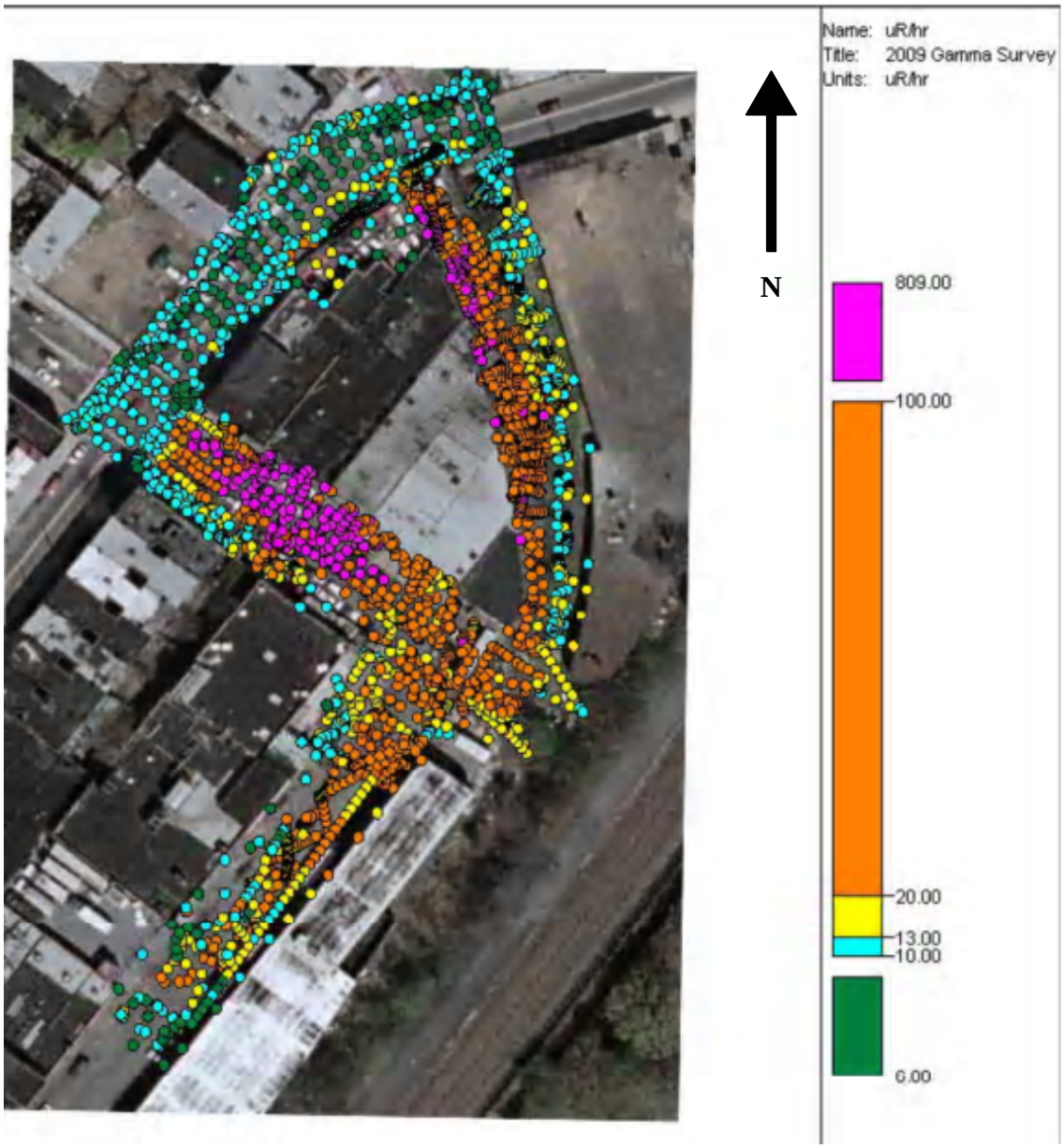

Figure 3-2 – Exterior Gamma Survey Results

3.3 Interior Gamma Measurements

The interior areas were originally divided into six survey units. After field visits were conducted the field team added an addition survey unit based on the actual building layout. The additional, seventh survey unit was added to include the 1125 Irving Avenue, Primo Fix-a-Flat Tire Shop and the K&M Auto Repair Shop on 15-14 Cooper Avenue. The interior areas are designated A-1 through A-7, as shown in Figure 2-1.

For survey unit A-1 at 1125 Irving Ave., there were three elevations, the basement, the ground floor (deli), and the upper floor (apartment). The maps in Figures 3.3 and 3.6, and the Tables 3.2 through 3.6 refer to the lowest elevation the basement. The basement had the following surveys performed: gamma, alpha, radon, and soil sample. The first floor was occupied with frequent presence of the general public, and only an informal gamma survey was taken. In this survey, no fixed measurement points were taken; however the scan indicated no readings above background. There were no surveys taken of the upper floor (apartment).

Gamma scans were performed with a Ludlum 44-10 scintillation probe and a Ludlum 2360 or 2350 digital ratemeter. Fixed point readings were collected on a 10’ x 10’ rectangular grid. The readings were recorded manually. The results are shown in Figure 3-3 in units of micro-R/hr (µR/hr), where a background reading would be in the range of 6 – 10 µR/hr.

The gamma readings shown in Figure 3-3 are color-coded based on magnitude: pink and orange indicating radioactivity levels that would certainly exceed remediation guidelines, yellow indicating suspect areas that would need subsurface soil sampling to determine if higher levels exist deeper than is detectable from the surface; blue indicating levels slightly above background but acceptable, and green indicating levels within the range of normal background radiation.

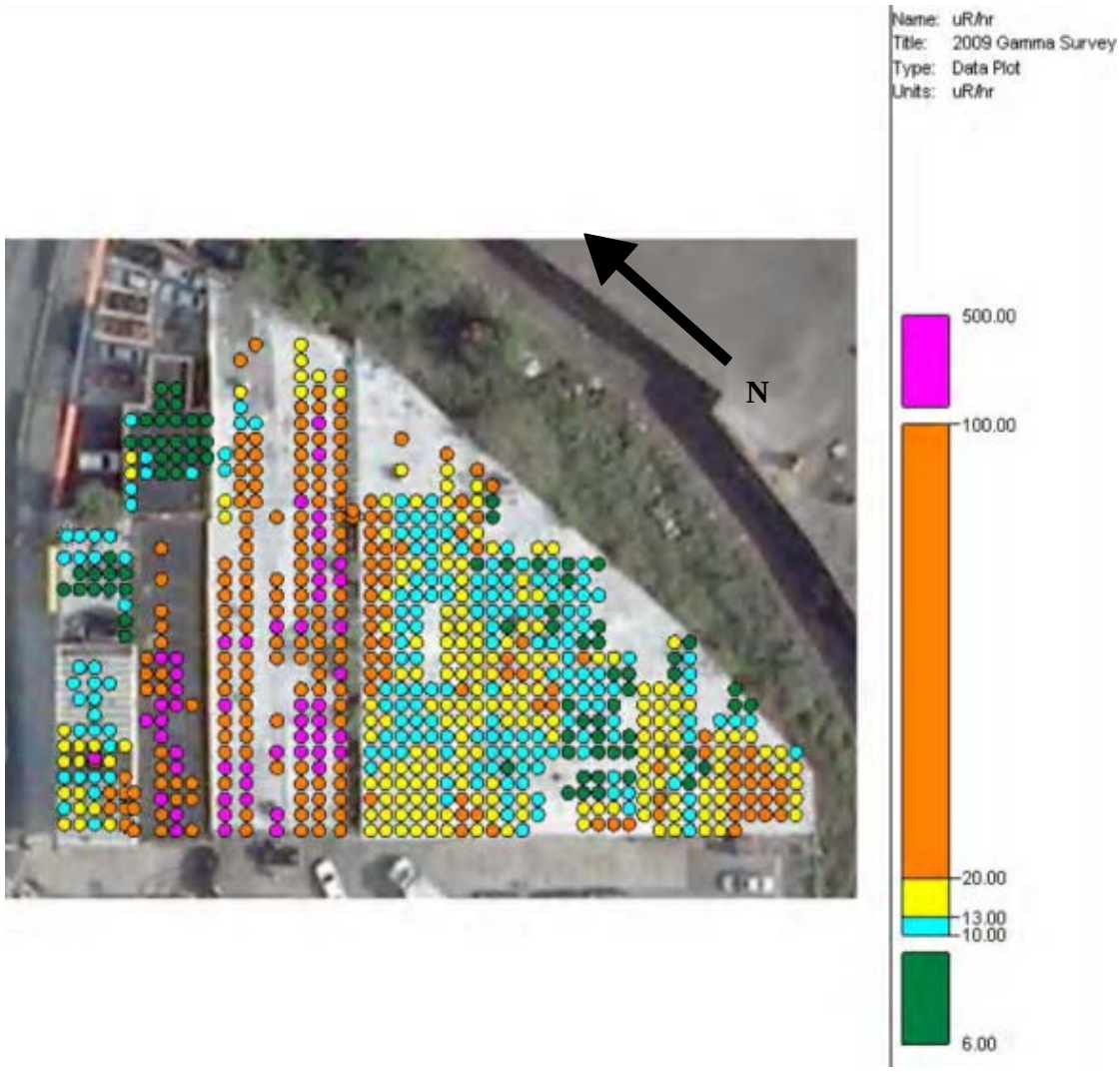

Figure 3-3 – Interior Gamma Survey Results
(Blank areas were not surveyed due to the presence of cars, ice machines, and materials on pallets or shelves; and survey unit A-1 indicates radiation levels in the basement)

Discussion:

As can be seen in Figure 1-4, the southern section of the property, in the 1954 photograph, appears to have been an exterior staging yard, with what may be piles of monazite and/or waste tailings somewhat visible. The gamma readings in this part of the present building (survey area A-5 and A-6) as well as the subsurface samples (discussed later) indicate background to moderate levels of radioactivity under the slab, probably residual monazite and tailings from the former storage yard.

The original Wolff-Alport processing buildings shown in Figure 1-4 show relatively high gamma and subsurface radioactivity levels (survey areas A-2, A-3, and A-4, Jarabacoa Deli Grocery Corp at 1125 Irving Avenue, Primo Auto Body at 1127 Irving Avenue, and S&M Construction at 1129 Irving Avenue, respectively). This is discussed further in Section 3.5.

3.4 Determination of Soil Sampling Locations

Locations for both interior and exterior soil sample collection were determined based on the surface gamma readings shown in Figures 3-2 and 3-3, historical information, and professional judgment. Both hot spots and moderate spots were chosen as well as a few near-background spots under which deeper contamination was suspected. 21 surface soil samples (exterior) and 28 subsurface samples (14 interior and 14 exterior) were collected. One sewer sample was also collected.

The subsurface samples were collected using a Geoprobe™ system with a 2" diameter soil core to depths ranging from 10 to 20 feet. After extraction from the ground, the soil cores were laid out on plastic sheeting until the remaining borehole was gamma logged. A Ludlum 44-62 scintillation probe was used to perform the logging in 6" depth increments. When the depth at which the maximum gamma reading was determined, the radioactivity in the corresponding core section (laying on the plastic sheeting) was confirmed with a Ludlum 44-9 GM probe to account for possible core compaction. The core section corresponding to the maximum gamma logging depth was collected in a sample container. These samples were analyzed via gamma spectroscopy at the laboratory. The subsurface sampling locations are shown in Figure 3-4.

Locations for surface samples were chosen in areas in which core sampling was not performed due to obstructions or to further investigate elevated gamma readings. All surface samples were collected outdoors because all interior areas were covered in concrete, the presence of which could impede the detection of contamination. The surface sampling locations are shown in Figure 3-5.

Figure 3-4 – Subsurface Soil Sampling and Gamma Logging Locations

Figure 3-5 – Surface Soil Sampling Locations

3.5 Results of Soil Sampling and Gamma Logging

The results of gamma spectroscopic analysis of surface and sub-surface soil samples are shown in Table 3.2 along with the depth of sample collection. The results are color-coded, showing thorium concentrations as red if readings were > 55 pCi/g above background, brown if reading were 5 to 55 pCi/g above background, and black if readings were < 5 pCi/g above background. The use of 55 pCi/g was an arbitrary value used to indicate a level that is substantially above background and to enhance the readability of the map. Based on background levels in the Long Island area (0.5 – 1.0 pCi/g Th-232), a value of 1 pC/g is assumed for the site. Therefore, for example, a result of 5.6 pCi/g is considered to be less than 5 pCi/g above background and would be colored black in Table 3.2.

The results of gamma logging measurements are shown in Table 3.3. The results are color-coded, showing the highest gamma logging levels (> 500 µR/hr) in red that approximate thorium concentrations > 55 pCi/g , intermediate gamma logging levels (45 µR/hr to 500 µR/hr) in brown that approximate thorium concentrations from 5 to 55 pCi/g above background, and black < 45 µR/hr, approximating <5 pCi/g above background. (These correlations between µR/hr in a gamma logging manhole to the surrounding thorium concentration in soil were developed in the investigators' past work at other thorium-contaminated sites[2]. Such correlations and estimates of radionuclide concentration in soil are very approximate and thus have uses limited to scoping surveys and other specialized investigations.)

A graphical representation of the soil and gamma logging results is displayed on the site map in Figure 3-6. The color-coding shows thorium concentrations as red if > 55 pCi/g, orange: 5 to 55 pCi/g, green: < 5 pCi/g above background, green with red dot: < 5 pCi/g above background with hot gamma log. The red dotted line/circle identifies the area of deep contamination and the green with red dot

[2] A gamma logging study conducted at the WGGM Superfund site resulted in a downhole gamma exposure rate to soil concentration factor of 5.3 uR/hr per pCi/g Ra-226+Th-232 series concentration. This factor applies to homogenous concentrations in a volume of soil. Inhomogeneities would cause significant uncertainties in estimates of radionuclide concentrations from gamma logging data.

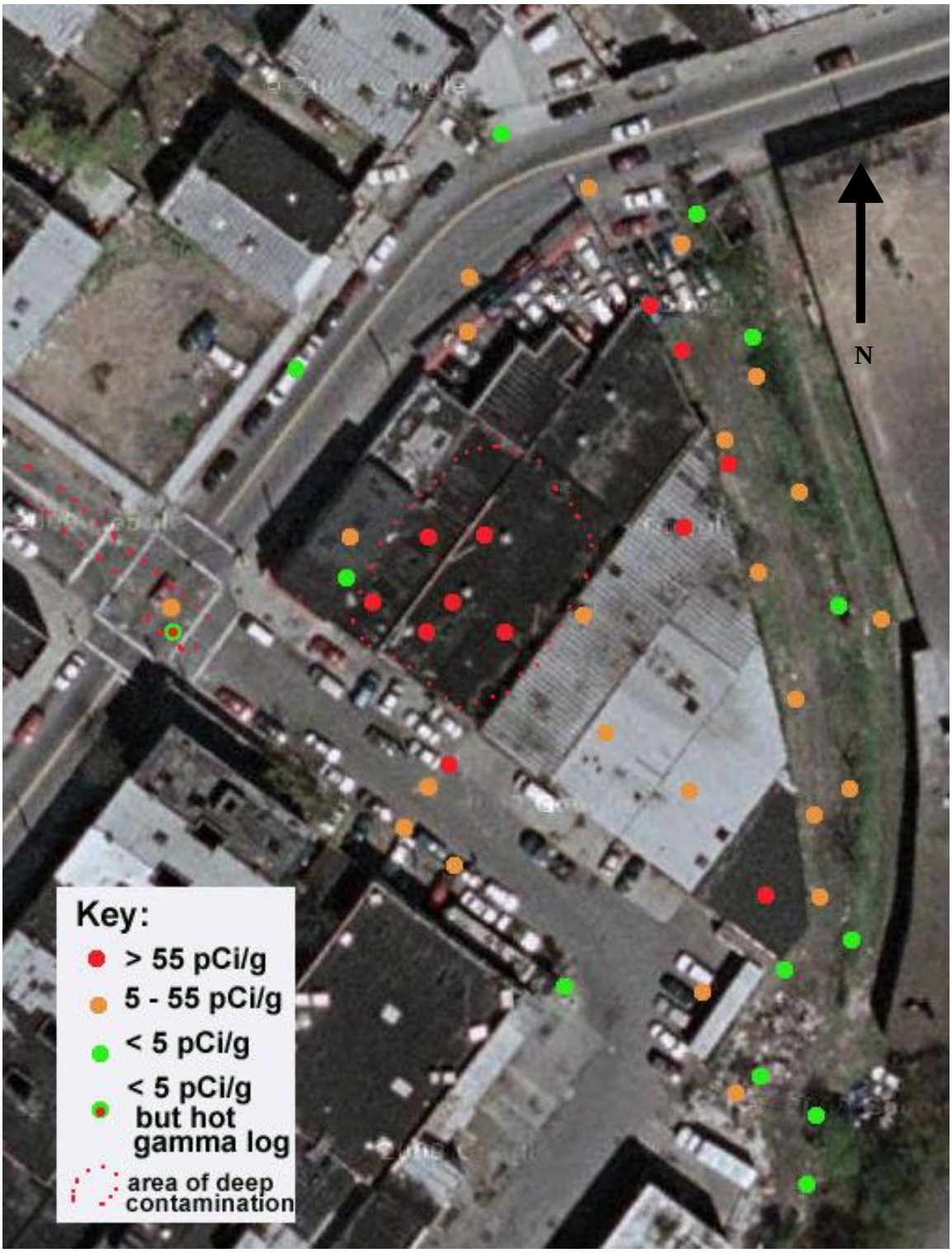

Figure 3-6 – Graphical Representation of Soil Sample Analysis Results

Discussion:

Areas affected by FWACC waste tailings

The depth, concentration range, and appearance of contamination are fairly similar under survey areas B-3 (Irving Avenue and Moffat Street), B-2 (the rail spur), and A-5 / A-6 (the former storage yard, 1129 and 1133-1139 Irving Avenue, now the Arctic Glacier Losquadro Inc. warehouse at the southern end of the building). The appearance of the material in the contaminated soil layer appears to be a black or gray, ash-like material, undoubtedly the waste tailings from the FWACC operations. The depth of contamination is typically within the top 1 to 4 feet of the surface and is due to surface deposition of tailings.

Areas affected by FWACC process thorium

Deeper contamination exists under the original Wolff-Alport buildings (Jarabacoa Deli Grocery Corp at 1125 Irving Avenue and Primo Auto Body at 1127 Irving Avenue) down to 15 to 20 feet or more, with thorium concentrations ranging from 100's to 1100 pCi/g. Observations of soil cores and measurement results indicate that the upper-most 4 feet of contamination appears to be similar tailings as was observed over the rest of the Site. However, there is a lens of deeper contamination at about 8 to 10 feet in depth. It is interesting to note that no tailings or ash-like material is visible in the deep cores, only native sand containing high radioactivity levels sometimes in a relatively thin band (see Table 3.3 - Gamma Logging Results, Manholes A3-B, A3-A, A2-A and A2-B.)

Manhole A2-A, in particular, shows high levels in the top 4 feet, a lens at 8 - 9 feet, and then moderately elevated readings down to 20 feet and probably deeper. This deep contamination below 4 feet appears to be due to soluble thorium leaching down through the sand rather than the burial of tailings. An acidic odor was also noticeable near some of the cores. It is possible that releases from the former thorium purification process occurred. Such processes normally use strong acids, such as nitric or hydrofluoric acid, to dissolve and purify the metals of interest and documents from DOE identified sulfuric acid in the process used by Wolff-Alport.

A very approximate estimate of the real extent of deep contamination (> 8 feet deep) under the original Wolff Alport processing building is also shown in Figure 3-6 as a dotted red circle. Also shown is the other location of deep contamination, the sewer down the middle of Irving Avenue. These very rough estimates of the area of deeper contamination are only provided as a guide for discussion. Further sampling would be necessary to properly delineate and quantify the contaminated volume of soil.

1127 Irving Avenue, Jarabacoa Deli Grocery Corp Basement

The building presently housing the delicatessen on the corner of Cooper Avenue and Irving Avenue (1125 Irving Avenue, Jarabacoa Deli Grocery Corp) is the only structure on the block with a basement. Because it was constructed before operation of the FWACC, buried tailings were not expected as was confirmed by the generally low gamma levels there. However, the building's basement is adjacent to the contaminated soil under the FWACC Kiln-Vat Building.

The adjacent contamination is detectable via gamma measurement at one spot along the southern brick wall. A sub-slab soil sample (A1B) collected near the wall showed an acceptable thorium concentration but a slightly elevated gamma logging level, possibly detecting nearby contamination not yet reaching the soil at that spot. Another sample, A1A, collected from soil in a manhole used as a floor drain, showed both an elevated thorium concentration (21 pCi/g) and elevated gamma logging reading. It is not clear whether the source of this elevated reading is migration from the adjacent Kiln/Vat Building or prior backwash from the sewer system.

Table 3.2 - Surface and Subsurface Soil Analysis Results

				Radionuclide Concentration (per wet mass)												
LAB	Location	Depth	Date	Radium-226			Thorium-232			Potassium-40			Mass	
ID		(feet)	Collected	(pCi/g)			(pCi/g)			(pCi/g)			(g-wet)	(g-dry)
692-1	**M-2**	0.5	7/24/09	7.1	±	0.6	**38.2**	±	**2.2**	19.0	±	1.9	291.1	273.0
692-2	**M-1**	sewer	7/23/09	8.4	±	1.1	**81.3**	±	**4.6**	12.2	±	0.8	86.0	58.8
716-01	B1A	2	11/12/09	0.7	±	0.1	1.3	±	0.1	11.4	±	0.7	382.1	347.4
716-02	**B3B**	0-1	11/12/09	27.5	±	1.4	**143.7**	±	**7.2**	24.3	±	1.5	335.3	314.4
716-03	**B3C**	0-1	11/12/09	12.0	±	0.6	**40.6**	±	**2.1**	16.4	±	1.3	323.4	302.2
716-04	B3A	8'-9'	11/12/09	0.6	±	0.0	2.1	±	0.1	12.0	±	0.6	383.1	361.5
716-05	**B1B**	0-0.5	11/12/09	2.8	±	0.2	**10.4**	±	**0.6**	12.1	±	1.0	268.7	250.9
716-06	B1C	1.5	11/12/09	0.52	±	0.03	1.4	±	0.1	13.6	±	0.7	337.7	305.3
716-07	**B3D**	0-0.5	11/12/09	2.2	±	0.2	**10.2**	±	**0.6**	7.1	±	0.6	457.1	416.1
725-01	**A2B**	0.5-1	12/16/09	154.2	±	17.8	**1133.4**	±	**68.4**	0.0	±	0.0	121.2	101.2
725-02	**A4A**	0.5-1.5	12/16/09	24.8	±	2.3	**169.6**	±	**9.7**	20.7	±	6.2	281.8	251.2
725-03	**A3A**	0.5-1.5	12/16/09	0.8	±	1.9	**202.3**	±	**11.8**	3.7	±	8.6	169.9	128.8
725-04	**A2A**	8.5-9	12/16/09	0.1	±	4.5	**476.9**	±	**28.2**	58.0	±	20.5	142.0	123.2
725-05	**A3B**	0.5-1.5	12/16/09	58.1	±	3.6	**424.7**	±	**22.1**	22.9	±	5.2	361.9	329.8
725-06	**A1A**	0.5-1.5	12/16/09	1.2	±	0.1	**21.2**	±	**1.1**	7.9	±	0.8	136.1	82.4
725-07	**A6C**	0.5-1.5	12/12/09	12.9	±	0.9	**75.9**	±	**4.1**	10.8	±	2.5	298.0	275.4
725-08	**A5A**	1-1.5	12/13/09	6.2	±	0.5	**44.6**	±	**2.4**	11.4	±	1.8	323.2	279.4
725-09	A1B	0.5-1	12/16/09	0.8	±	0.2	2.8	±	0.3	11.3	±	1.5	240.3	203.8
725-10	**A6B**	0.5-1.5	12/12/09	8.9	±	0.6	**45.2**	±	**2.5**	12.6	±	1.4	410.2	375.6
725-11	**A5B**	0.5-1.5	12/16/09	20.7	±	1.3	**77.4**	±	**4.2**	16.3	±	3.1	191.1	170.8
725-12	**A6A**	0.5-1.0	12/16/09	3.2	±	0.2	**13.2**	±	**0.8**	15.4	±	1.4	196.7	181.4
725-13	**A3C**	0.5-1.0	12/13/09	12.4	±	0.8	**73.4**	±	**3.9**	25.8	±	2.9	188.9	163.3
725-14	B2D	0-1	12/12/09	1.2	±	0.1	3.7	±	0.3	8.3	±	0.7	213.7	172.4
725-15	**B2A**	0-1	12/13/09	5.5	±	0.3	**28.8**	±	**1.5**	8.1	±	1.0	311.3	275.1
725-16	**B1D**	2"-1'	12/12/09	3.7	±	0.3	**15.2**	±	**0.9**	13.9	±	1.4	190.0	184.8
725-17	**B2B**	0-1	12/12/09	7.9	±	0.6	**99.5**	±	**5.2**	7.9	±	1.6	373.3	312.4
725-18	B2C	0-1	12/12/09	1.3	±	0.1	5.5	±	0.4	6.2	±	0.7	376.9	300.2
725-19	**B2F**	0-0.5	12/12/09	5.5	±	0.4	**20.7**	±	**1.1**	12.5	±	1.2	302.6	255.7
725-20	**B2E**	2-2.5	12/12/09	27.1	±	1.5	**207.8**	±	**10.5**	27.6	±	2.5	314.1	268.7
725-21	B2G	4'-5'	12/12/09	2.0	±	0.1	1.9	±	0.1	8.6	±	0.5	192.6	139.9
725-22	B2S1	surface	12/16/09	0.3	±	0.0	0.5	±	0.1	4.5	±	0.5	349.5	179.9
725-23	**B2S2**	surface	12/16/09	25.1	±	1.7	**471.8**	±	**24.1**	49.4	±	5.2	196.7	125.1
725-24	**B2S3**	surface	12/16/09	1.9	±	0.2	**9.7**	±	**0.6**	7.9	±	0.9	202.7	148.3
725-25	**B2S4**	surface	12/16/09	5.0	±	0.3	**25.3**	±	**1.3**	12.2	±	1.0	296.1	249.3
725-26	**B2S5**	surface	12/16/09	3.5	±	0.2	**17.9**	±	**0.9**	9.2	±	0.7	263.1	198.6
725-27	**B2S6**	surface	12/16/09	2.2	±	0.2	**12.0**	±	**0.7**	11.9	±	1.0	257.5	201.5
725-28	**B2S7**	surface	12/16/09	3.8	±	0.2	**18.3**	±	**1.0**	9.4	±	0.7	229.7	172.5

Table 3.2 – continued

				Radionuclide Concentration (per wet mass)													
LAB	Location	Depth	Date	Radium-226				Thorium-232				Potassium-40				Mass	
ID		(feet)	Collected	(pCi/g)				(pCi/g)				(pCi/g)				(g-wet)	(g-dry)
725-29	**B2S8**	surface	12/16/09	2.5	±	0.2		**17.0**	±	**0.9**		9.3	±	0.9		296.3	224.2
725-30	**B2S9**	surface	12/16/09	2.2	±	0.2		**12.1**	±	**0.7**		8.6	±	0.8		283.4	216.7
725-31	**B2S10**	surface	12/16/09	1.9	±	0.2		**10.9**	±	**0.7**		10.8	±	1.2		293.1	272.0
725-32	B2S11	surface	12/16/09	1.1	±	0.1		2.1	±	0.1		10.0	±	0.5		357.1	308.6
725-33	B2S12	surface	12/16/09	2.4	±	0.1		5.4	±	0.3		10.7	±	0.6		297.4	248.8
725-34	B2S13	surface	12/16/09	0.9	±	0.1		0.8	±	0.1		8.0	±	0.7		330.3	247.6
725-35	**B2S14**	surface	12/16/09	1.9	±	0.1		**8.2**	±	**0.5**		9.2	±	0.6		350.8	294.4
725-36	B2S15	surface	12/16/09	1.4	±	0.1		4.7	±	0.3		8.1	±	0.5		359.8	267.0
725-37	B2S16	surface	12/16/09	1.3	±	0.1		2.5	±	0.2		7.6	±	0.6		304.0	234.7
725-38	**B3S1**	surface	12/16/09	3.1	±	0.2		**13.7**	±	**0.8**		7.9	±	0.7		531.4	467.7
725-39	**B3S2**	surface	12/16/09	1.3	±	0.1		**7.8**	±	**0.4**		7.5	±	0.5		467.9	418.6
725-40	**B1S2**	surface	12/16/09	3.6	±	0.2		**13.7**	±	**0.7**		8.1	±	0.6		422.0	356.5
725-41	B1S3	surface	12/16/09	1.3	±	0.1		5.9	±	0.3		5.7	±	0.3		379.7	296.3

Bold text in brown indicates thorium results > 5 pCi/g above background but < 55 pCi/g

Bold text in red indicates thorium results > 55 pCi/g

Table 3.3 - Gamma Logging - Downhole Gamma Exposure Rate (µR/hr)

Depth	Gamma Logging - Downhole Gamma Exposure Rate (uR/hr)																					
(ft)	B2-G	B2-F	B2-D	B2-E	B2-C	B2-B	B2-A	B1-D	A6-C	A6-A	A6-B	A5-A	A3-C	A3-B	A3-A	A4-A	A5-B	A6-D	A2-A	A2-B	A1-A	A1-B
0.0	54	128	70	516	67	597	211	53	116	28	117	127	91	395	615	778	307	14	765	2095	331	62
0.5	150	139	66	1330	70	1105	555	86	771	71	389	442	265	1174	1643	2325	88	31	2252	5044	884	76
1.0	126	63	45	1838	49	660	239	33	486	110	502	782	118	2937	2693	275	459	24	3919	6498	1258	60
1.5	42	30	31	2179	36	142	80	23	304	40	414	653	713	3656	2124	1118	89	20	3803	5083	944	46
2.0	26	21	29	2106	26	47	40	21	314	28	441	259	446	2367	844	450	44	21	3453	2736	489	62
2.5	24	19	24	1033	24	24	31	21	292	24	277	74	255	1800	524	264	28	23	2808	1605	290	33
3.0	29	23	21	694	25	23	25	21	218	25	76	32	164	1471	345	226	24	22	3211	1295	131	24
3.5	36	21	18	199	24	22	23	21	93	26	34	27	57	1152	139	290	23	23	1873	859	41	21
4.0	43	20	22	72	26	23	22	20	56	24	27	24	40	1286	92	579	25	21	1071	578	44	byhand
4.5	46	20	24	40	25	25	24	22	39	20	28	26	36	1767	74	359	36	20	801	309	byhand	
5.0	45	19	23	33	24	21	24	24	28	23	33	25	30	1977	87	148	30	19	729	209		
5.5	37	17	22	28	24	24	23	27	28	23	21	24	28	2255	52	118	23	20	588	204		
6.0	22	20	19	26	22	24	26	26	26	24	19	24	27	2083	65	254	23	24	500	263		
6.5	21	20	20	26	24	26	25	25	28	22	18	24	26	1785	80	273	25	21	380	340		
7.0	24	19	21	26	22	27	25	23	26	23	19	19	23	1656	50	78	21	refus	467	690		
7.5	27	20	26	23	23	24	24	22	25	27	20	18	21	2622	53	64	21		374	1333		
8.0	30	20	30	26	23	27	26	21	25	26	21	20	21	2574	54	43	24		572	1123		
8.5	26	19	28	26	21	24	25	20	37	25	19	23	24	1824	81	38	25		1722	1206		
9.0	25	23	25	25	refus	24	26	19	45	22	18	25	30	1537	244	70	31		1339	1118		
9.5	27	23	25	25		25	25	20	refus	25	18	26	refus	1645	463	160	refus		789	1213		
10.0	26									25	21			1793	1023				414	384		
10.5														4016	2254				244	208		
11.0														4216	665				292	87		
11.5														1804	190				280	107		
12.0														427	61				290	37		
12.5														113	35				365	35		
13.0														62	26				306	42		
13.5														67	23				321	81		
14.0														75	30				292	79		
14.5														40	31				335	83		
15.0														30	29				386	49		
15.5														29	26				451	22		
16.0														26	25				401	23		
16.5														25	24				364	26		
17.0														25	22				416	31		
17.5														26	22				342	26		
18.0														26	22				449	25		
18.5														28	22				576	23		
19.0														26	21				507	19		
19.5														29	23				453	24		
20.0														59	34					80		

Bold text in brown indicates an estimated thorium concentration > 5 pCi/g above background but < 55 pCi/g
Bold text in red indicates an estimated thorium concentration > 55 pCi/g

3.6 Interior Surface Contamination Measurements

Selected building surfaces (mainly floors) were measured for the presence of removable and fixed alpha contamination. Smear samples were collected in survey areas A-1 through A-7, detailed in the table below:

Survey Areas	Description	Address	Approx. Width (ft)
A-1	Jarabacoa Deli Grocery Corp (basement)	1125 Irving Ave	25
A-2	Primo Auto Body, (storage area)	1127 Irving Ave	20
A-3	Primo Auto Body (body shop)	1127 Irving Ave	25
A-4	S&M Construction (warehouse)	1129 Irving Ave	20
A-5	Arctic Glacier Losquadro, Inc. (warehouse)	1129 Irving Ave	35
A-6	Arctic Glacier Losquadro, Inc. (warehouse)	1129 Irving Ave, 1133-39 Irving Ave	75 40
A-7	Primo Flat Fix, Mini Shop, K & M Auto Repair (interior areas)	1125 Irving Ave, 15-14 Cooper Ave	

The results are included with the interior gamma survey results in Appendix A.

Discussion:

Only one (1) smear sample showed alpha results greater than background (Smear #38, 106 alpha dpm/100 cm^2) in Primo Auto Body (survey area A-3, 1127 Irving Avenue) on the floor near a drain-hole. This is approximately equal to the guideline level shown in Table 2.1. In March, 2010, additional smears were collected in the area to investigate this elevated result. A repeat smear of the spot and seven (7) nearby smears showed no elevated levels (samples A3-1 to A3-8, at the end of Appendix A). A 0.7 gram sample of dirt from the nearby floor drain was also collected and analyzed via gross alpha and gross beta. No elevated concentration of radioactivity was found in this dirt (Sample A3-9, Appendix A). Apparently, the original smear #38 had randomly picked-up particle of thorium,-bearing from the floor.

Direct alpha readings of the floors also showed some detectable alpha radioactivity in a few areas ranging from 400 to 700 dpm/100 cm^2 in area A-1 (Jarabacoa Deli Grocery Corp delicatessen basement at 1125 Irving Avenue) and in areas A-2 and A-3 (Primo Auto Body at 1127 Irving Avenue). These spots are within the maximum guideline value, 2500 dpm/100 cm^2 (listed in Table 2.1) and the entire area of each unit appears to be within the 500 dpm/100 cm^2 average guideline.

The alpha activity in the Jarabacoa Deli Grocery Corp delicatessen basement at 1125 Irving Avenue could be due to backwash of contamination from the floor drain discussed in Section 3.5. The alpha activity in Primo Auto Body (1127 Irving Avenue) could be due to tracking of contamination from other areas of the Site or had been left from the original FWACC operation. The levels are low and highly fixed as is evident from the lack of removable alpha activity detected, other than smear #38.

The other interior survey areas (A-4, S&M Construction at 1129 Irving Avenue A-5, Arctic Glacier Losquadro, Inc. at 1129 Irving Avenue, A-6, Arctic Glacier Losquadro, Inc. at 1129 and

1133-1139 Irving Avenue and A-7, Primo Flat Fix, Mini Shop, K & M Auto Repair at 1125 Irving Avenue and 15-14 Cooper Avenue) showed no detectable alpha activity. These areas have relatively new concrete floors which are still radiologically clean. Foot or tire tracking of radioactivity from other areas of the Site has not significantly occurred on these floors.

The original wooden ceiling beams in area A-2 (the original kiln/vat building) appeared blackened and damaged due to rot or heating. These were scanned with a Ludlum 44-9 GM probe. The brick archways in kiln/vat area were also scanned. All readings were at background.

The surface contamination measurement results are shown in Table 3.4.

Table 3.4 – Surface Contamination Measurement Results

Project: FWACC
Dates Smears Analyzed: 1/6/10, 3/18/10

Type: smear samples & direct alpha
Dates Collected: 11/18-19/09, 12/15/09
3/18/2010

Sample	Date Collected	Smear samples Gross Alpha (dpm + 1 sig)	Smear samples Gross Beta (dpm + 1 sig)	Area (cm^2)	Description	Direct Alpha (dpm/100 cm2)
1	11/18/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 1	210
2	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 2	14
3	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 3	154
4	11/18/2009	0.7 ± 1.2	4.5 ± 3.1	100	Wipe - Loc 4	14
5	11/18/2009	0.6 ± 1.2	5.9 ± 3.3	100	Wipe - Loc 5	0
6	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 6	0
7	11/18/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 7	0
8	11/18/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 8	14
9	11/18/2009	-0.8 ± 0.7	5.5 ± 3.2	100	Wipe - Loc 9	182
10	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 10	154
11	11/18/2009	-0.7 ± 0.7	-1.6 ± 2.3	100	Wipe - Loc 11	70
12	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 12	210
13	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 13	14
14	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 14	0
15	11/18/2009	-0.7 ± 0.7	-1.6 ± 2.3	100	Wipe - Loc 15	0
16	11/18/2009	0.7 ± 1.2	1.6 ± 2.8	100	Wipe - Loc 16	70
17	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 17	0
18	11/18/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 18	210
19	11/18/2009	0.0 ± 1.0	-1.1 ± 2.4	100	Wipe - Loc 19	0
20	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 20	98
21	11/18/2009	-0.7 ± 0.7	3.4 ± 3.0	100	Wipe - Loc 21	0
22	11/18/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 22	0
23	11/18/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 23	0
24	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 24	0
25	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 25	182
26	11/18/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 26	0
27	11/18/2009	1.4 ± 1.4	0.7 ± 2.7	100	Wipe - Loc 27	70
28	11/18/2009	0.0 ± 1.0	0.4 ± 2.6	100	Wipe - Loc 28	0
29	11/18/2009	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - Loc 29	70
30	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 30	126
31	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 31	70
32	11/18/2009	-0.7 ± 0.7	4.1 ± 3.1	100	Wipe - Loc 32	98
33	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 33	434
34	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 34	154
35	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 35	0
36	11/19/2009	1.4 ± 1.4	1.5 ± 2.8	100	Wipe - Loc 36	294
37	11/19/2009	1.4 ± 1.4	2.9 ± 2.9	100	Wipe - Loc 37	126
38	11/19/2009	106.4 ± 8.7	88.4 ± 9.0	100	Wipe - Loc 38	0
39	11/19/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 39	0
40	11/19/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 40	42
41	11/19/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 41	406
42	11/19/2009	0.7 ± 1.2	0.9 ± 2.7	100	Wipe - Loc 42	154
43	11/19/2009	0.0 ± 1.0	1.1 ± 2.7	100	Wipe - Loc 43	126
44	11/19/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 44	98
45	11/19/2009	0.0 ± 1.0	1.1 ± 2.7	100	Wipe - Loc 45	182
46	12/15/2009	0.0 ± 1.0	5.4 ± 3.2	100	Wipe - Loc 46	602

Table 3.4 – continued

Sample	Date Collected	Gross Alpha (dpm + 1 sig)	Gross Beta (dpm + 1 sig)	Area (cm^2)	Description	Direct Alpha (dpm/100 cm2)
47	12/15/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 47	0
48	12/15/2009	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - Loc 48	350
49	12/15/2009	0.7 ± 1.2	0.9 ± 2.7	100	Wipe - Loc 49	14
50	12/15/2009	1.4 ± 1.4	0.7 ± 2.7	100	Wipe - Loc 50	42
51	12/15/2009	0.0 ± 1.0	5.4 ± 3.2	100	Wipe - Loc 51	714
A	12/15/2009	1.1 ± 0.9	2.7 ± 2.1	100	Wipe - Loc A	9
B	12/15/2009	-0.4 ± 0.6	3.7 ± 2.1	100	Wipe - Loc B	0
C	12/15/2009	0.0 ± 0.7	0.4 ± 1.8	100	Wipe - Loc C	0
D	12/15/2009	-0.7 ± 0.5	1.6 ± 1.9	100	Wipe - Loc D	0
E	12/15/2009	-0.7 ± 0.5	-0.5 ± 1.7	100	Wipe - Loc E	0
A3-1	3/18/2010	0.0 ± 0.7	1.8 ± 2.0	100	Wipe - Loc 38 retest	
A3-2	3/18/2010	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - 4' S of 38	
A3-3	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - drain rim	
A3-4	3/18/2010	0.0 ± 1.0	-1.1 ± 2.4	100	Wipe - 4' N of 38	
A3-5	3/18/2010	0.7 ± 1.2	-0.5 ± 2.5	100	Wipe - 4' N,2'W of 38	
A3-6	3/18/2010	0.0 ± 1.0	3.9 ± 3.0	100	Wipe - 2' W of 38	
A3-7	3/18/2010	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - 4' S,2'W of 38	
A3-8	3/18/2010	3.5 ± 1.9	8.2 ± 3.6	100	Wipe - 5' E of 38	
A3-9	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	0.741 g	dirt from drain near 38	
A1-23x12	12/15/2009	n/a	n/a		beam above 51	42
MDA's		3.3	8.3			80 (L_c)

Method: Gas Proportional Counting using a Canberra Model 2404F Alpha/Beta Counting System (Serial # 790347)
Uncertainties are 1-sigma counting errors.
Alpha standard radionuclide: Pu-239 Beta standard radionuclide: Sr/Y-90
Standards are traceable to the National Institute of Standards and Technology.
CoPhysics Corporation Radioactive Materials License: NYS 2691-3949

3.7 Radon / Thoron Measurements

Radon-222 and Radon-220 integrated concentration measurements were performed using Landauer Alpha Track (RadTrack™) detectors. The detectors' entry ports have specialty membranes which allow diffusion of radon only (radon detector) or thoron + radon (thoron detector). The individual thoron and radon results are calculated from each pair of detectors and are shown in the following table:

Table 3.5 - Radon and Thoron Measurement Results

Survey Area	Description	Radon Detector #	Radon-222 (pCi/l)	Thoron Detector #	Radon-220 (Thoron) (pCi/l)
A1	1125 Irving Avenue, Jarabacoa Deli Grocery Corp Basement	4792802	1.4 ± 0.1	4808565	12.7 +- 0.4
A2	1127 Irving Avenue, Primo Auto Body Storage Bay	4792798	1.4 ± 0.1	4808548	0.8 +- 0.2
A3	1127 Irving Avenue Primo Auto Body Main Work Area	4792808	1.6 ± 0.1	4808554	1.8 +- 0.2

Time of exposure for all alpha track detectors: 11/30/09 to 3/8/10 (98 days)
Note: USEPA recommended guideline for radon concentration in homes: 4 pCi/liter

Discussion:

The main result of interest above is the 12.7 pCi/l thoron concentration in the Jarabacoa Deli Grocery Corp delicatessen basement at 1125 Irving Avenue. The basement's proximity to the thorium-contaminated soil on the south side of the basement, holes in its slab, and its lack of ventilation all contribute to the elevated thoron level. This radon detector was hung from the ceiling joist near the hot water heater about 3 to 4 feet from the wall exhibiting the elevated gamma readings.

Because the 1125 Irving Avenue, Jarabacoa Deli Grocery Corp delicatessen basement is used for storage, and food items are sealed/packaged, and no individual spends significant amounts of time there, there is not an immediate health concern. Radon/thoron tests of the upper floors are recommended for future studies to determine if thoron seepage into upper floors is occurring.

The low radon levels in the 1127 Irving Avenue Primo Auto Body storage and work bays are probably due to the poor air-tightness of these structures, thus providing fresh air to dilute the radon and thoron levels.

4.0 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

4.1 Soil Sample Analysis

The soil boring samples and surface samples were collected during several sampling events conducted on July 23 and 24, November 12, and December 12 and 16, 2009 using the protocols included in the FWACC Sampling, Monitoring and Analysis Plan. Forty nine (49) soil samples and one (1) sewer sample were collected.

The samples collected were analyzed using HPGe gamma spectroscopy at CoPhysics Corporation. The 609 kilo-electron volt (keV) gamma ray line from Bi-214 was used for radium-226 determination and the 911 keV line from Ac-228 was used for thorium-232 determination. The method used is equivalent to Method GA-01-R,"Gamma Radioassay" from the HASL-300 Manual (DOE, 1997), and the method is one of the EPA methods approved for determination of gamma emitters in drinking water. The results listed in Table 3.2 are in units of pCi/g wet weight (*in situ* concentration). After counting, the samples were dried and reweighed. The dry weights are also included in Table 3.2 should the reader wish to have information regarding moisture content or calculate concentration per unit dry mass.

Duplicate Analysis

Due to the small sample sizes and inhomogeneity of contaminants in the environment, field duplicate sample collection is not possible. Therefore, duplicate testing was performed by reanalysis of at least 5% of the samples. The results are shown in Table 4.1.

Blank Analysis

A de-ionized water sample was analyzed as the blank sample. The results are shown in Table 4.1.

Reference (or Spike) Sample Analysis

Various types of reference samples are routinely analyzed as quality control checks. These include internal lab standards, IAEA and DOE intercomparison study samples, and National Institute of Standards and Technology (NIST) traceable standards. The results of those checks performed during the FWACC analysis period are shown in Table 4.1

Results of QC Sample Analysis

The results of QC sample analysis shown in Table 4.1

Table 4.1 - Soil Analysis QC Samples

LAB ID	Location	Depth (feet)	Radionuclide Concentration: Radium-226 (pCi/g)			Thorium-232 (pCi/g)			Potassium-40 (pCi/g)		
Duplicates											
716-6dup	B1C	1.5	0.55	±	0.03	0.69	±	0.04	10.7	±	0.6
716-06	B1C	1.5	0.52	±	0.03	1.4	±	0.1	13.6	±	0.7
725-8dup	A5A	1-1.5	6.4	±	0.6	42.2	±	2.4	8.9	±	2.5
725-08	A5A	1-1.5	6.2	±	0.5	44.6	±	2.4	11.4	±	1.8
725-2dup	A4A	0.5-1.5	33.7	±	2.0	209.6	±	10.9	14.7	±	4.2
725-02	A4A	0.5-1.5	24.8	±	2.3	169.6	±	9.7	20.7	±	6.2
725-19dup	B2F	0-0.5	5.7	±	0.5	19.5	±	1.5	8.4	±	2.1
725-19	B2F	0-0.5	5.5	±	0.4	20.7	±	1.1	12.5	±	1.2
716-1dup	B1A	2.0	0.8	±	0.1	1.0	±	0.2	11.3	±	0.9
716-01	B1A	2.0	0.7	±	0.1	1.3	±	0.1	11.4	±	0.7
Reference Samples											
DI blank	DI		0.06	±	0.01	0.03	±	0.01	0.60	±	0.07
FI-gyp	result		28.0	±	1.5						
	reference value		26.0	±	1.3						
iaea-gyp	result		18.6	±	1.0						
	reference value		21.1	±	0.9						
EMLQAP58	result		2.1	±	0.2	1.3	±	0.1	13.6	±	1.1
	reference value		1.8	±	0.1	1.6	±	0.1	17.2	±	0.9
THstd-251	result					244.8	±	13.3			
	reference value					251.0	±	10.0			
EPA Pitch	result		45.5	±	2.3						
	reference value		46.6	±	2.3						

4.2 Instrumentation

All instruments used for the scoping survey were calibrated within 1 year of use and were source-checked on the day of use.

Results of gamma scintillation measurements for surface and sub-surface locations were recorded in counts per minute or counts per ½ minute. The count rate data was converted to exposure rate (µR/hr) using conversion factors determined during calibration to a Cs-137 gamma field in the laboratory. While the energy response of gamma scintillators to Cs-137 is somewhat different than that of Th-232 series gamma emitters in soil, they are sufficiently similar for the purposes of a scoping survey.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Sewers

The sewer under Irving Avenue is internally and/or externally contaminated with thorium extending from the Former Wolff-Alport Chemical Corporation (FWACC) connection point near Cooper Avenue westward to Eldert Street. External contamination is probably due to backfill of sewer installation trenches with FWACC tailings or is due to leakage of contaminated water into the soil from inside the sewer. Internal contamination is obviously due to residual liquid- or sludge-based thorium released from the FWACC. Sewer points downstream from Eldert Street were within normal, background levels because a greater flow of dilution water from other branches occurs at this point. Sewer access points on other streets adjoining the Site (Moffat Street and most of Cooper Avenue) were at background levels except for the two (2) manholes on Cooper Avenue nearest the Site at the intersection with Irving Avenue and near the K&M Auto Repair Shop.

At the intersection of Irving Avenue and Cooper Avenue, there is a layer of contamination about 8 feet deep under the intersection that is not detectable from the surface. As discussed in the paragraph above, this layer may have been backfilled external to the sewer during system maintenance or may be due to past leakage of thorium from the sewer into surrounding soil after being discharged from the FWACC.

As a result of these findings any workers involved in excavation activities in the streets or manhole entry (in Irving Avenue, north of Eldert Street) should work under a Site Specific HASP and follow appropriate equipment decontamination procedures. The NYCDOHMH prepared a Worker Factsheet (included as Appendix F) for the NYCDEP which outlined minimum requirements.

5.2 Contamination near the Ground Surface

Most of the Site areas to the south, east and west of the original FWACC buildings have somewhat elevated gamma radiation levels due to the presence of a 1- to 4-foot thick layer of contaminated soil. The appearance of the material in the contaminated soil layer is a black or gray, ash-like material, undoubtedly the waste tailings from the FWACC operations. These tailings reside under the asphalt of Irving Avenue and Moffat Street, under the concrete slab of the Arctic Glacier building, and within the surface soils of the rail spur behind the property. The depth of contamination is typically within the top 12” of soil under the pavement or ground surface, with occasional deeper areas down to 4 feet. Cooper Avenue, to the north of the Site, appears to be clean other than the sewer under the Irving Avenue intersection and at a few minor spots in front of the K&M Auto Repair Shop. The elevated readings on Moffat Street appear to drop off to background about 300 feet away from Irving Avenue. More distant measurements away from the city block containing the FWACC were not performed as part of this scoping survey. Future testing for contamination near the ground surface beyond the block of interest is recommended to bound the extents of possible offsite impact.

5.3 Deep Contamination

Deeper contamination exists under the original Wolff-Alport Buildings down to 15 to 20 feet or more, with thorium concentrations ranging from 100's to 1100 pCi/g. The upper-most 4 feet of contamination appears to be similar tailings as was observed over the rest of the Site. However, the deeper contamination appears to be a more soluble, leachable form of thorium probably process thorium dissolved in acid. The Department of Energy (DOE) Report on Monazite Sand, included in Appendix G, indicates that sulfuric acid and heat were used by Wolff Alport to break down monazite into its Thorium and Rare Earth components. It is likely that the original FWACC building on Irving Avenue housed kilns and vats used to create liquid-based forms of thorium via extraction from monazite sand. The outlines of the original brick archways through which material entered the process are still visible in the wall between the two Primo Auto Body bays, as shown in Figure 1-4. This is a more highly mobile form of thorium contamination that is unlike the tailings-based, insoluble forms normally seen in most thorium-contaminated sites in the northeast US. As such, further studies of ground water in the vicinity are highly recommended due to the apparent migration of thorium into the deeper layers. However, because in New York City there are no likely ground water users in the vicinity, the performance of additional testing is not considered urgent from a public exposure consideration.

The basement of the delicatessen (Jarabacoa Deli Grocery Corp, 1125 Irving Avenue) on the corner of Cooper Avenue and Irving Avenue is being affected by the adjacent bolus of thorium contamination under the original FWACC Kiln-Vat building. The adjacent contamination is detectable via gamma measurement through the southern brick wall of the basement. A small amount of contamination also appears to exist under the basement slab. It is not clear whether the source of this contamination is migration from the adjacent Kiln/Vat Building or was prior backwash from the sewer system into the sub-slab space. Regardless of the source, this contamination may require remediation based on future property use. Based on the results of this scoping survey, further studies of deep contamination are necessary to delineate and quantify the volume of contaminated soil.

5.4 Radon

Integrated radon concentration measurements in the basement of the Jarabacoa Deli Grocery Corp delicatessen at 1125 Irving Avenue conducted over a 3-month period indicated a concentration of 12.7 pCi/liter Rn-220 (thoron) and 1.4 pCi/liter Rn-222 (radon), the former being greater than the USEPA recommended guideline of 4 pCi/liter[3]. Based on the results of this scoping survey, further evaluations of radon and thoron are needed in occupied areas of 1125 Irving Avenue. In addition, future studies should consider the potential for impact offsite.

Both radon and thoron levels in the 2 bays of Primo Auto Body (1127 Irving Avenue) were well within the 4 pCi/l level probably due to the large amount of air infiltration through these older, poorly-sealed buildings.

[3] The USEPA has no specific guideline for thoron levels in homes, therefore the 4 pCi/l level adopted by USEPA Region 2 for both radon or thoron for the cleanup level in homes associated with the Welsbach Superfund Site in Camden, NJ was used as a reference guideline.

5.5 Surface Contamination

Surface contamination measurements in the Jarabacoa Deli Grocery Corp delicatessen at 1125 Irving Avenue and Primo Auto Body at 1127 Irving Avenue indicated a few readings on concrete floors with slightly elevated, but acceptable alpha radioactivity levels. One location in Primo Auto Body at 1127 Irving Avenue showed removable alpha contamination slightly higher than the selected radioactive contamination guideline for this survey. However, follow-up wipe tests in the immediate area showed no further elevated levels. Direct (fixed) alpha readings showed a few spots above background in the Jarabacoa Deli Grocery Corp delicatessen basement and Primo Auto Body, but the readings were within the selected maximum fixed alpha guideline level. These low-level contamination readings were probably due to foot tracking or water based migration of thorium from soils to the concrete surfaces. Floors in the remainder of the buildings have relatively new concrete or have been painted and have not yet experienced thorium migration or tracking from other parts of the Site. Based on the results of this scoping survey, further testing for surface contamination is not necessary.

5.6 General Summary

The Site contains relatively high levels of thorium contamination in soil extending to a depth of 20 or more feet directly under the original FWACC buildings (1127 Irving Avenue, Primo Auto Body, and 1125 Irving Avenue, Jarabacoa Deli Grocery Corp; Office; Primo Flat Fix; Mini Shop). The remainder of the city block surrounding the original FWACC building and some of the adjacent streets have underlying contaminated soil in the 1- to 4- foot depth range due to deposition of ash-like waste tailings spread out from the former operation.

The sewer line leading away from the FWACC has internal contamination extending four (4) blocks downstream. Some of the soils external to the sewer line are also contaminated due to sewer leakage or backfill with tailings during past maintenance excavation. There are currently no radiological hazards to workers at the Site, though sewer and excavation workers should abide the recommendations in Section 5.1 for Sewers. The Site will need substantial excavation to accomplish remediation, based on future site usage and federal cleanup requirements from sites similar types of contamination.

Further studies of ground water in the vicinity are highly recommended due to the apparent migration of thorium into the deeper layers, however these studies are not considered urgent from a public exposure consideration. Beyond further ground water investigation, further testing and remediation will be based on proposed future Site usage. Based on results from this scoping survey study, further offsite testing is recommended.

6.0 REFERENCES

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(NRC 2003b) Title 10, Code of Federal Regulations, Part 20, Paragraph 1402 of 10CFR20, "Radiological Criteria for Unrestricted Use."

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(NYCDOHMH 2002) New York City Health Code §175.03, "Standards for the Protection Against Radiation" 2002.

(WGGM 2002) Master Final Status Survey Plan - Welsbach/GGM Contamination Site, Camden, NJ, USACE, 2002.

(40CFR192) Code of Federal Regulations 40 CFR 192, Health and Environmental Protection Standards for Uranium and Thorium Mill tailings.

APPENDICES

APPENDIX A

INTERIOR GAMMA, ALPHA, AND SMEAR RESULTS

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
0	2	A-1	5	0	14	14					
0	7	A-1	10	0	12	12					
0	12	A-1	15	0	14	11					
0	17	A-1	20	0	13	13					
0	22	A-1	25	0	14	14					
0	27	A-1	30	0	17	17					
0	32	A-1	35	0	14	14					
3	47	A-1	50	3	10	12					
5	2	A-1	5	5	14	14					
5	7	A-1	10	5	14	14					
5	12	A-1	15	5	15	15					
5	17	A-1	20	5	13	13					
5	22	A-1	25	5	15	16	0	< 3.3	< 8.3	47	
5	27	A-1	30	5	14	16					
5	32	A-1	35	5	13	13					
5	42	A-1	45	5	10	10					
5	52	A-1	55	5	13	12					
10	2	A-1	5	10	13	14					
10	7	A-1	10	10	15	16					
10	12	A-1	15	10	13	17					
10	17	A-1	20	10	12	12					
10	22	A-1	25	10	36	31					
10	23	A-1	26	10	340		602	< 3.3	< 8.3	46	
10	23	A-1	26	10			42	< 3.3	< 8.3	50	beam above
10	27	A-1	30	10	18	26					
10	32	A-1	35	10	13	13					
10	37	A-1	40	10	12	12					
10	42	A-1	45	10	13	12					
10	47	A-1	50	10	12	12	14	< 3.3	< 8.3	49	
10	52	A-1	55	10	12	12					
15	2	A-1	5	15	20	18	350	< 3.3	< 8.3	48	
15	7	A-1	10	15	24	18					
15	12	A-1	15	15	38	24					
15	17	A-1	20	15	13	13					
15	22	A-1	25	15	16	16					
15	27	A-1	30	15	13	14					
15	32	A-1	35	15	13	13					
15	47	A-1	50	15	10	10					
15	55	A-1	58	15		16					hole in wall
20	2	A-1	5	20	24	31					
20	7	A-1	10	20	25	37					
20	12	A-1	15	20	28	30					
20	17	A-1	20	20	23	22					
20	27	A-1	30	20	15	15					
23	0	A-1	3	23	43	44					
23	7	A-1	10	23	30	50					
23	12	A-1	15	23	50	90	714				
23	12	A-1	15	23			42	< 3.3	< 8.3	51	beam above
27	35	A-2	35	0	150	85					
27	45	A-2	45	0	60		154	< 3.3	< 8.3	34	
27	50	A-2	50	0	30						
27	55	A-2	55	0	30						

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
32	0	A-2	0	5	80	40					
32	5	A-2	5	5	60	60	126	< 3.3	< 8.3	30	
32	10	A-2	10	5	260	110	70	< 3.3	< 8.3	31	
32	15	A-2	15	5	75	110					
32	20	A-2	20	5	40	45					
32	25	A-2	25	5	80	60					
32	30	A-2	30	5	220	140	98	< 3.3	< 8.3	32	
32	35	A-2	35	5	190	100					
32	40	A-2	40	5	123	60					
32	45	A-2	45	5	70	70					
32	50	A-2	50	5	70	60					
32	55	A-2	55	5	120	70					
32	60	A-2	60	5	40	45					
32	65	A-2	65	5	40	60					
32	70	A-2	70	5	60	-	0	< 3.3	< 8.3	35	estimate from scan
32	80	A-2	80	5	60						estimate from scan
32	90	A-2	90	5	60						estimate from scan
37	0	A-2	0	10	160	60					
37	5	A-2	5	10	200	100					
37	10	A-2	10	10	75	105					
37	15	A-2	15	10	60	110					
37	20	A-2	20	10	400	180					
37	25	A-2	25	10	125	125					
37	40	A-2	40	10	240	150					
37	45	A-2	45	10	500	180	434	< 3.3	< 8.3	33	
37	50	A-2	50	10	130						
37	55	A-2	55	10	155						
42	0	A-2	0	15	90	50					
42	10	A-2	10	15	45	65					
42	15	A-2	15	15	40	60					
42	40	A-2	40	15	65	65					
37	25	A-2	25	10							GM check of overhead beam - bkg
37	45	A-2	45	10							GM check of overhead beam - bkg
47		A-2	0-45	20							GM check of old kiln wall - bkg
53	0	A-3	0	3	120	100					
53	5	A-3	5	3	130	100					
53	10	A-3	10	3	180	110					
53	15	A-3	15	3	100	110	294	< 3.3	< 8.3	36	
53	20	A-3	20	3	120	90					
53	25	A-3	25	3	60	60					
53	30	A-3	30	3	60	50	0	106+-8	88+-9	38	
53	35	A-3	35	3	60	60					
53	40	A-3	40	3	120	90					
53	45	A-3	45	3	80	70					
53	50	A-3	50	3	40	50					
53	55	A-3	55	3	90	60					
53	60	A-3	60	3	200	110	42	< 3.3	< 8.3	40	
53	65	A-3	65	3	80	80					
53	70	A-3	70	3	50	50					
53	75	A-3	75	3	30	30					
53	80	A-3	80	3	40	40					
53	85	A-3	85	3	60	60	154	< 3.3	< 8.3	42	

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
53	100	A-3	100	3	20	20					
53	105	A-3	105	3	20	20					
53	115	A-3	115	3	10						
53	120	A-3	120	3	10						
60	0	A-3	0	10	100	100					
60	5	A-3	5	10	100	120					
60	10	A-3	10	10	130	120					
60	15	A-3	15	10	140	110					
60	20	A-3	20	10	160	110	0	< 3.3	< 8.3	39	
60	25	A-3	25	10	90	70					
60	30	A-3	30	10	70	60					
60	35	A-3	35	10	80	80					
60	40	A-3	40	10	70	75					
60	45	A-3	45	10	60	60					near drain
60	50	A-3	50	10	80	75					
60	55	A-3	55	10	80	75					
60	60	A-3	60	10	120	90					
60	65	A-3	65	10	70	60					
60	70	A-3	70	10	75	50					
60	75	A-3	75	10	60	50					
60	80	A-3	80	10	70	50					
60	85	A-3	85	10	30	60					
60	90	A-3	90	10	70	50					
60	95	A-3	95	10	50	50					
60	100	A-3	100	10	30	40					
70	0	A-3	0	20	110	70					near door
70	5	A-3	5	20	120	100	126	< 3.3	< 8.3	37	
70	20	A-3	20	20	50	50					
70	25	A-3	25	20	120	110					
70	35	A-3	35	20	90	70					
70	55	A-3	55	20	80	75					
70	60	A-3	60	20	75	70					
70	65	A-3	65	20	120	75	406	< 3.3	< 8.3	41	
70	70	A-3	70	20	100	75					
70	75	A-3	75	20	80	60					
70	80	A-3	80	20	90	60	126	< 3.3	< 8.3	43	
70	100	A-3	100	20	60	60					
58	105	A-3	105	8	40	30					
58	110	A-3	110	8	40	30					
58	115	A-3	115	8	30	30					
58	120	A-3	120	8	40	30	98	< 3.3	< 8.3	44	
58	125	A-3	125	8	24	18					
58	130	A-3	130	8	12	12					
58	135	A-3	135	8	13	13					
58	140	A-3	140	8	16	16					
63	105	A-3	105	13	80	60					
63	110	A-3	110	13	30	30					
63	115	A-3	115	13	40	38					
63	120	A-3	120	13	40	40					
63	125	A-3	125	13	40	40					
63	130	A-3	130	13	10	10	182	< 3.3	< 8.3	45	
58	150	A-3			30	30					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
63	155	A-3			40	40					
78	0	A-4	0	3	50	45					
78	5	A-4	5	3	45	65					
78	10	A-4	10	3	45	45					
78	15	A-4	15	3	60	60					
78	20	A-4	20	3	80	80					
78	25	A-4	25	3	120	85					in office
78	30	A-4	30	3	120	100					in office
78	35	A-4	35	3	130	85					in office
78	40	A-4	40	3	110	70					in office
78	45	A-4	45	3	100	80					in office
78	55	A-4	55	3	80	80					
78	60	A-4	60	3	80	80					
78	65	A-4	65	3	150	90					
78	70	A-4	70	3	65	65					
78	75	A-4	75	3	30	30					
78	80	A-4	80	3	30	30					
78	85	A-4	85	3	90	70					
78	90	A-4	90	3	80	80					
78	95	A-4	95	3	70	70					
78	100	A-4	100	3	100	85					
78	105	A-4	105	3	170	90	0	< 3.3	< 8.3	D	
78	110	A-4	110	3	80	80					
78	115	A-4	115	3	50	50					
78	120	A-4	120	3	60	45					
78	125	A-4	125	3	50	50					
78	130	A-4	130	3	70	50					
78	135	A-4	135	3	100	40					
78	140	A-4	140	3	20	20					
78	145	A-4	145	3	20	20					
78	150	A-4	150	3	20	20					
78	155	A-4	155	3	20	20					
84	0	A-4	0	9	50	80					
84	5	A-4	5	9	50	60					
84	10	A-4	10	9	85	75					
84	15	A-4	15	9	100	100					
84	20	A-4	20	9	160	130					
84	25	A-4	25	9	170	170					
84	30	A-4	30	9	260	160	9	< 3.3	< 8.3	A	
84	35	A-4	35	9	110	110					
84	40	A-4	40	9	110	100					
84	45	A-4	45	9	80	80					
84	50	A-4	50	9	90	80					
84	55	A-4	55	9	80	70					
84	60	A-4	60	9	60	70					
84	65	A-4	65	9	100	70					
84	70	A-4	70	9	100	80					
84	75	A-4	75	9	110	100	0	< 3.3	< 8.3	C	
84	80	A-4	80	9	120	80					
84	85	A-4	85	9	110	90					
84	90	A-4	90	9	100	70					
84	95	A-4	95	9	120	120					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
84	100	A-4	100	9	160	120					
84	105	A-4	105	9	100	80					
84	110	A-4	110	9	85	80					
84	115	A-4	115	9	90	80					
84	120	A-4	120	9	110	85					
84	125	A-4	125	9	50	60					
84	130	A-4	130	9	145	65					
84	135	A-4	135	9	40	40					
84	140	A-4	140	9	30	25					
84	145	A-4	145	9	20	20					
84	150	A-4	150	9		20					
91	0	A-4	0	16	100	100					
91	5	A-4	5	16	60	70					
91	10	A-4	10	16	60	70					
91	15	A-4	15	16	60	70					
91	20	A-4	20	16	100	100					
91	25	A-4	25	16	140	120					
91	30	A-4	30	16	130	100					
91	35	A-4	35	16	60	65					
91	40	A-4	40	16	90	75					
91	45	A-4	45	16	100	80					
91	50	A-4	50	16	180	90	0	< 3.3	< 8.3	B	
91	55	A-4	55	16	85	60					
91	60	A-4	60	16	80	60					
91	65	A-4	65	16	120	60					
91	70	A-4	70	16	100	55					
91	75	A-4	75	16	70	60					
91	80	A-4	80	16	120	70					
91	85	A-4	85	16	120	70					
91	90	A-4	90	16	90	60					
91	95	A-4	95	16	80	50					
91	100	A-4	100	16	40	60					
91	105	A-4	105	16	80	80					
91	110	A-4	110	16	80	80					
91	115	A-4	115	16	60	60					
91	120	A-4	120	16	80	45	0	< 3.3	< 8.3	E	
91	125	A-4	125	16	40	30					
91	130	A-4	130	16	50	30					
91	135	A-4	135	16	40	20					
91	140	A-4	140	16	15	15					
91	145	A-4	145	16	25	15					
95	100	A-4	100	20	40	40					
95	102	A-4	102	20	70	70					
101	0	A-5	0	0	15	15					
101	5	A-5	5	0	16	16					
101	10	A-5	10	0	21	14	210	< 3.3	< 8.3	1	
101	15	A-5	15	0	14	15					
101	20	A-5	20	0	12	14					
101	25	A-5	25	0	**13**	**13**					
101	30	A-5	30	0	16	13					
101	35	A-5	35	0	15	13					
101	40	A-5	40	0	14	12					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
101	45	A-5	45	0	30	15					
101	50	A-5	50	0	38	13					
101	55	A-5	55	0	40	27					
101	60	A-5	60	0	30	24	14	< 3.3	< 8.3	2	
101	65	A-5	65	0	27	20					
101	70	A-5	70	0	26	28					
101	75	A-5	75	0	38	28					
101	80	A-5	80	0	30	30					
101	85	A-5	85	0	54	30					
101	90	A-5	90	0	75	40	154	< 3.3	< 8.3	3	
101	95	A-5	95	0	48	30					
101	100	A-5	100	0	30	24					
101	105	A-5	105	0	36	25					
106	0	A-5	0	5	15	17					
106	5	A-5	5	5	15	15					
106	10	A-5	10	5	15	15					
106	15	A-5	15	5	16	15					
106	20	A-5	20	5	14	14					
106	25	A-5	25	5	11	12					
106	30	A-5	30	5	12	13					
106	35	A-5	35	5	13	13					
106	40	A-5	40	5	12	13					
106	45	A-5	45	5	12	10					
106	50	A-5	50	5	30	30					
106	55	A-5	55	5	25	20					
106	60	A-5	60	5	24	18					
106	65	A-5	65	5	18	18					
106	70	A-5	70	5	22	16					
106	75	A-5	75	5	20	28					
106	80	A-5	80	5	25	22					
106	85	A-5	85	5	32	28					
106	90	A-5	90	5	25	30					
106	95	A-5	95	5	18	26					
106	100	A-5	100	5	25	25					
106	105	A-5	105	5	20	18					
111	0	A-5	0	10	16	18					
111	5	A-5	5	10	15	16					
111	10	A-5	10	10	16	16					
111	15	A-5	15	10	15	15					
111	20	A-5	20	10	14	14					
111	25	A-5	25	10	11	12					
111	30	A-5	30	10	12	12					
111	35	A-5	35	10	11	13					
111	40	A-5	40	10	12	11					
111	45	A-5	45	10	11	11					
111	50	A-5	50	10	20	16					
111	55	A-5	55	10	13	16					
111	60	A-5	60	10	12	12					
111	65	A-5	65	10	13	13					
111	70	A-5	70	10	12	12					
111	75	A-5	75	10	12	12					
111	80	A-5	80	10	20	18					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
111	85	A-5	85	10	18	18					
111	90	A-5	90	10	22	18					
111	95	A-5	95	10	12	16					
111	100	A-5	100	10	12	18					
111	105	A-5	105	10	12	12					
111	115	A-5	115	10	20	20					
111	125	A-5	125	10	60	60					
116	0	A-5	0	15	16	16					
116	5	A-5	5	15	15	17					
116	10	A-5	10	15	14	16	14	< 3.3	< 8.3	4	
116	15	A-5	15	15	19	16					
116	20	A-5	20	15	15	15					
116	25	A-5	25	15	14	14					
116	30	A-5	30	15	13	14					
116	35	A-5	35	15	12	13					
116	40	A-5	40	15	12	12					
116	45	A-5	45	15	**12**	**12**					
116	50	A-5	50	15	18	18					
116	55	A-5	55	15	12	13					
116	60	A-5	60	15	14	12	0	< 3.3	< 8.3	5	
116	65	A-5	65	15	12	12					
116	70	A-5	70	15	12	12					
116	75	A-5	75	15	13	12					
116	80	A-5	80	15	11	12					
116	85	A-5	85	15	14	20					
116	90	A-5	90	15	12	12	0	< 3.3	< 8.3	6	
116	95	A-5	95	15	12	18					
116	100	A-5	100	15	13	13					
116	105	A-5	105	15	16	15					
121	0	A-5	0	20	17	19					
121	5	A-5	5	20	16	14					
121	10	A-5	10	20	15	15					
121	15	A-5	15	20	15	14					
121	20	A-5	20	20	15	16					
121	25	A-5	25	20	15	15					
121	30	A-5	30	20	13	13					
121	35	A-5	35	20	13	13					
121	40	A-5	40	20	14	13					
121	45	A-5	45	20	13	13					
121	75	A-5	75	20	11	10					
121	80	A-5	80	20	12	12					
121	85	A-5	85	20	12	12					
121	90	A-5	90	20	12	11					
121	95	A-5	95	20	12	12					
121	100	A-5	100	20	13	13					
121	105	A-5	105	20	12	11					
126	0	A-5	0	25	17	17					
126	5	A-5	5	25	14	15					
126	10	A-5	10	25	13	14					
126	15	A-5	15	25	13	15	0	< 3.3	< 8.3	7	
126	20	A-5	20	25	14	15					
126	25	A-5	25	25	13	13					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
126	30	A-5	30	25	13	13					
126	35	A-5	35	25	14	13					
126	40	A-5	40	25	15	13					
126	45	A-5	45	25	12	13					
126	50	A-5	50	25	14	12					
126	55	A-5	55	25	20	16					
126	60	A-5	60	25	20	15	14	< 3.3	< 8.3	8	
126	65	A-5	65	25	15	13					
126	70	A-5	70	25	14	12					
126	75	A-5	75	25	12	12					
126	80	A-5	80	25	12	13					
126	85	A-5	85	25	14	12					
126	90	A-5	90	25	14	14	182	< 3.3	< 8.3	9	
126	95	A-5	95	25	11	11					
126	100	A-5	100	25	12	12					
126	105	A-5	105	25	15	13					
126	110	A-5	110	25	18	15					
126	115	A-5	115	25	20	18					
126	120	A-5	120	25	60	30	154	< 3.3	< 8.3	10	
131	0	A-5	0	30	90	40					
131	5	A-5	5	30	40	40					
131	10	A-5	10	30	30	30					
131	15	A-5	15	30	20	20					
131	20	A-5	20	30	20	20					
131	25	A-5	25	30	20	20					
131	30	A-5	30	30	20	20					
131	35	A-5	35	30	20	20					
131	40	A-5	40	30	20	20					
131	45	A-5	45	30	30	20					
131	50	A-5	50	30	20	20					
131	55	A-5	55	30	20	20					
131	60	A-5	60	30	20	20					
131	65	A-5	65	30	20	20					
131	70	A-5	70	30	20	20					
131	75	A-5	75	30	20	20					
131	80	A-5	80	30	20	20					
131	85	A-5	85	30	20	20					
131	90	A-5	90	30	10	20					
131	95	A-5	95	30	30	20					
131	100	A-5	100	30	20	20					
131	105	A-5	105	30	40	40					
136	0	A-6	0	5	20	18					
136	5	A-6	5	5	22	20					
136	10	A-6	10	5	18	18					
136	15	A-6	15	5	12	12					
136	20	A-6	20	5	13	13	14	< 3.3	< 8.3	13	
136	25	A-6	25	5	14	12					
136	30	A-6	30	5	12	12					
136	35	A-6	35	5	16	14					
136	40	A-6	40	5	18	14	0	< 3.3	< 8.3	14	
136	45	A-6	45	5	15	15					
136	50	A-6	50	5	20	14					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
136	55	A-6	55	5	20	14					
136	60	A-6	60	5	15	14	0	< 3.3	< 8.3	15	
136	65	A-6	65	5	14	9					
136	70	A-6	70	5	12	10					
136	75	A-6	75	5	12	10					
136	80	A-6	80	5	12	12	70	< 3.3	< 8.3	16	
136	85	A-6	85	5	8	10					
136	90	A-6	90	5	22	12					
136	95	A-6	95	5	16	14					
136	100	A-6	100	5	25	16					
136	105	A-6	105	5	18	20					
136	110	A-6	110	5	19	18					
136	115	A-6	115	5	25	14					
141	0	A-6	0	10	23	14					
141	5	A-6	5	10	16	16					
141	10	A-6	10	10	16	14					
141	15	A-6	15	10	16	14					
141	20	A-6	20	10	10	10	98	< 3.3	< 8.3	20	
141	25	A-6	25	10	12	10					
141	30	A-6	30	10	12	12					
141	35	A-6	35	10	12	10					
141	40	A-6	40	10	18	14					
141	45	A-6	45	10	12	12					
141	50	A-6	50	10	15	14					
141	55	A-6	55	10	18	16					
141	60	A-6	60	10	12	10					
141	65	A-6	65	10	10	10					
141	70	A-6	70	10	10	12					
141	75	A-6	75	10	10	10					
141	80	A-6	80	10	10	10					
141	85	A-6	85	10	12	16					
141	90	A-6	90	10	20	12					
141	100	A-6	100	10	6	6					
141	105	A-6	105	10	8	10					
141	110	A-6	110	10	22	14					
146	0	A-6	0	15	16	16					
146	5	A-6	5	15	12	12					
146	10	A-6	10	15	12	12					
146	15	A-6	15	15	10	10					
146	20	A-6	20	15	8	8					
146	25	A-6	25	15	10	8					
146	30	A-6	30	15	10	10					
146	35	A-6	35	15	18	12					
146	40	A-6	40	15	14	14	0	< 3.3	< 8.3	19	
146	45	A-6	45	15	20	14					
146	50	A-6	50	15	24	16					
146	55	A-6	55	15	28	15					
146	60	A-6	60	15	16	16	210	< 3.3	< 8.3	18	
146	65	A-6	65	15	8	10					
146	70	A-6	70	15	12	12					
146	75	A-6	75	15	10	13					
146	80	A-6	80	15	12	12	0	< 3.3	< 8.3	17	

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
146	85	A-6	85	15	8	6					
146	90	A-6	90	15	10	10					
151	0	A-6	0	20	10	10					
151	5	A-6	5	20	15	12					
151	10	A-6	10	20	15	15					
151	15	A-6	15	20	10	10					
151	20	A-6	20	20	10	10					
151	25	A-6	25	20	10	8					
151	30	A-6	30	20	12	10					
151	35	A-6	35	20	18	12					
151	40	A-6	40	20	14	14					
151	45	A-6	45	20	18	14					
151	50	A-6	50	20	40	20					
151	55	A-6	55	20	18	12					
151	60	A-6	60	20	22	16					
151	65	A-6	65	20	18	15					
151	70	A-6	70	20	10	10					
151	75	A-6	75	20	14	14					
151	80	A-6	80	20	15	22					
151	85	A-6	85	20	10	22					
151	90	A-6	90	20		40					
156	0	A-6	0	25		7					
156	5	A-6	5	25	10	9					
156	10	A-6	10	25	12	7					
156	15	A-6	15	25		6					
156	20	A-6	20	25	10	8					
156	25	A-6	25	25	10	10					
156	30	A-6	30	25	12	12					
156	35	A-6	35	25	16	12					
156	40	A-6	40	25	24	16					
156	45	A-6	45	25	16	16					
156	50	A-6	50	25	18	14					
156	55	A-6	55	25	14	12					
156	60	A-6	60	25	10	11					
156	65	A-6	65	25	14	12					
156	70	A-6	70	25	10	10					
156	75	A-6	75	25	14	18					
156	80	A-6	80	25	12	20					
156	85	A-6	85	25	8	8					
156	90	A-6	90	25	17	16					
161	25	A-6	25	30	12	12					
161	30	A-6	30	30	15	10					
161	35	A-6	35	30	14	12					
161	40	A-6	40	30	22	14	70	< 3.3	< 8.3	11	
161	45	A-6	45	30	30	16	210	< 3.3	< 8.3	12	
161	50	A-6	50	30	12	12					
161	55	A-6	55	30	18	12					
161	60	A-6	60	30	10	10					
161	65	A-6	65	30	7	7					
161	70	A-6	70	30	8	8					
161	75	A-6	75	30	12	14					
161	80	A-6	80	30	10	10					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
161	85	A-6	85	30	10	16					
161	90	A-6	90	30	14	9					
166	12	A-6	12	35	6	6					
166	25	A-6	25	35	8	10					
166	30	A-6	30	35	8	8					
166	35	A-6	35	35	10	9					
166	40	A-6	40	35	9	10					
166	45	A-6	45	35	12	12					
166	50	A-6	50	35	12	10					
166	55	A-6	55	35	12	10					
166	60	A-6	60	35	10	10					
166	65	A-6	65	35	10	8					
166	70	A-6	70	35	10	10					
166	75	A-6	75	35	12	15					
166	80	A-6	80	35	8	12					
166	85	A-6	85	35	8						
171	2	A-6	2	40	18	14					
171	7	A-6	7	40	14	10					
171	12	A-6	12	40	7	6					
171	17	A-6	17	40	8	5					
171	25	A-6	25	40	10	8					
171	30	A-6	30	40	10	8					
171	35	A-6	35	40	8	8					
171	40	A-6	40	40	11	8					
171	45	A-6	45	40	10	10					
171	50	A-6	50	40	10	10					
171	55	A-6	55	40	24	14					
171	60	A-6	60	40	7	7					
171	65	A-6	65	40	10	8					
171	70	A-6	70	40	10						
171	75	A-6	75	40	10	8					
171	80	A-6	80	40	10	10					
171	85	A-6	85	40	10	15					
176	2	A-6	2	45	30	15					
176	7	A-6	7	45	14	10					
176	12	A-6	12	45	8	5					
176	17	A-6	17	45	6	4					
176	25	A-6	25	45	9	9					
176	30	A-6	30	45	8	8					
176	35	A-6	35	45	9	9					
176	40	A-6	40	45	10	8					
176	45	A-6	45	45	10	10					
176	50	A-6	50	45	10	9					
176	55	A-6	55	45	16	10					
176	60	A-6	60	45	9	9					
176	65	A-6	65	45	7	8					
176	75	A-6	75	45	10	10					
176	85	A-6	85	45	8						
181	2	A-6	2	50	23	12					
181	7	A-6	7	50	16	12					
181	12	A-6	12	50	10	10					
181	17	A-6	17	50	10	8					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
181	25	A-6	25	50	7	7					
181	30	A-6	30	50	10	6					
181	35	A-6	35	50	10	10					
181	40	A-6	40	50	9	6					
181	45	A-6	45	50	10	8					
181	50	A-6	50	50	8	8					
181	55	A-6	55	50	16	8					
186	2	A-6	2	55	24	15	70	< 3.3	< 8.3	27	
186	7	A-6	7	55	12	10					
186	12	A-6	12	55	10	10					
186	17	A-6	17	55	8	10					
186	25	A-6	25	55	6	7					
186	30	A-6	30	55	8	8					
186	45	A-6	45	55	6	6					
186	50	A-6	50	55	6	6					
186	55	A-6	55	55	10	10					
191	5	A-6	5	60	20	20					
191	10	A-6	10	60	20	20					
191	15	A-6	15	60	20	20					
191	20	A-6	20	60	20	20					
191	25	A-6	25	60	20	20					
191	30	A-6	30	60	20	20					
191	35	A-6	35	60	20	20					
191	40	A-6	40	60	20	20					
191	45	A-6	45	60	20	20					
196	0	A-6	0	65	20	10					
196	5	A-6	5	65	30	13					
196	10	A-6	10	65	30	14	0	< 3.3	< 8.3	21	
196	15	A-6	15	65	20	12					
196	20	A-6	20	65	40	11					
196	25	A-6	25	65	20	9	0	< 3.3	< 8.3	22	
196	30	A-6	30	65	20	9					
196	35	A-6	35	65	20	9					
196	40	A-6	40	65	20	9	0	< 3.3	< 8.3	23	
196	45	A-6	45	65	20	8					
201	0	A-6	0	70	20	20					
201	5	A-6	5	70	16	30					
201	10	A-6	10	70	20	30					
201	15	A-6	15	70	12	30					
201	20	A-6	20	70	19	30					
201	25	A-6	25	70	20	40					
201	30	A-6	30	70	20	20					
201	35	A-6	35	70	20	20					
201	40	A-6	40	70	20	20					
201	45	A-6	45	70	20	20					
201	50	A-6	50	70	8	9					
201	55	A-6	55	70	8	10					
201	60	A-6	60	70	18	12					
206	0	A-6	0	75	10	11					
206	5	A-6	5	75	12	11					
206	10	A-6	10	75	10	11	0	< 3.3	< 8.3	26	
206	15	A-6	15	75	8	12					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
206	20	A-6	20	75	13	12					
206	25	A-6	25	75	9	10	182	< 3.3	< 8.3	25	
206	30	A-6	30	75	10	11					
206	35	A-6	35	75	10	10					
206	40	A-6	40	75	14	12	0	< 3.3	< 8.3	24	
206	45	A-6	45	75	12	10					
206	50	A-6	50	75	10	11					
206	55	A-6	55	75	10	11					
206	60	A-6	60	75	8	12					
211	0	A-6	0	80	18	18					small Losquadro Warehouse area
211	5	A-6	5	80	15	15					
211	10	A-6	10	80	20	17					
211	15	A-6	15	80	15	14					
211	20	A-6	20	80	7	12					
211	25	A-6	25	80	30	20					
211	30	A-6	30	80	30	12					
216	0	A-6	0	85	16	17					
216	5	A-6	5	85	16	18					
216	10	A-6	10	85	18	18					
216	15	A-6	15	85	20	20					
216	20	A-6	20	85	20	19	0	< 3.3	< 8.3	28	
216	25	A-6	25	85	20	18					
216	30	A-6	30	85	20	16					
216	35	A-6	35	85	10	10					
221	0	A-6	0	90	21	22					
221	5	A-6	5	90	30	28					
221	10	A-6	10	90	29	28					
221	15	A-6	15	90	26	24					
221	20	A-6	20	90	22	20					
221	25	A-6	25	90	21	21					
221	30	A-6	30	90	16	14					
221	35	A-6	35	90	12	11					
221	40	A-6	40	90	8	8					
221	45	A-6	45	90	8	8					
226	5	A-6	5	95	26	26					
226	10	A-6	10	95	40	26	70	< 3.3	< 8.3	29	
226	15	A-6	15	95	35	35					
226	20	A-6	20	95	35	22					
226	25	A-6	25	95	23	22					
226	30	A-6	30	95	16	14					
226	35	A-6	35	95	10	8					
226	40	A-6	40	95	8	8					
231	5	A-6	5	100	39	33					
231	10	A-6	10	100	42	30					
231	15	A-6	15	100	27	27					
231	20	A-6	20	100	22	21					
231	25	A-6	25	100	16	15					
236	5	A-6	5	105	26	15					
236	10	A-6	10	105	22	22					
236	15	A-6	15	105	26	22					
236	20	A-6	20	105	19	14					
236	25	A-6	25	105	16	12					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
241	5	A-6	5	110	17	12					
241	5	A-6	5	110	17	12					
241	10	A-6	10	110	15	14					
241	10	A-6	10	110	15	14					
241	15	A-6	15	110	16	14					
241	15	A-6	15	110	16	14					
241	20	A-6	20	110	15	14					
241	20	A-6	20	110	15	14					
241	25	A-6	25	110	12	12					
241	25	A-6	25	110	12	12					
0	77	A-7fix	15	0	8	8					
0	87	A-7fix	25	0	11	10					
1	94	A-7fix	32	1	10	8					
5	77	A-7fix	15	5	8	8					
5	82	A-7fix	20	5	8	8					
5	87	A-7fix	25	5	10	8					
5	94	A-7fix	32	5	12	12					
10	77	A-7fix	15	10	8	8					
10	82	A-7fix	20	10	8	8					
10	87	A-7fix	25	10	10	10					
10	94	A-7fix	32	10	12	10					
15	77	A-7fix	15	15	8	8					
15	82	A-7fix	20	15	8	8					
15	87	A-7fix	25	15	9	8					
15	94	A-7fix	32	15	12	12					
20	62	A-7fix	0	20	8	8					
20	67	A-7fix	5	20	8	8					
20	72	A-7fix	10	20	12	12					
20	77	A-7fix	15	20	8	9					
20	82	A-7fix	20	20	8	9					
20	87	A-7fix	25	20	10	10					
22	104	A-7KM	3	0	10	10					
22	109	A-7KM	8	0	10	11					
22	114	A-7KM	13	0	18	14					
22	119	A-7KM	18	0	16	12					
22	124	A-7KM	23	0	9	9					
22	131	A-7KM	30	0	12	12					
27	114	A-7KM	13	5	12	12					
27	119	A-7KM	18	5	10	10					
27	124	A-7KM	23	5	8	8					
27	131	A-7KM	30	5	9	9					
32	114	A-7KM	13	10	8	8					
32	119	A-7KM	18	10	8	8					
32	124	A-7KM	23	10	8	8					
32	131	A-7KM	30	10	8	8					
37	114	A-7KM	13	15	8	8					
37	119	A-7KM	18	15	9	9					
37	124	A-7KM	23	15	8	8					
37	131	A-7KM	30	15	8	8					
42	114	A-7KM	13	20	10	10					
42	119	A-7KM	18	20	8	8					
42	124	A-7KM	23	20	8	8					

Bldg X (ft)	Bldg Y (ft)	Area	Area X (ft)	Area Y (ft)	Gamma Surface (uR/hr)	Gamma @ 1m (uR/hr)	Dir.Alpha (dpm/100 cm2)	Rem Alpha (dpm/100 cm2)	Rem Beta (dpm/100 cm2)	Wipe #	Notes
42	131	A-7KM	30	20	8	8					
47	119	A-7KM	18	25	8	8					
47	124	A-7KM	23	25	8	10					
47	131	A-7KM	30	25	9	9					
32	136	A-7KM	35	10	8	8					office
37	136	A-7KM	35	15	8	8					office
32	141	A-7KM	40	10	8	8					office
37	141	A-7KM	40	15	8	8					office

Additional Smear Sample Results in the vicinity of Smear #38:

Additional Smear Sample Results in the Vicinity of Smear #38

Project: FWACC
Date Analyzed: 3/18/2010

Type: Smears
Dates Collected: 3/18/2010

Sample	Date Collected	Gross Alpha (dpm + 1 sig)	Gross Beta (dpm + 1 sig)	Area (cm^2)	Description
38	11/19/2009	106.4 ± 8.7	88.4 ± 9.0	100	Wipe - Original #38
A3-1	3/18/2010	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 38 retest
A3-2	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - 4' S of 38
A3-3	3/18/2010	0.0 ± 1.0	-1.1 ± 2.4	100	Wipe - drain rim
A3-4	3/18/2010	0.7 ± 1.2	-0.5 ± 2.5	100	Wipe - 4' N of 38
A3-5	3/18/2010	0.0 ± 1.0	3.9 ± 3.0	100	Wipe - 4' N,2'W of 38
A3-6	3/18/2010	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - 2' W of 38
A3-7	3/18/2010	3.5 ± 1.9	8.2 ± 3.6	100	Wipe - 4' S,2'W of 38
A3-8	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - 5' E of 38
A3-9	3/18/2010	0.0 ± 1.0	9.6 ± 3.7	0.741 g	dirt from drain near 38

APPENDIX B
RAW DATA AND CALIBRATION CERTIFICATES

CoPhysics Corporation
1242 Route 208
Monroe, NY 10950
Tel: 845-783-4402 Fax: 845-783-7191
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RADIOANALYTICAL RESULTS

Project: FWACC
Dates Analyzed: 1/6/10, 3/18/10

Type: wipe tests
Dates Collected: 11/18-19/09, 12/15/09 3/18/2010

Sample	Date Collected	Gross Alpha (dpm + 1 sig)	Gross Beta (dpm + 1 sig)	Area (cm^2)	Description
1	11/18/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 1
2	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 2
3	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 3
4	11/18/2009	0.7 ± 1.2	4.5 ± 3.1	100	Wipe - Loc 4
5	11/18/2009	0.6 ± 1.2	5.9 ± 3.3	100	Wipe - Loc 5
6	11/18/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 8
7	11/18/2009	-0.8 ± 0.7	5.5 ± 3.2	100	Wipe - Loc 9
8	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 10
9	11/18/2009	-0.7 ± 0.7	-1.6 ± 2.3	100	Wipe - Loc 11
12	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 12
13	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 13
14	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 14
15	11/18/2009	-0.7 ± 0.7	-1.6 ± 2.3	100	Wipe - Loc 15
16	11/18/2009	0.7 ± 1.2	1.6 ± 2.8	100	Wipe - Loc 16
17	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 17
18	11/18/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 18
19	11/18/2009	0.0 ± 1.0	-1.1 ± 2.4	100	Wipe - Loc 19
20	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 20
21	11/18/2009	-0.7 ± 0.7	3.4 ± 3.0	100	Wipe - Loc 21
22	11/18/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 22
23	11/18/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 23
24	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 24
25	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 25
26	11/18/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 26
27	11/18/2009	1.4 ± 1.4	0.7 ± 2.7	100	Wipe - Loc 27
28	11/18/2009	0.0 ± 1.0	0.4 ± 2.6	100	Wipe - Loc 28
29	11/18/2009	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - Loc 29
30	11/18/2009	-0.7 ± 0.7	2.0 ± 2.8	100	Wipe - Loc 30
31	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 31
32	11/18/2009	-0.7 ± 0.7	4.1 ± 3.1	100	Wipe - Loc 32
33	11/18/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 33
34	11/18/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 34
35	11/18/2009	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - Loc 35
36	11/19/2009	1.4 ± 1.4	1.5 ± 2.8	100	Wipe - Loc 36
37	11/19/2009	1.4 ± 1.4	2.9 ± 2.9	100	Wipe - Loc 37
38	11/19/2009	106.4 ± 8.7	88.4 ± 9.0	100	Wipe - Loc 38
39	11/19/2009	0.0 ± 1.0	2.5 ± 2.9	100	Wipe - Loc 39
40	11/19/2009	-0.7 ± 0.7	-0.2 ± 2.5	100	Wipe - Loc 40
41	11/19/2009	-0.7 ± 0.7	0.5 ± 2.6	100	Wipe - Loc 41
42	11/19/2009	0.7 ± 1.2	0.9 ± 2.7	100	Wipe - Loc 42
43	11/19/2009	0.0 ± 1.0	1.1 ± 2.7	100	Wipe - Loc 43
44	11/19/2009	-0.7 ± 0.7	2.7 ± 2.9	100	Wipe - Loc 44
45	11/19/2009	0.0 ± 1.0	1.1 ± 2.7	100	Wipe - Loc 45
46	12/15/2009	0.0 ± 1.0	5.4 ± 3.2	100	Wipe - Loc 46

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CoPhysics Corp.

Sample	Date Collected	Gross Alpha (dpm + 1 sig)	Gross Beta (dpm + 1 sig)	Area (cm^2)	Description
47	12/15/2009	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 47
48	12/15/2009	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - Loc 48
49	12/15/2009	0.7 ± 1.2	0.9 ± 2.7	100	Wipe - Loc 49
50	12/15/2009	1.4 ± 1.4	0.7 ± 2.7	100	Wipe - Loc 50
51	12/15/2009	1.1 ± 0.9	2.7 ± 2.1	100	Wipe - Loc A
52	12/15/2009	-0.4 ± 0.6	3.7 ± 2.1	100	Wipe - Loc B
53	12/15/2009	0.0 ± 0.7	0.4 ± 1.8	100	Wipe - Loc C
54	12/15/2009	-0.7 ± 0.5	1.6 ± 1.9	100	Wipe - Loc D
55	12/15/2009	-0.7 ± 0.5	-0.5 ± 1.7	100	Wipe - Loc E
A3-1	3/18/2010	-0.7 ± 0.7	1.3 ± 2.7	100	Wipe - Loc 38 retest
A3-2	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - 4' S of 38
A3-3	3/18/2010	0.0 ± 1.0	-1.1 ± 2.4	100	Wipe - drain rim
A3-4	3/18/2010	0.7 ± 1.2	-0.5 ± 2.5	100	Wipe - 4' N of 38
A3-5	3/18/2010	0.0 ± 1.0	3.9 ± 3.0	100	Wipe - 4' N,2'W of 38
A3-6	3/18/2010	0.0 ± 1.0	1.8 ± 2.8	100	Wipe - 2' W of 38
A3-7	3/18/2010	3.5 ± 1.9	8.2 ± 3.6	100	Wipe - 4' S,2'W of 38
A3-8	3/18/2010	0.0 ± 1.0	-0.4 ± 2.5	100	Wipe - 5' E of 38
A3-9	3/18/2010	0.0 ± 1.0	9.6 ± 3.7	0.741 g	dirt from drain near 38
MDA's		3.3	8.3		Minimum Detectable Activity

Method: Gas Proportional Counting using a Canberra Model 2404F Alpha/Beta Counting System (Serial # 790347)
Uncertainties are 1-sigma counting errors.
Alpha standard radionuclide: Pu-239 Beta standard radionuclide: Sr/Y-90
Standards are traceable to the National Institute of Standards and Technology.
Radioactive Materials License: NYS 2691-3949

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Theodore E. Rahon, Ph.D., CHP
President

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CoPhysics Corp.

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1242 Route 208
Monroe, NY 10950
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www.cophysics.com

GAS PROPORTIONAL COUNTER - QUALITY ASSURANCE TESTS

Instrument: Canberra Model 2404F Gas Flow Proportional Counter (Serial # 790347)
Dates Analyzed: 1/6/2010

HV = 1550 V
DISC = 1000 V
CrossTalk Factor = 0.060

Nuclide*	Manufacturer	Source #	Date	Original Activity (dpm)	Half Life (days)	Present Activity (dpm)	CTime (min)	Alpha Count Rate (cpm)	Beta Count Rate (cpm)	Calc. Effic.	Reference Effic.	Type	Difference (%)
BKG							100	0.23	1.25			BKG	
C-14	Amersham	CD 259	6/18/1990	87690	2.09E+06	87483	10	1165.0	8100.0	0.092	0.10	C14 beta	-7.6
Sr/Y-90	Amersham	CD 260	5/23/1990	200200	10446	124422	10	1008.8	51852.35	0.259	0.280	gr beta	-7.5
Pu-239	Source, Inc.	96PU3201622	6/8/1996	25500	8.81E+06	25490	10	6873.7	58.67	0.270	0.282	gr alpha	-4.4
Sr/Y-90	NEN	black	1/1/1973	52000	10446	21204	10	20.8	14791.2	0.284	0.280	gr beta	1.6
Th-230	Source, Inc.	93Th230-4167	1/13/1994	15000	2.81E+07	14998	10	3974.4	622.4	0.265	0.282	gr alpha	-6.0

* Standards are traceable to the National Institute of Standards and Technology.

Theodore E. Rahon

Theodore E. Rahon, Ph.D., CHP

GammSpec Calcuations - FWACC report Feb-2010.XLS

Gamma Spectroscopic Analysis
Raw Data and Calculations

Detector: NIGC, RG15 - 20% HPGe s# 2156,1265 | Project: FWACC

MCA: Trump PCI MCA card

Lab ID#	mass (g)	Geom			Date Col	Date Analyzed	LT (sec)	Bi-214 609 kev cts	Bi-214 609 kev 1s	Ac-228 911 keV cts	Ac-228 911 keV 1s	K-40 1460 keV cts	K-40 1460 keV 1s	609 peak net cps result	609 peak net cps 1sig	911 peak net cps result	911 peak net cps 1sig
692-1	291.1	J200	M-2	0.5	7/24/2009	8/11/2009	1954.5	820	55	2463	65	220	19	0.42	0.03	1.26	0.03
692-2	86	J200	M-1	sewer	7/23/2009	8/11/2009	70731	10414	1205	56002	1442	1515	72	0.15	0.02	0.79	0.02
716-01	382.1	J450	B1A	2	11/12/2009	12/9/2009	7538.8	276	25	258	19	667	27	0.04	0.00	0.03	0.00
716-02	335.3	J200	B3B	0-1	11/12/2009	12/9/2009	21909	40888	503	119493	481	3630	121	1.87	0.02	5.45	0.02
716-03	323.4	J200	B3C	0-1	11/12/2009	12/10/2009	5568.4	4366	87	8271	126	602	38	0.78	0.02	1.49	0.02
716-04	383.1	J450	B3A	8'-9'	11/12/2009	12/10/2009	88412	3166	82	4748	83	8271	96	0.04	0.00	0.05	0.00
716-05	268.7	J200	B1B	0-0.5	11/12/2009	12/11/2009	5564.9	837	38	1760	45	368	23	0.15	0.01	0.32	0.01
716-06	337.7	J200	B1C	1.5	11/12/2009	12/17/2009	88412	3166	82	4748	83	8271	96	0.04	0.00	0.05	0.00
716-07	457.1	J450	B3D	0-0.5	11/12/2009	1/2/2010	5564.9	837	38	1760	45	368	23	0.15	0.01	0.32	0.01
725-01	121.2	J200	A2B	0.5-1	12/16/2009	1/2/2010	165.24	626	65	2570	87	0	19	3.79	0.39	15.55	0.53
725-02	281.8	J200	A3D	0.5-1.5	12/16/2009	1/2/2010	429	607	47	2321	64	51	15	1.41	0.11	5.41	0.15
725-03	169.9	J200	A3A	0.5-1.5	12/16/2009	1/2/2010	469.24	13	31	1826	55	6	14	0.03	0.07	3.89	0.12
725-04	142	J200	A2A	8.5-9	12/16/2009	1/2/2010	238.66	1	31	1830	58	40	14	0.00	0.13	7.67	0.24
725-05	361.9	J450	A3B	0.5-1.5	12/16/2009	1/2/2010	983.84	3044	116	10238	150	166	37	3.09	0.12	10.41	0.15
725-06	136.1	J200	A1A	0.5-1.5	12/16/2009	1/2/2010	14485	482	52	4733	82	316	26	0.03	0.00	0.33	0.01
725-07	298	J200	A6C	0.5-1.5	12/12/2009	1/5/2010	1069.9	831	44	2741	57	70	16	0.78	0.04	2.56	0.05
725-08	323.2	J200	A5A	1-1.5	12/13/2009	1/5/2010	1542.4	622	39	2518	54	116	17	0.40	0.03	1.63	0.04
725-09	240.3	J200	A1B	0.5-1	12/16/2009	1/5/2010	1282	52	10	99	10	71	9	0.04	0.01	0.08	0.01
725-10	410.2	J450	A6B	0.5-1.5	12/12/2009	1/5/2010	1879	1008	44	2358	52	198	19	0.54	0.02	1.25	0.03
725-11	191.1	J200	A5B	0.5-1.5	12/16/2009	1/5/2010	1651.8	1328	48	2766	57	105	19	0.80	0.03	1.67	0.03
725-12	196.7	J200	A6A	0.5-1.0	12/16/2009	1/5/2010	4633.9	593	34	1366	39	286	21	0.13	0.01	0.29	0.01
725-13	188.9	J200	A3C	0.5-1.0	12/13/2009	1/5/2010	1933.9	917	43	3034	59	192	19	0.47	0.02	1.57	0.03
725-14	213.7	J200	B2D	0-1	12/12/2009	1/5/2010	9174.5	496	31	814	44	331	21	0.05	0.00	0.09	0.00
725-15	311.3	J200	B2A	0-1	12/13/2009	1/6/2010	4968.7	1710	59	5049	75	254	29	0.34	0.01	1.02	0.02
725-16	190	J200	B1D	2"-1'	12/12/2009	1/6/2010	3675.7	531	33	1205	38	197	17	0.14	0.01	0.33	0.01
725-17	373.3	J450	B2B	0-1	12/12/2009	1/6/2010	2009.3	870	53	5054	75	121	24	0.43	0.03	2.52	0.04
725-18	376.9	J450	B2C	0-1	12/12/2009	1/6/2010	2935.4	210	20	415	22	139	13	0.07	0.01	0.14	0.01
725-19	302.6	J200	B2F	0-0.5	12/12/2009	1/6/2010	3088.7	1038	44	2195	51	238	19	0.34	0.01	0.71	0.02
725-20	314.1	J200	B2E	2-2.5	12/12/2009	1/6/2010	3461.6	5976	132	25581	181	610	47	1.73	0.04	7.39	0.05
725-21	192.6	J200	B2G	4'-5'	12/12/2009	1/6/2010	72846	5705	91	3054	66	2468	57	0.08	0.00	0.04	0.00

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Lab ID#	mass	Geom			Date	Date	LT	609 kev		911 keV		1460 keV		609 peak net cps		911 peak net cps	
	(g)				Col	Analyzed	(sec)	cts	1s	cts	1s	cts	1s	result	1sig	result	1sig
725-22	349.5	J200	B2S1	surface	12/16/2009	1/7/2010	5102.9	111	16	110	13	164	15	0.02	0.00	0.02	0.00
725-23	196.7	J200	B2S2	surface	12/16/2009	1/8/2010	3189.2	3196	148	33510	346	630	58	1.00	0.05	10.51	0.11
725-24	202.7	J200	B2S3	surface	12/16/2009	1/8/2010	6606.1	510	35	1475	44	215	21	0.08	0.01	0.22	0.01
725-25	296.1	J200	B2S4	surface	12/16/2009	1/11/2010	6061	1818	61	5147	90	447	30	0.30	0.01	0.85	0.01
725-26	263.1	J200	B2S5	surface	12/16/2009	1/11/2010	10790	1994	64	5753	81	533	32	0.18	0.01	0.53	0.01
725-27	257.5	J200	B2S6	surface	12/16/2009	1/12/2010	4285.3	496	34	1503	41	268	18	0.12	0.01	0.35	0.01
725-28	229.7	J200	B2S7	surface	12/16/2009	1/12/2010	16830	3009	82	7988	126	743	39	0.18	0.00	0.47	0.01
725-29	296.3	J200	B2S8	surface	12/16/2009	1/13/2010	5579.6	836	45	3177	60	314	24	0.15	0.01	0.57	0.01
725-30	283.4	J200	B2S9	surface	12/16/2009	1/13/2010	5149.7	645	39	2003	47	256	21	0.13	0.01	0.39	0.01
725-31	293.1	J200	B2S10	surface	12/16/2009	1/13/2010	2416.1	279	26	873	32	156	16	0.12	0.01	0.36	0.01
725-32	357.1	J450	B2S11	surface	12/16/2009	1/13/2010	34822	1985	59	1765	49	2531	55	0.06	0.00	0.05	0.00
725-33	297.4	J200	B2S12	surface	12/16/2009	1/14/2010	67385	9858	181	12279	121	4380	77	0.15	0.00	0.18	0.00
725-34	330.3	J200	B2S13	surface	12/16/2009	1/15/2010	4330.1	251	19	122	14	234	16	0.06	0.00	0.03	0.00
725-35	350.8	J450	B2S14	surface	12/16/2009	1/14/2010	10741	1078	45	2100	49	703	31	0.10	0.00	0.20	0.00
725-36	359.8	J450	B2S15	surface	12/16/2009	1/17/2010	23515	1792	57	2694	58	1402	43	0.08	0.00	0.11	0.00
725-37	304	J200	B2S16	surface	12/16/2009	1/18/2010	10447	816	35	893	33	493	26	0.08	0.00	0.09	0.00
725-38	531.4	J450	B3S1	surface	12/16/2009	1/19/2010	3307.2	805	37	1635	43	282	22	0.24	0.01	0.49	0.01
725-39	467.9	J450	B3S2	surface	12/16/2009	1/19/2010	6707.9	594	36	1656	44	478	25	0.09	0.01	0.25	0.01
725-40	422	J450	B1S2	surface	12/16/2009	1/19/2010	8977.8	2008	59	3503	63	623	31	0.22	0.01	0.39	0.01
725-41	379.7	J450	B1S3	surface	12/16/2009	1/20/2010	31983	2254	69	4841	76	1407	47	0.07	0.00	0.15	0.00
Duplicates																	
716-6dup	337.7	J200	B1C	1.5		2/12/2010	70855	2658	69	1856	53	5198	78	0.04	0.00	0.03	0.00
725-8dup	323.2	J200	A5A	1-1.5		1/5/2010	1114.7	467	34	1721	46	65	18	0.42	0.03	1.54	0.04
725-2dup	281.8	J200	A3D	0.5-1.5		2/17/2010	1257.8	2422	82	8411	116	106	30	1.93	0.07	6.69	0.09
725-19dup	302.6	J200	B2F	0-0.5		1/6/2010	969.18	339	24	649	36	50	12	0.35	0.02	0.67	0.04
716-1dup	382.1	J450	B1A	2		12/9/2010	3111.4	133	16	78	12	273	17	0.04	0.01	0.03	0.00
Reference Samples																	
DI blank	200	J200	ref			8/12/2009	100000	246	40	59	26	243	25	0.00	0.00	0.00	0.00
Fl-gyp	200	J200	ref			12/1/2009	3156.6	3580	63					1.13	0.02		
iaea-gyp	127.1	J200	ref			1/20/2010	4627.4	2223	49					0.48	0.01	0.00	0.00
EMLQAP58	200	J200	ref			10/7/2009	7204.3	617	39	214	22	399	27	0.09	0.01	0.03	0.00
THstd-251	442	J450	ref			12/1/2009	376.84			2761	60					7.33	0.16
EPA Pitch	401.8	J450	ref			1/8/2010	74247	199689	560	0	1	0	1	2.69	0.01	0.00	0.00
Fl-gyp	450	J450	ref			12/3/2009	91011	156683	423					1.72	0.00		

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1460 peak net cps		Geom-corrected Effic (c/d)			Ra-226 (pCi/g)		Th-232 (pCi/g)		K-40 (pCi/g)	
result	1sig	609	911	1460	Conc	1Sig	Conc	1Sig	Conc	1Sig
0.11	0.01	0.00548	0.00306	0.00055	7.1	0.6	38.2	2.2	19.0	1.9
0.02	0.00	0.00548	0.00306	0.00055	8.4	1.1	81.3	4.6	12.2	0.8
0.09	0.00	0.00398	0.00183	0.00055	0.7	0.1	1.3	0.1	11.4	0.7
0.17	0.01	0.00548	0.00306	0.00055	27.5	1.4	143.7	7.2	24.3	1.5
0.11	0.01	0.00548	0.00306	0.00055	12.0	0.6	40.6	2.1	16.4	1.3
0.09	0.00	0.00398	0.00183	0.00055	0.6	0.0	2.1	0.1	12.0	0.6
0.07	0.00	0.00548	0.00306	0.00055	2.8	0.2	10.4	0.6	12.1	1.0
0.09	0.00	0.00548	0.00306	0.00055	0.5	0.0	1.4	0.1	13.6	0.7
0.07	0.00	0.00398	0.00183	0.00055	2.2	0.2	10.2	0.6	7.1	0.6
0.00	0.11	0.00548	0.00306	0.00055	154.2	17.8	1133.4	68.4	0.0	0.0
0.12	0.03	0.00548	0.00306	0.00055	24.8	2.3	169.6	9.7	20.7	6.2
0.01	0.03	0.00548	0.00306	0.00055	0.8	1.9	202.3	11.8	3.7	8.6
0.17	0.06	0.00548	0.00306	0.00055	0.1	4.5	476.9	28.2	58.0	20.5
0.17	0.04	0.00398	0.00183	0.00055	58.1	3.6	424.7	22.1	22.9	5.2
0.02	0.00	0.00548	0.00306	0.00055	1.2	0.1	21.2	1.1	7.9	0.8
0.07	0.01	0.00548	0.00306	0.00055	12.9	0.9	75.9	4.1	10.8	2.5
0.08	0.01	0.00548	0.00306	0.00055	6.2	0.5	44.6	2.4	11.4	1.8
0.06	0.01	0.00548	0.00306	0.00055	0.8	0.2	2.8	0.3	11.3	1.5
0.11	0.01	0.00398	0.00183	0.00055	8.9	0.6	45.2	2.5	12.6	1.4
0.06	0.01	0.00548	0.00306	0.00055	20.7	1.3	77.4	4.2	16.3	3.1
0.06	0.00	0.00548	0.00306	0.00055	3.2	0.2	13.2	0.8	15.4	1.4
0.10	0.01	0.00548	0.00306	0.00055	12.4	0.8	73.4	3.9	25.8	2.9
0.04	0.00	0.00548	0.00306	0.00055	1.2	0.1	3.7	0.3	8.3	0.7
0.05	0.01	0.00548	0.00306	0.00055	5.5	0.3	28.8	1.5	8.1	1.0
0.05	0.00	0.00548	0.00306	0.00055	3.7	0.3	15.2	0.9	13.9	1.4
0.06	0.01	0.00398	0.00183	0.00055	7.9	0.6	99.5	5.2	7.9	1.6
0.05	0.00	0.00398	0.00183	0.00055	1.3	0.1	5.5	0.4	6.2	0.7
0.08	0.01	0.00548	0.00306	0.00055	5.5	0.4	20.7	1.1	12.5	1.2
0.18	0.01	0.00548	0.00306	0.00055	27.1	1.5	207.8	10.5	27.6	2.5
0.03	0.00	0.00548	0.00306	0.00055	2.0	0.1	1.9	0.1	8.6	0.5

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GammSpec Calcuations - FWACC report Feb-2010.XLS

1460 peak net cps		Geom-corrected Effic (c/d)			Ra-226 (pCi/g)		Th-232 (pCi/g)		K-40 (pCi/g)	
result	1sig	609	911	1460	Conc	1Sig	Conc	1Sig	Conc	1Sig
0.03	0.00	0.00548	0.00306	0.00055	0.3	0.0	0.5	0.1	4.5	0.5
0.20	0.02	0.00548	0.00306	0.00055	25.1	1.7	471.8	24.1	49.4	5.2
0.03	0.00	0.00548	0.00306	0.00055	1.9	0.2	9.7	0.6	7.9	0.9
0.07	0.00	0.00548	0.00306	0.00055	5.0	0.3	25.3	1.3	12.2	1.0
0.05	0.00	0.00548	0.00306	0.00055	3.5	0.2	17.9	0.9	9.2	0.7
0.06	0.00	0.00548	0.00306	0.00055	2.2	0.2	12.0	0.7	11.9	1.0
0.04	0.00	0.00548	0.00306	0.00055	3.8	0.2	18.3	1.0	9.4	0.7
0.06	0.00	0.00548	0.00306	0.00055	2.5	0.2	17.0	0.9	9.3	0.9
0.05	0.00	0.00548	0.00306	0.00055	2.2	0.2	12.1	0.7	8.6	0.8
0.06	0.01	0.00548	0.00306	0.00055	1.9	0.2	10.9	0.7	10.8	1.2
0.07	0.00	0.00398	0.00183	0.00055	1.1	0.1	2.1	0.1	10.0	0.5
0.06	0.00	0.00548	0.00306	0.00055	2.4	0.1	5.4	0.3	10.7	0.6
0.05	0.00	0.00548	0.00306	0.00055	0.9	0.1	0.8	0.1	8.0	0.7
0.07	0.00	0.00398	0.00183	0.00055	1.9	0.1	8.2	0.5	9.2	0.6
0.06	0.00	0.00398	0.00183	0.00055	1.4	0.1	4.7	0.3	8.1	0.5
0.05	0.00	0.00548	0.00306	0.00055	1.3	0.1	2.5	0.2	7.6	0.6
0.09	0.01	0.00398	0.00183	0.00055	3.1	0.2	13.7	0.8	7.9	0.7
0.07	0.00	0.00398	0.00183	0.00055	1.3	0.1	7.8	0.4	7.5	0.5
0.07	0.00	0.00398	0.00183	0.00055	3.6	0.2	13.7	0.7	8.1	0.6
0.04	0.00	0.00398	0.00183	0.00055	1.3	0.1	5.9	0.3	5.7	0.3
0.07	0.00	0.00548	0.00306	0.00055	0.5	0.03	0.7	0.0	10.7	0.6
0.06	0.02	0.00548	0.00306	0.00055	6.4	0.6	42.2	2.4	8.9	2.5
0.08	0.02	0.00548	0.00306	0.00055	33.7	2.0	209.6	10.9	14.7	4.2
0.05	0.01	0.00548	0.00306	0.00055	5.7	0.5	19.5	1.5	8.4	2.1
0.09	0.01	0.00398	0.00183	0.00055	0.8	0.1	1.0	0.2	11.3	0.9
0.00	0.00	0.00548	0.00306	0.00055	0.06	0.01	0.03	0.01	0.60	0.07
		0.00548	0.00306	0.00055	28.0	1.5				
0.00	0.00	0.00548	0.00306	0.00055	18.6	1.0				
0.06	0.00	0.00548	0.00306	0.00055	2.1	0.2	1.3	0.1	13.6	1.1
		0.00398	0.00183	0.00055			244.8	13.3		
0.00	0.00	0.00398	0.00183	0.00055	45.5	2.3				
		0.00398	0.00183	0.00055	26.0	1.3				

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CoPhysics

CERTIFICATE OF INSTRUMENT CALIBRATION

CoPhysics Corporation
1242 Route 208 Monroe, NY 10950
www.cophysics.com
845-783-4402

Co./Institute: CoPhysics Corporation **Calibration Date:** 05/11/09
Investigator: **Phone:** **Due Date:** 05/11/10
Address: 1242 Route 208 Monroe, NY 10950

Instrument Manufacturer: LUDLUM MEASUREMENTS, INC. **Detector Type:** 2x2 NaI Scint.
Meter Model: 2221 **Meter Serial #:** 73685 **Probe Model:** 44-10 **Probe Serial #:** 068744

Temperature (deg.C): 18 Relative Humidity (%): 51 Barometric Pressure (mbar): 998
Mechanical Chk: OK Bat. Chk: OK Zero Chk: OK F/S Chk: OK Alarm Chk: NA Audio Chk: OK Plateau Chk: OK
Operating Voltage (V): 1,250 Input Sensitivity (mV): 15 Threshold Setting: 100 Window Setting: -
Repairs :

CALIBRATION DATA

	Source	Type or Attenuator	Dist.(cm)	Cal. Reference	Units	Scale	Net Reading	Units	Correction Factor	Efficiency
1	CS137D		123.0	14.19	uR/hr	digital	13.68	KCPM	1.0372 uR/hr/KCPM	-
2	CS137D		100.0	21.46	uR/hr	digital	24.97	KCPM	0.8594 uR/hr/KCPM	-
3	CS137D		73.0	40.28	uR/hr	digital	41.88	KCPM	0.9617 uR/hr/KCPM	-
4	CS137D		50.0	85.86	uR/hr	digital	88.13	KCPM	0.9742 uR/hr/KCPM	-
5	CS137D		30.0	238.49	uR/hr	digital	219.81	KCPM	1.0849 uR/hr/KCPM	-
6	CS137A	100	235.0	499.11	uR/hr	digital	369.48	KCPM	1.3508 uR/hr/KCPM	-

Calibration Notes: READINGS WITH 25-FOOT CABLE

STANDARD DATA

Source/Nuclide	Manufacturer	Model#	Serial#	Type	Activity	As of	Geometry
CS137A Cs-137	JL Shepherd & Assoc, Inc.	28-6A	10287	Gamma	918.826 mCi	05/11/09	Parallel
CS137D Cs-137	DuPont-NEN	NES9017	083-01	Gamma	0.065 mCi	05/11/09	Parallel

Certification: This instrument has been calibrated to standards traceable to the National Institute of Standards and Technology and conforms to the requirements of ANSI N323-1978 and 10CFR35. The calibration is performed under New York State Radioactive Materials License # 2691-3949, expires 7/31/10.

Calibrated by: Theodore E. Rabb Date: 05/11/09
Quality Assurance: Jesse Dabbs Date: 5/11/09

CoPhysics

CoPhysics Corporation
1242 Route 208 Monroe, NY 10950
www.cophysics.com
845-783-4402

CERTIFICATE OF INSTRUMENT CALIBRATION

Co./Institute: CoPhysics Corporation **Calibration Date:** 06/04/09
Investigator: C **Phone:** **Due Date:** 06/04/10
Address: 1242 Route 208 Monroe, NY 10950

Instrument Manufacturer: Ludlum Measurements Inc. **Detector Type:** GM-C
Meter Model: 3 **Meter Serial #:** 138997 **Probe Model:** 44-9 **Probe Serial #:** 141724

Temperature (deg.C): 22 Relative Humidity (%): 54 Barometric Pressure (mbar): 997
Mechanical Chk: OK Bat. Chk: OK Zero Chk: OK F/S Chk: OK Alarm Chk: NA Audio Chk: OK Plateau Chk: NA
Operating Voltage (V): 925 Input Sensitivity (mV): 36 Threshold Setting: - Window Setting: -
Repairs :

CALIBRATION DATA

	Source	Type or Attenuator	Dist.(cm)	Cal. Reference	Units	Scale	Net Reading	Units	Correction Factor	Efficiency
1	CS137A	4	67.0	152.24	mR/hr	X100	140.00	mR/hr	1.0874	-
2	CS137A	4	118.0	49.08	mR/hr	X100	55.00	mR/hr	0.8923	-
3	CS137A	4	214.0	14.92	mR/hr	X10	14.50	mR/hr	1.0289	-
4	CS137A	4	370.0	4.99	mR/hr	X10	5.00	mR/hr	0.9980	-
5	CS137A	10	433.0	1.50	mR/hr	X1	1.50	mR/hr	1.0000	-
6	CS137A	100	235.0	0.50	mR/hr	X1	0.50	mR/hr	1.0000	-
7	CS137A	100	428.0	0.15	mR/hr	X0.1	0.13	mR/hr	1.1538	-
8	C14E		0.0	87,488.31	DPM	X10	6,000.00	CPM	14.5813 DPM /CPM	0.0685
9	TC99A		0.0	90,990.90	DPM	X10	17,000.00	CPM	5.3524 DPM /CPM	0.1868
10	SR90A		0.0	126,226.10	DPM	X10	43,000.00	CPM	2.9354 DPM /CPM	0.3406

Calibration Notes:

STANDARD DATA

Source/Nuclide		Manufacturer	Model#	Serial#	Type	Activity	As of	Geometry
C14E	C-14	Amersham	AS570C	CD259	Beta	87488.313 dpm	06/04/09	Parallel
CS137A	Cs-137	JL Shepherd & Assoc, Inc.	28-6A	10287	Gamma	917.334 mCi	06/04/09	Parallel
SR90A	Sr-90	Amersham	AS580SR	CD260	Beta	126226.100 dpm	06/04/09	Parallel
TC99A	Tc-99	DuPont-NEN	DISC	NA	Beta	90990.900 dpm	06/04/09	Parallel

Certification: This instrument has been calibrated to standards traceable to the National Institute of Standards and Technology and conforms to the requirements of ANSI N323-1978 and 10CFR35. The calibration is performed under New York State Radioactive Materials License # 2691-3949, expires 7/31/10.

Calibrated by: Theodore E Tabor Date: 06/04/09
Quality Assurance: Jesse Cobb Date: 6/4/09

CoPhysics

CERTIFICATE OF INSTRUMENT CALIBRATION

CoPhysics Corporation
1242 Route 208 Monroe, NY 10950
www.cophysics.com
845-783-4402

Co./Institute: CoPhysics Corporation
Calibration Date: 11/27/09
Investigator:
Phone:
Due Date: 11/27/10
Address: 1242 Route 208 Monroe, NY 10950

Instrument Manufacturer: LUDLUM MEASUREMENTS, INC. **Detector Type:** ALPHA SCINT
Meter Model: 2350 **Meter Serial #:** 105641 **Probe Model:** 43-5 **Probe Serial #:** 078658

Temperature (deg.C): 20 Relative Humidity (%): 43 Barometric Pressure (mbar): 1000
Mechanical Chk: OK Bat. Chk: OK Zero Chk: OK F/S Chk: OK Alarm Chk: NA Audio Chk: OK Plateau Chk: OK
Operating Voltage (V): 800 Input Sensitivity (mV): 15 Threshold Setting: 100 Window Setting: -
Repairs :

CALIBRATION DATA

	Source	Type or Attenuator	Dist.(cm)	Cal. Reference	Units	Scale	Net Reading	Units	Correction Factor	Efficiency
1	PU239B		0.0	2,860.00	DPM	digital	337.00	CPM	8.4866 DPM /CPM	0.1178
2	PU239A		0.0	25,489.80	DPM	digital	3,023.00	CPM	8.4319 DPM /CPM	0.1185
3	PU239C		0.0	340,000.00	DPM	digital	40,803.00	CPM	8.3327 DPM /CPM	0.1200
4	PU239D		0.0	2,380.00	KDPM	digital	191.00	KCPM	12.4607 KDPM /KCPM	0.0802
5	TH230A		0.0	31,750.00	DPM	digital	3,693.00	KCPM	8.5973 DPM /KCPM	0.1163

Calibration Notes:

STANDARD DATA

Source/Nuclide	Manufacturer	Model#	Serial#	Type	Activity	As of	Geometry
PU239A Pu-239	The Source, Inc.	S-Pu-4a	01621->4	Alpha	25489.800 dpm	11/27/09	Parallel
PU239B Pu-239	The Source, Inc.	S-Pu-4b	01621->4	Alpha	339864.000 dpm	11/27/09	Parallel

Certification: This instrument has been calibrated to standards traceable to the National Institute of Standards and Technology and conforms to the requirements of ANSI N323-1978 and 10CFR35. The calibration is performed under New York State Radioactive Materials License # 2691-3949, expires 7/31/10.

Calibrated by: _____ Date: 11/27/09

Quality Assurance: _____ Date: 11/27/09

CoPhysics

CERTIFICATE OF INSTRUMENT CALIBRATION

CoPhysics Corporation
1242 Route 208 Monroe, NY 10950
www.cophysics.com
845-783-4402

Co./Institute: CoPhysics Corporation **Calibration Date:** 07/20/09
Investigator: **Phone:** **Due Date:** 07/20/10
Address: 1242 Route 208 Monroe, NY 10950

Instrument Manufacturer: LUDLUM MEASUREMENTS, INC. **Detector Type:** 2x2 NaI Scint.
Meter Model: 2360 **Meter Serial #:** 141322 **Probe Model:** 44-10 **Probe Serial #:** 068744

Temperature (deg.C): 21 Relative Humidity (%): 60 Barometric Pressure (mbar): 993
Mechanical Chk: OK Bat. Chk: OK Zero Chk: OK F/S Chk: OK Alarm Chk: OK Audio Chk: OK Plateau Chk: OK
Operating Voltage (V): 1,275 Input Sensitivity (mV): 3 Threshold Setting: - Window Setting: -
Repairs :

CALIBRATION DATA

	Source	Type or Attenuator	Dist.(cm)	Cal. Reference	Units	Scale	Net Reading	Units	Correction Factor	Efficiency
1	PULSE		0.0	200.00	CPM	digital	200.00	CPM	1.0000	-
2	PULSE		0.0	2,000.00	CPM	digital	2,000.00	CPM	1.0000	-
3	PULSE		0.0	20,000.00	CPM	digital	20,000.00	CPM	1.0000	-
4	PULSE		0.0	200,000.00	CPM	digital	200,000.00	CPM	1.0000	-
5	PULSE		0.0	20,000.00	CPM	SCAL	19,963.00	CPM	1.0018	-
6	CS137D		125.0	13.68	uR/hr	digital	18,690.00	CPM	0.000732 uR/hr/CPM	-
7	CS137D		100.0	21.37	uR/hr	digital	24,380.00	CPM	0.000877 uR/hr/CPM	-
8	CS137D		80.0	33.39	uR/hr	digital	37,340.00	CPM	0.000894 uR/hr/CPM	-
9	CS137D		50.0	85.48	uR/hr	digital	82,030.00	CPM	0.0010 uR/hr/CPM	-
10	CS137D		30.0	237.45	uR/hr	digital	182,420.00	CPM	0.0013 uR/hr/CPM	-
11	CS137A	100	331.0	250.47	uR/hr	digital	149,080.00	CPM	0.0016 uR/hr/CPM	-
12	CS137A	100	234.0	501.17	uR/hr	digital	291,490.00	CPM	0.0017 uR/hr/CPM	-

Calibration Notes: CALIBRATED WITH 15-FOOT CABLE; Approx. 1000 CPM per uR/hr

STANDARD DATA

Source/Nuclide	Manufacturer	Model#	Serial#	Type	Activity	As of	Geometry
CS137A Cs-137	JL Shepherd & Assoc, Inc.	28-6A	10287	Gamma	914.724 mCi	07/20/09	Parallel
CS137D Cs-137	DuPont-NEN	NES9017	083-01	Gamma	0.065 mCi	07/20/09	Parallel

Certification: This instrument has been calibrated to standards traceable to the National Institute of Standards and Technology and conforms to the requirements of ANSI N323-1978 and 10CFR35. The calibration is performed under New York State Radioactive Materials License # 2691-3949, expires 7/31/10.

Calibrated by: Theodore E. Tabor Date: 07/20/09
Quality Assurance: Jesse Solis Date: 7/20/09

CoPhysics

CERTIFICATE OF INSTRUMENT CALIBRATION

CoPhysics Corporation
1242 Route 208 Monroe, NY 10950
www.cophysics.com
845-783-4402

Co./Institute: CoPhysics Corporation **Calibration Date:** 11/11/09
Investigator: **Phone:** **Due Date:** 11/11/10
Address: 1242 Route 208 Monroe, NY 10950

Instrument Manufacturer: LUDLUM MEASUREMENTS, INC. **Detector Type:** 1/2x1 NaI Scint.
Meter Model: 2221 **Meter Serial #:** 73685 **Probe Model:** 44-62 **Probe Serial #:** 165709

Temperature (deg.C): 21 Relative Humidity (%): 41 Barometric Pressure (mbar): 1010
Mechanical Chk: OK Bat. Chk: OK Zero Chk: OK F/S Chk: NA Alarm Chk: NA Audio Chk: OK Plateau Chk: OK
Operating Voltage (V): 900 Input Sensitivity (mV): 6 Threshold Setting: 50 Window Setting: -
Repairs :

CALIBRATION DATA

	Source	Type or Attenuator	Dist.(cm)	Cal. Reference	Units	Scale	Net Reading	Units	Correction Factor	Efficiency
1	PULSE		0.0	400.00	CPM	dig	403.00	CPM	0.9925	-
2	PULSE		0.0	4,000.00	CPM	dig	3,980.00	CPM	1.0050	-
3	PULSE		0.0	40,000.00	CPM	dig	39,700.00	CPM	1.0075	-
4	PULSE		0.0	400,000.00	CPM	dig	397,000.00	CPM	1.0075	-
5	PULSE		0.0	20,000.00	CPM	SCAL	19,876.00	30sCT	1.0062 CPM /30sCT	-
6	CS137D		143.0	10.38	uR/hr	dig	446.00	CPM	0.0232 uR/hr/CPM	-
7	CS137D		98.0	22.09	uR/hr	dig	1,310.00	CPM	0.0168 uR/hr/CPM	-
8	CS137D		58.0	63.07	uR/hr	dig	3,624.00	CPM	0.0174 uR/hr/CPM	-
9	CS137D		40.0	132.61	uR/hr	dig	7,630.00	CPM	0.0173 uR/hr/CPM	-
10	CS137A	100	369.0	200.10	uR/hr	dig	7,495.00	CPM	0.0266 uR/hr/CPM	-
11	CS137A	100	165.0	1,000.78	uR/hr	dig	38,929.00	CPM	0.0257 uR/hr/CPM	-

Calibration Notes: USE WITH 20 FOOT CABLE ONLY. Approx. 60 CPM per uR/hr;

STANDARD DATA

Source/Nuclide	Manufacturer	Model#	Serial#	Type	Activity	As of	Geometry
CS137A Cs-137	JL Shepherd & Assoc, Inc.	28-6A	10287	Gamma	908.260 mCi	11/11/09	Parallel
CS137D Cs-137	DuPont-NEN	NES9017	083-01	Gamma	0.064 mCi	11/11/09	Parallel

Certification: This instrument has been calibrated to standards traceable to the National Institute of Standards and Technology and conforms to the requirements of ANSI N323-1978 and 10CFR35. The calibration is performed under New York State Radioactive Materials License # 2691-3949, expires 7/31/10.

Calibrated by: _____ Date: 11/11/09
Quality Assurance: _____ Date: 11/11/09

APPENDIX C
LAB LICENCES AND CERTIFICATIONS

Radtrak. Radon Gas Detector

Landauer, Inc. 2 Science Road Glenwood,Illinois 60425-1586
Telephone: (800) 528-8327 Facsimile: (708) 755-7048

TEST/REPORT ADDRESS:

CO PHYSICS CORP
1242 ROUTE 208
MONROE, NY
10950

YOUR STATE AGENCY:
NY DEPT OF HEALTH
(800) 458-1158

RADON MONITORING REPORT

Detector Number	Detector Type	Starting Date	Ending Date	Days	Location	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	Note
4792798	RADTRAK W/TH	11/30/09	03/08/10	98			1.4 ±0.10	
4792802	RADTRAK W/TH	11/30/09	03/08/10	98	BASEMENT		1.4 ±0.11	
4792808	RADTRAK W/TH	11/30/09	03/08/10	98			1.6 ±0.11	
4808548	INDOOR AIR	11/30/09	03/08/10	98			2.2 ±0.14	
4808554	INDOOR AIR	11/30/09	03/08/10	98			3.4 ±0.18	
1	2	3	4	5	6	7	8	9

* * * C O N T I N U E D * * *

RESULTS RELATED ONLY TO MONITORS AS RECEIVED BY LANDAUER.

	Process No.	Date Rec'd.	Report Date	Acct. No.
DRB	A21846	03/11/10	03/17/10	0400000

KEEP THIS DOCUMENT WITH YOUR IMPORTANT PAPERS
- SEE OTHER SIDE FOR IMPORTANT INFORMATION -

Radtrak. Radon Gas Detector

Landauer, Inc. 2 Science Road Glenwood,Illinois 60425-1586
Telephone: (800) 528-8327 Facsimile: (708) 755-7048

TEST/REPORT ADDRESS:

CO PHYSICS CORP
1242 ROUTE 208
MONROE, NY
10950

YOUR STATE AGENCY:
NY DEPT OF HEALTH
(800) 458-1158

RADON MONITORING REPORT

Detector Number	Detector Type	Starting Date	Ending Date	Days	Location	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	Note
4808565	INDOOR AIR	11/30/09	03/08/10	98	BASEMENT		14.1 ±0.4	
1	2	3	4	5	6	7	8	9

RESULTS RELATED ONLY TO MONITORS AS RECEIVED BY LANDAUER.

	Process No.	Date Rec'd.	Report Date	Acct. No.
DRB	A21846	03/11/10	03/17/10	0400000

KEEP THIS DOCUMENT WITH YOUR IMPORTANT PAPERS
- SEE OTHER SIDE FOR IMPORTANT INFORMATION -

RADON TEST DETECTOR LOG

Landauer, Inc.
2 Science Road
Glenwood, IL 60425-1586

20103

Company: FWACC Project
Address: c/o CoPhysics Corp
1242 RE 208
Monroe, NY 10950
Phone: 845-782-4402
Contact: T. Rahon
Account #:

Detector Number	Starting Date			Ending Date			Detector Location/Comments
	Mo	Day	Yr	Mo	Day	Yr	
4792802	11	30	09	03	08	10	DELI BASEMENT
4808565	11	30	09	03	08	10	" "
4808554	11	30	09	03	08	10	Primo Auto Body A-3 Back area
4792808	11	30	09	03	08	10	" " " (light pole on left)
4792798	11	30	09	03	08	10	Primo Auto Body A-2 Left side
4808548	11	30	09	03	08	10	" " " (on 2x4 ~8' up)
							please email results to ted@cophysics.com

Return original copy with detectors. Retain copy for your records.

White - ORIGINAL COPY Yellow - CUSTOMER COPY Page 1 of 1

Form # 137-033

NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

Pursuant to the Public Health Law and Industrial Code Rule 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing radioactive material(s) for the purpose(s), and at the place(s) designated below. The license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

1. NAME OF LICENSEE CoPhysics Corporation FEIN: 06-1205972 Phone: (845) 783-4402	3. LICENSE NUMBER C2691 4. EXPIRATION DATE **July 31, 2010**
2. ADDRESS OF LICENSEE 1 Commercial Drive Florida, New York 10921	5a. REFERENCE: DL 07-135 b. AMENDMENT NO.: 1

6. Radioactive Materials (elements in mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Cesium 137	A. Sealed Sources	A. 1.2 curies
B. Atomic numbers 1 through 83	B. Any	B. 10 millicuries per nuclide, 100 millicuries total
C. Atomic numbers 84 through 98	C. Any	C. 100 microcuries per nuclide, 1 millicurie total
D. Atomic numbers 1 through 98	D. Any	D. 10 microcuries per sample
E. Atomic numbers 1 through 98	E. Sealed Sources	E. 15 millicuries per device, 100 millicuries total
F. Hydrogen 3	F. Luminous Safety Devices	F. 20 curies per device, 2000 curies total
G. Source Material	G. Any	G. 15 pounds at one time, 150 pounds total per calendar year
H. Any	H. Any	H. As necessary

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NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

3. License Number C2691 **5a. Ref. DL 07-135** **b. Amend. No. 1**

9. Authorized use.

Conditions 6.A.
As a source authorized for use in a J.L. Shepherd and Associates Sub-Model 28-6 Instrument Calibrator, as specified in the Registry of Radioactive Sealed Sources and Devices' Safety Evaluation for the calibrator.

Condition 6.B. and 6.C
As reference standards for calibration and testing of instruments.

Condition 6.D.
As test media for analysis. Test media containing more than 10 microcuries per sample shall be handled in accordance with procedures contained in documents referenced in Condition 16 of the license. The licensee shall notify the Department within seven (7) days of any analysis that indicates a sample exceeding the activity specified in Condition 8.D.

Condition 6.E. and 6.F.
As generally licensed or exempt devices for fixed measuring, gauging, controlling, static elimination, calibration, luminosity, etc. for purposes of transfer from client to manufacturer, recycler, or licensed disposal facility.

Condition 6.G.
As authorized in 12 NYCRR Part 38, Section 38.41, Table 3, Item (d).

Condition 6.H.
Handling at client sites for the purpose of decontamination and decommissioning (D&D) pursuant to criteria and procedures contained in documents referenced in Condition 16 of the license. D&D projects subject to prior approval by this office shall be submitted for review at least thirty (30) days prior to the start of each project.

10. A. Licensed radioactive material in Conditions 6.A. through 6.G shall be stored and/or used at the address specified in Condition 2.

B. Materials authorized in Condition 6.B. through 6.H. may also be used at client sites anywhere in New York State where the Department of Labor has jurisdiction.

11. A. Licensed material shall be used by, or under the supervision of, Theodore E. Rahon, Ph.D. (Radiation Safety Officer)

B. Licensed material may be used by James Dietrich, Ahmad Hatami or Dennis Quinn.

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NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

3. License Number C2691 **5a. Ref. DL 07-135** **b. Amend. No. 1**

12. Detector cells containing licensed material shall not be opened, or foils removed from the detector cells by the licensee.

13. The licensee is not authorized to repair or effect any changes in the detector cells or modify or alter labels affixed thereto, except as otherwise approved by the Department.

14. The licensee shall conduct a physical inventory every six (6) months to account for all sources received and possessed under the License. The records of the inventories shall be maintained for three (3) years from the date of the inventory for inspection by the Department, and shall include the quantities and kinds of licensed material, Manufacturer's Name and Model No., location of the gauges, the date of the inventory and the name of the person who performed it.

15. The licensee is authorized to provide leak test and instrument calibration services on a commercial basis for other State or U.S. Nuclear Regulatory Commission licensees.

16. Except as specifically provided otherwise in this License, the licensee shall conduct its program in accordance with the statements, representation and procedures contained in the documents, including any enclosures, listed below. The Department's Regulations shall govern, unless the statements, representation and procedures in the licensee's application and correspondence are more restrictive than the Regulations.

    A. License Renewal Application dated August 30, 2001, signed by Theodore E. Rahon, Ph.D., with attachments.

    B. Letter dated September 25, 2002, signed by Theodore E. Rahon, Ph.D., with attachments.

    C. Letter dated October 2, 2003, signed by Theodore E. Rahon, Ph.D.

    D. Letter dated June 25, 2004, signed by Theodore E. Rahon, Ph.D., with attachments.

    E. **License Renewal Request dated May 29, 2007, signed by Theodore E. Rahon, Ph.D.**

FOR THE NEW YORK STATE DEPARTMENT OF HEALTH

DATE: 1/4/07

by: Clayton J. Bradt
Principal Radiophysicist

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IAEA

Atoms for Peace: The First Half Century

1957–2007

Seibersdorf Laboratories

Certificate of Participation in the IAEA Proficiency Test

Issued in Seibersdorf, on 15th June 2007, to:

DR. THEODORE E. RAHON
from

COPHYSICS CORPORATION
UNITED STATES OF AMERICA

for participation in the:

IAEA-CU-2006-03 WORLD-WIDE OPEN PROFICIENCY TEST ON THE DETERMINATION OF GAMMA EMITTING RADIONUCLIDES

Organized by the International Atomic Energy Agency
Reference Materials Group, Chemistry Unit, PCI, NAAL

June 2006 - June 2007

This test was organized by the IAEA, in accordance with the guidelines of the ISO/IUPAC International Harmonized Protocol for Proficiency Testing of the (Chemical) Analytical Laboratories, © IUPAC, 1993.

Each participant received a detailed report on his/her performance. This report included an evaluation of the trueness and precision of the reported data and where possible, suggestions or reasons to explain any large discrepancies. A final report (IAEA/AL/171) containing an evaluation of all participants was issued by the IAEA Reference Materials Group. In this latter report, all laboratories have been assigned a code to ensure anonymity and therefore identification of a particular laboratory's results can only be obtained with the agreement of that laboratory.

Gabriele Voigt	Abdulghani Shakhashiro	Umberto Sansone
Director, NAAL	Reference Materials Group	Head, Chemistry Unit

The International Atomic Energy Agency is a United Nations Organization

APPENDIX D

NYCDOHMH AND NYSDEC FINAL JOINT FIELD SUMMARY REPORT

THE CITY OF NEW YORK

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Michael R. Bloomberg
Mayor

Thomas R. Frieden, M.D., M.P.H.
Commissioner

nyc.gov/health

FORMER WOLFF ALPORT CHEMICAL CORPORATION SITE

FINAL
JOINT FIELD SUMMARY REPORT

NEW YORK CITY DEPARTMENT OF HEALTH & MENTAL HYGIENE

and

NEW YOUR STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

August, 2007

New York State Department of Environmental Conservation
Division of Solid and Hazardous Materials
Bureau of Hazardous Waste and Radiation Management, Radiological Sites Section
625 Broadway, Albany, New York 12233-7255
Phone: (518) 402-8579 • **FAX:** (518) 402-8646
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

EXECUTIVE SUMMARY

Department of Health and Mental Hygiene (DOHMH) and New York State Department of Environmental Conservation (DEC) performed radiation surveys of the former Wolff-Alport Chemical Corporation located at 1127-1129 Irving Avenue at the Brooklyn/Queens border. DEC performed surveys and some soil sampling in outdoor areas surrounding the site and DOHMH performed surveys inside three of the buildings that were part of the Wolff-Alport operation. These surveys were performed in order to confirm previously reported findings of radioactive contamination at this site that may have resulted from the activities performed by Wolff-Alport in the 1940s and early 1950s and to determine whether a full site assessment would be necessary.

Findings by both DEC and DOHMH confirmed excess radiation levels in areas surrounding the buildings involved and in the buildings themselves, corroborating earlier surveys. Some readings ranged from 2 to 1000 times normal background levels, with the highest being in a sewer located in front of 1125 Irving Avenue. Limited soil sampling behind these buildings also indicated that contamination could be extensive, especially as one moved closer to the rear building entryways.

The preliminary surveys conducted by DOHMH and DEC are not of sufficient scope to allow either agency to make definitive statements about health consequences to members of the public or to workers at these locations. However, based on the readings obtained outside, it is unlikely that members of the public would spend enough time at or over the areas identified in the surveys to exceed the radiation exposure limits permitted by the New York City Health Code from licensed activities. (While these sites are not licensed by DOHMH, the exposure limits are used as criteria for unlicensed activities as well.) The preliminary dose assessment calculations were completed with radiological measurements obtained in the Primo Auto Body facility. Presumed work practices indicate that exposures to employees may exceed the yearly limits to members of the public permitted by the Health Code.

Based on the confirmatory findings of radioactive contamination at the former Wolff-Alport site, both agencies recommend a formal site assessment be done for the impacted buildings and the surrounding outdoor areas. The assessment should include:

1. Steps are taken to reduce exposure to individuals working in areas found to have elevated radiation levels. Actions may include identifying these areas so that workers do not spend time on or near them and using shielding material for those areas that must be utilized. (Time, Distance, Shielding)
2. A detailed determination of radon and thoron concentrations within the buildings and the extent and depth of thorium contamination in the walls and under the cement floors;
3. A detailed dose assessment for current employees of Primo Auto Body, LJ Ironworks, and Losquadro Ice Company;
4. A detailed determination of the nature and extent of the radiologically contaminated soil surrounding the buildings including depth of contamination and volume of soil involved;
5. A determination of the extent (if any) of contamination migration from the site; and
6. Recommendations for the steps necessary to decontaminate and remediate the affected buildings, surrounding area and the one sewer line having excess radiation levels.

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1.0 INTRODUCTION

In an effort to produce a citywide ground level radiation background map, the Department of Health and Mental Hygiene (DOHMH), Bureau of Environmental Science and Engineering (ESE) completed a vehicle-based background radiation survey

throughout the city. During a portion of the survey, an above background level of gamma activity was detected on Irving Avenue between Cooper Avenue and Moffat Street on the Brooklyn/Queens border. Gamma radiation measurements peaked at approximately 1.5 milliRoentgen per hour (mR/hr) in the street in front of 1129 Irving Avenue. Local gamma radiation background is roughly 0.02 mR/hr.

Through conversations with the NYS Department of Environmental Conservation (DEC) and the US Environmental Protection Agency (EPA), DOHMH was informed that the former Wolff-Alport Chemical Corporation was based at 1127 Irving Avenue. Documents produced by the US Department of Energy (DOE) indicate the owners of Wolff-Alport sold large amounts of thorium oxalate to the now defunct Atomic Energy Commission (AEC).

1.1 Site Background

According to federal records, Wolff-Alport operated at this location from approximately 1920 to about 1954. About 1940, the company began importing Monazite sand from the Belgian Congo through the rail spur located in back of the property. Monazite sand is rich in thorium and rare earth elements, and the company extracted these rare earth elements and sold them to various commercial entities. Initially, the thorium (with presumably other radioactive decay daughters) was considered a waste product and was disposed of into the sewer. Wolff-Alport was ordered to halt sewer disposal in the all of 1947 by the AEC. In order to then minimize the waste, Wolff-Alport began concentrating the thorium as a precipitate and then sold the sludge to the AEC.

1.2 Site Description

The former Wolff-Alport site is located at 1127 Irving Avenue in an urban, light industrial area bordered by residential areas to the north and west. Immediately east of the former site is warehouse building space. Immediately west is a former deli/grocery that was heavily damaged by a fire in 2007. The rail line behind the site is heavily overgrown and contains a significant amount of illegally dumped trash. The Cemetery of the Evergreens borders the site to the south and east on the opposite side of the rail line (see attached figure).

1.3 Former Land/Building Use

Wolff-Alport terminated operations at the site in approximately 1954. Land use records after 1954 are extremely limited. In 1988, Lynda Knitwear occupied the site. In late 2000, the site was used by the current rental occupants, Primo Auto Body.

1.4 Current Land/Building Use

The building that housed the former Wolff-Alport operations appears to have been subdivided (access ways between the portions were sealed) at a later date. Most of the areas investigated during this field effort are used for storage of materials with limited/short term entry by individuals. The one exception is in the main working area of Primo Auto Body, (1127A Irving Avenue) where individuals spend their entire working day in the building while completing various auto repairs and bodywork.

2.0 PREVIOUS INVESTIGATIONS

Previous investigations at the site have been limited. Below is a summary to date:

- DOE, Office of Nuclear Energy - Formerly Utilized Sites Remedial Action Program (FUSRAP), Summary Report and Designation/Elimination Analysis, 1984 – Report claimed that Wolff-Alport's main operation was the production of rare earths materials and the that sale of thorium to AEC was incidental. The report states that AEC was aware that Wolff-Alport was discharging to the sewer in 1947, and based on the quantity of material processed at the facility, this evidence suggests the possibility of sewer contamination and that further investigations may be warranted to assess the potential for radiological contamination at the site.

- Combined investigation between the EPA and the DOHMH, in February 1988 – confirmed the presence of radiological contamination at the site. It was determined during this investigation that further characterization of the site would be necessary to determine the extent of the contamination, including the building sanitary sewer laterals at the site. The surveys detected elevated gamma activity both outside and inside the structure with peak measurements of 1 mR/hr near the rear of the building. At the time it was concluded that the levels were below the regulatory limit and therefore did not pose a danger to workers or members of the general public.

- Combined investigation between the DEC and the DOHMH, October 2000 – Also confirmed the presence of radiological contamination at the site.

3.0 FIELD INVESTIGATION METHODOLOGIES

On May 3, 2007 staff from Office of Radiological Health (ORH) completed a site reconnaissance to determine approximate manpower requirements and examine site logistics and layout and to examine work practices, habits and general day-to-day activities of workers in the businesses now occupying the former Wolff-Alport location. On May 3, 5 and 6, 2007, staff from ESE and ORH conducted a joint preliminary investigation with the DEC to further ascertain the extent of radiological contamination both on-and off-site. EPA was on hand to provide technical assistance. During previous conference calls between the agencies, it was decided that DOHMH would be responsible for surveying the indoor areas on-and off-site and DEC would be responsible for outdoors areas. EPA would act as observers. Table 1 summarized all agency responsibilities.

TABLE 1 AGENCY SITE INVESTIGATION RESPONSIBILITIES			
NYC DOHMH RESPONSIBILITIES	**NYC DEP RESPONSIBILITIES**	**NYS DEC RESPONSIBILITIES**	**EPA RESPONSIBILITIES**
• Indoor survey • Initial indoor air testing	• Manhole access	• Outdoor public/private surveys • Soil sampling and analysis	• Sample analysis support, if needed

3.1 Building Nomenclature and Identification

In order to survey the large, relatively open storage areas accurately, the field crew used existing interior building layouts (interior wall layouts) to subdivide the areas to be surveyed into manageable sized areas. However, upon examination of the interior layouts it was determined the subdivided areas did not always correlate with physical mailing address (portions of two separate buildings each had the same mailing address). DOHMH therefore examined historical reports for the properties in question such as; Certificates of Buildings, various mapping databases, local business listings, the NYC Department of Planning's Tax Lot database and spoke to property owners themselves. All of these areas produced conflicting reports on actual property addresses. With no further information available, DOHMH writes this report knowing address information may be conflicting. Therefore in order to avoid confusion in reading this report with regard to identification of survey areas, nomenclature and identification was revised in the field and was designed based on a number of factors including; the physical mailing address of each entity as supplied by the building owners and the relative locations of the subdivided buildings. The building identification was developed using the physical mailing address with an alphanumeric identification. A designation of A and B was inserted into the identification for subdivided buildings with similar mailing addresses. Building identification is as follows:

- **Former Deli/Grocery** (physical address unmarked)
  – 1125 Irving Avenue

- **Primo Storage Area** (physical address unmarked)
  – 1127 Irving Avenue

- **Primo Body Shop**
  – 1127A Irving Avenue

- **LJ Ironworks**
  – 1129 Irving Avenue

- **Losquardo** Large West (physical address unmarked)
  – 1129A Irving Avenue
- **Losquadro** Large East (physical address unmarked)
  - 1129B Irving Avenue
- **Losquadro** (physical address unmarked)
  - 1139 Irving Avenue

For a listing of building nomenclature based on Department of City Planning Tax Lot files, please refer to map "Wolff Alport: Property Information" on page 8 of this report.

Wolff Alport: Property Information

Interior Limited Gamma Radiation Survey

NYC Health
nyc.gov/health

Vacant

Owner: **Eizikovitz, Israel**
Tenant: Vacant
Address: 1125 Irving Ave.*
Lot: 46*

Figure #1

Owner: **LPL Properties, Inc.**
Tenant: Primo Auto Store
Address: 1127 Irving Ave.*
Lot: 44*

Figure #2

Owner: **Losquadro Ice Co., Inc.**
Tenant: Primo Auto Body
Address: 1129 Irving Ave.* ^
Lot: 42* ^

Figure #3

Owner: **Losquadro Ice Co., Inc.**
Tenant: L.J. Iron Works Inc.
Address: 1129 Irving Ave*
Lot: 42*

0 55 110 220 330 440 Feet

Figure #4

Owner: **Losquadro Ice Co., Inc.**
Tenant: Losquadro Ice Co. Inc.
Address: 1133 Irving Ave.* ^
Lot: 33* ^

Legend

- Indoor Study Area
- Railroad Tracks
- Building Footprint
- Parks

^ Address listed on building does not match address in MapPLUTO and Department of Buildings' records

* Addresses obtained from MapPLUTO - dataset containing the Department of City Planning's Tax Lot Base Map files and PLUTO™ tax lot data files

NYC DOHMH
Environmental Sciences and Engineering
Author: Basia Morofsky
Michael Funaro

Date: July 30, 2007

3.2 Survey Equipment

All indoor surveys were conducted with a Ludlum model 2241 scaler/ratemeters with a Ludlum model 44-2 (1-inch by 1-inch sodium iodide scintillation detector). Outdoor surveys were completed with a Ludlum model 2221 scaler/ratemeters with a Ludlum model 44-10 (2-inch by 2-inch sodium iodide scintillation detector). Sewer surveys were completed with a Ludlum model 77-3 Stretch Scope (Teledetector). Radon measuremtns were collected with a Thermo Alpha-7 Continuous Air Monitor. The table below lists unique specifications for each detector used during the investigation.

TABLE 2
FIELD INVESIGATION EQUIPMENT

DOHMH ID	MODEL NUMBER	SERIAL NUMBER	DATE OF LAST CALIBRATION
Unit C	Ludlum 2241	198229	May 12, 2006
	Ludlum 44-2	PR204877	
Unit L	Ludlum 2241	228243	September 29, 2006
	Ludlum 44-2	PR246154	
Unit M	Ludlum 2241	228166	September 29, 2006
	Ludlum 44-2		
	Thermo Alpha-7	245	June 1, 2006
NYS DEC ID	**MODEL NUMBER**	**SERIAL NUMBER**	**DATE OF LAST CALIBRATION**
DEC # 19	Ludlum 2221	183981	December 19, 2006
	Ludlum 44-10	PR195161	
Teledetector	Ludlum 77-3	48480	March 30. 2007

The Q/C procedures for each instrument were performed in the office, prior to and after the surveys in the field.

3.3 Survey Methods

Previous investigations conducted at the site indicated various levels of gamma radiation above background at the site and in the buildings adjacent to the site. Walk-through surveys were conducted first to determine approximate waist height gamma exposure levels throughout each building. When large expanses of elevated gamma radiation were detected, the building (or subdivided area) would then be subject to a more detailed investigation to estimate the approximate percentage of area potentially impacted by contamination.

3.3.1 DOHMH Methodologies

3.3.1.1 Walk-Through Surveys

An initial walk-through of all buildings was completed to determine which buildings, or portions of buildings, have elevated gamma measurements. The initial walk-through was conducted at one meter (waist height) above the floor using the detectors outlined in Table 2. Radiological data collected during this portion of the investigation were recorded onto sketches of the building. When large expanses of elevated gamma radiation (approximately 2 to 3 times

background) were detected in any building or portion of each building, the entire building was then fully characterized as described in Section 3.3.1.2. Radiological hot spots were marked as such to minimize the amount of re-surveying needed.

3.3.1.2 Gridded Surveys

In order to fully characterize the indoor areas, systematic surveys were conducted based on 5-foot by 5-foot grid with measurements collected at each node in the grid and where gridlines intersect with a surveying obstacle or a wall. Near-contact floor measurements were collected using the detectors outlined in Table 2. Once completed, these surveys were used to complete the indoor radiation contour maps and these in turn were used to determine the likely areas for soil contamination under the building.

3.3.2 NYS DEC Methodologies

3.3.2.1 1125 Irving Avenue ('vacant' from Map 1.0) – Sidewalk on the Cooper Avenue Side

The sidewalk along the side of 1125 Irving, along Cooper Avenue, was surveyed. Approximately 12 feet out from the building, and about 10 feet from the intersection of Cooper and Irving Avenues, an area of elevated count rates was delineated as 7.6 feet long (along Cooper Avenue) and 4.6 feet wide. The gamma count per minute measurements ranged from approximately 36,000 to 56,000 cpm. These measurements are more than 2.5X background. NYC DOHMH staff confirmed elevated radiation levels with their exposure rate meters

Map 1.0

3.3.2.2 1125 Irving Avenue - Sidewalk on Irving Avenue

On the Irving Avenue side of building 1125, the sidewalk in front of the building was surveyed. The grocery store that operated in this building is closed. There was a fire, and the building is now boarded up. Elevated measurements were found on the steps leading into the building and on the sidewalk in front of the steps. This area was delineated to be about 6 feet long (parallel to the curb) by 5.5 feet wide. The count rates ranged from 65,350 to 135,200 cpm. Count rates

increased as the street was approached, with the highest readings obtained at the curb.

3.3.2.3 1127 Irving Avenue - Sidewalk on Irving Avenue ('Figure #1' from Map 1.0 above)

The sidewalk in front of the auto body shop (1127 Irving Avenue) was surveyed. Elevated count rates were found in front of the door to the shop. At the entrance, the count rates were approximately 72,000 cpm and as one moved toward the street, the count rates increased. The highest count rate was about 205,000 cpm, near the street. These rates were confirmed by staff from EPA using a similar NaI detector.

3.3.2.4 1129 Irving Avenue - Sidewalk on Irving Avenue ('Figure#4' from Map 1.0 above)

The sidewalk in front of the ice making shop (1129 Irving Avenue) was surveyed. At the entrance to the building, the count rates were approximately 130,000 cpm. Again, as one moved toward the street, the count rates increased significantly. The highest count rates were up to 448,000 cpm. These readings were also confirmed by the NYC DOHMH and EPA staff.

3.3.2.5 Survey of Yard Behind Buildings on Irving Avenue (see Map 1.0)

The surveyors entered the backyard between 348 Moffat Street and 1133 Irving Avenue, through a gate in the fence. Waste and discarded items had been dumped here, so the survey was limited to the path through the debris. This path was a few feet higher in elevation than the land to the west, and appeared to be the bed of a rail spur coming off of a Long Island Railroad line, which runs northeast of the site. Walking along the spur in the area behind 1133 Irving, count rates ranged from 15,000 to 20,000 cpm. A sample was collected at a point where the count rate was about 20,000 cpm, which was above the screening level (see figure on page 9). Beyond that point, count rates were 12,000 to 13,000 cpm. The survey continued for about 100 feet, along the path, with no significant increases in the count rates. Surveying was suspended at that point, and resumed further north of the rail spur bed, behind 1129 Irving Avenue (see figure on page 9). As the back door of 1129 Irving Avenue was approached, count rates steadily increased, from about 24,000 cpm just off the rail spur bed, to 390,000 cpm, two feet from the building. A surface soil sample was collected at that location (see figure on page 9). The area to the south of the doorway was surveyed. Count rates within 10 feet of the building were in the range of 200,000 to 350,000 cpm, with the higher count rates closer to the building and the door.

Behind 1133 Irving Avenue, count rates decreased with distance from 1129 Irving, to 127,000 cpm about ten feet south of the wall between the two buildings. Further south, behind 1133 Irving, count rates increased as the surveyors approached a bricked-up opening that appeared to have once been an overhead doorway. In front of the former doorway, count rates were in the range of 174,000 to 198,000 cpm, and in one spot, 250,000 cpm. A few feet beyond the doorway, the count rate decreased to 126,000 cpm. Farther from the doorway,

and twenty feet from the southern edge of 1133 Irving, the count rate was 60,000 cpm.

3.3.2.6 Sewer Surveys

Three sewer manholes were opened by NYC DEP and measurements were taken with the Teledetector, at selected distances below street level. The probe was held within two inches of the wall. The readings are presented in Table 2.

Manhole 1 was a few yards southeast of the intersection of Irving Avenue and Cooper Avenue, in front of 1125 Irving (see figure on page 9). The inside surface was crusted with a granular material, all the way down to the bottom. Sewage was flowing about 9 feet below the street level. This was the only manhole in which measurements exceeded 0.2 mR/hr. The maximum measurement was 4 mR/hr, seven feet below street level in area less than six inches by six inches, on the southwest side of the manhole.

Manhole 2 was on Moffat Street, in front of 338 Moffat (see figure on page 9). This manhole was dry, and the inside was clean brick, with no granular deposits. All readings were 0.2 mR/hr or less.

Manhole 3 was on Irving Avenue, north of the intersection with Cooper Avenue (see figure on page 9). Sewage was flowing at 11 feet below street level. There was some granular material clinging to the sides, but it was not thick or extensive. All readings were 0.1 mR/hr or less.

TABLE 3
SURVEY OF SEWER ACCESS STRUCTURES

MANHOLE #1		MANHOLE #2		MANHOLE #3	
IRVING AVE, S OF COOPER AVE		IRVING AVE, N OF COOPER AVE		MOFFAT ST.	
FEET BELOW STREET LEVEL	MR/HOUR	FEET BELOW STREET LEVEL	MR/HOUR	FEET BELOW STREET LEVEL	MR/HOUR
0.5	≤0.2	2	≤ 0.1	0	0.05 - 0.15
2 - 2.5	0.25	3	≤ 0.1	1	0.05 - 0.1
4	0.3	6	0.05 - 0.2	3	0.05 - 0.1
7	4	9	0.05	6	0.1
9	0.4 - 0.7			11	0.1

4.0 FIELD INVESTIGATION RESULTS

4.1 Indoor

4.1.1 Former Deli/Grocery – 1125 Irving Avenue

This building sustained damage during a structure fire in early 2007. As such, no surveys were completed in the building at the time of the investigation.

4.1.2 Primo Storage Area – 1127 Irving Avenue

This portion of the building was full of automobiles in various states of disrepair, with a large majority of the vehicles being used for scavenged auto parts. Approximately 25% of the floor space was available for near-contact gamma survey. As such, the grid lines were shifted in order to facilitate surveying of the area. Numerous brick archways in the interior wall on the right side have been bricked closed, restricting access to 1127A Irving Avenue (east side). The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition. No evidence of floor drains was noted. However a sewer cleanout was found in the front portion of the building.

During the investigation it was noted that occupancy of this portion of the building was extremely limited, with one individual occasionally entering to remove/retrieve auto parts from the building. Typical use of this portion of the building has changed substantially since the previous investigation completed in 1988.

Due to the large number of measurements above background detected during the walk-through survey, this portion of the building was surveyed using a systematic grid system as described in Section 3.3.1.2. A large portion of the near contact measurements (approximately 90%) was above background (see Figure 1). There appeared to be three large areas of elevated exposure measurements; one in the center – right side, at approximate maximum of 0.7 mR/hr (previously identified as in a closet during the EPA investigation), an area adjacent to the roll down door of an approximate maximum of 0.2 mR/hr, and an area near the rear exterior wall of the building at an approximate maximum of 0.2 mR/hr. Survey of the subgrade sewer clean-out located in the hot spot adjacent to the roll down door indicated a maximum measurement of 1 mR/hr on contact with the vault walls on all sides. The brick-lined vault is approximately 3 feet by 2 feet and approximately 2 feet deep.

4.1.3 Primo Auto Body Shop – 1127A Irving Avenue

This portion of the building is Primo Auto Body's main working area. At the time of the investigation, work being performed at the site was auto body repair, auto body painting and general automotive repair. An interior wall composed of concrete masonry units (CMU) divided the area into two separate workspaces. The building contained a small office area and a small water closet with limited working plumbing and wastewater piping. The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition.

No evidence of floor drains was noted. There was a working door leading to the railroad right-of-way in the rear exterior wall.

During the investigation it was noted that this portion of the building was occupied by approximately six employees. Most employees completed their work in the standing position, however, during the investigation it was noted that employees were required to lay or sit directly on the floor to complete certain wheel and undercarriage repairs (no hydraulic auto lifts were noted). Typical use of this portion of the building has changed substantially since the previous investigation completed in 1988.

Due to the large number of measurements above background detected during the walk-through survey, this portion of the building was surveyed using a systematic grid system as described in Section 3.3.1.2. Large portions of the near contact measurements (approximately 90%) were elevated above background (Figure 2). There appeared to be two large areas of elevated exposure measurements; one in the center of the area, at approximate maximum of 0.2 mR/hr and an area adjacent to the exterior roll down door of an approximate maximum of 0.3 mR/hr. No subgrade sewer cleanout was noted in the area. A small office for the shop is located on the right side of the area near the exterior roll up door, where maximum near-contact measurements peaked at 0.2 mR/hr.

4.1.4 LJ Ironworks – 1129 Irving Avenue

This portion of the building is LJ Ironworks manufacturing area. At the time of the investigation, the rear portion was used to manufacture (weld) wrought iron fence/gates. The front portion of the building is used for parking three trucks. The building contained a small office area and small water closet with limited working plumbing and wastewater piping. The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition. No evidence of floor drains was noted. There was a working door leading to the railroad right-of-way in the rear exterior wall.

During the investigation it was noted that this portion of the building was occupied by approximately two employees. One employee was in the rear of the building, the other was sitting at a desk for an extended period of time in the office. Typical use of this portion of the building has changed substantially since the previous investigation completed in 1988.

Due to the large number of measurements above background detected during the walk-through survey, this portion of the building was surveyed using a systematic grid system as described in Section 3.3.1.2. Large portions of the near contact measurements (approximately 85%) were elevated above background (Figure 3). There appears to be one large area of elevated exposure measurements throughout most of the front portion of the building. Exposure rates peaked at approximate maximum of 0.2 mR/hr. No subgrade sewer cleanout was noted in the area. A small office for the shop is located on the left

side of the area near the exterior roll up door, where maximum near-contact measurements peaked at 0.1 mR/hr.

4.1.5 Losquardo Large West – 1129A Irving Avenue

This portion of the building is one of three storage areas used by Losquadro Ice. At the time of the investigation, the building was used for storage of vending ice freezers, pallets of plastic bags and calcium chloride (raise the freezing point of ice?). A portion of the floor was depressed (sump area) with a number 2 fuel oil truck parked in the sump area. Minor amounts of fuel oil were spilled in some areas of the building.. The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition. No evidence of floor drains was noted, but a sewer cleanout was found in the front portion of the building.

During the investigation it was noted that occupancy of this portion of the building was extremely limited, with one individual occasionally entering to remove a pallet of materials from the building. Typical use of this portion of the building probably has not changed since the previous investigation completed in 1988.

A Thermo Alpha-7 continuous air monitor (CAM) was set up in this building to monitor the concentration airborne radionuclides. After a 4-hour run, the spectrum of detected alpha emitters appeared normal. However, it should be noted that a large bay door was open during testing which did allow movement of outside air into the building.

The walk-through survey of this portion of the building indicated two small areas of elevated exposure. One area was detected along the wall on the left side of the building (rear portion) and another spot was detected along the rear wall adjacent to the left side. Peak approximate measurements for both spots were 0.3 mR/hr. The front portion of the building had an average exposure rate of 0.03 to 0.05 mR/hr. The rear portion of the building had an average exposure value of 0.02 to 0.03 mR/hr (Figure 4). Survey of the subgrade sewer cleanout indicated maximum contact measurement of 0.2 mR/hr on the vault walls on all sides. The vault is approximately 3 feet by 2 feet and approximately 3 feet deep.

4.1.6 Losquadro Large East - 1129B Irving Avenue

This portion of the building is the second of three storage areas used by Losquadro Ice. At the time of the investigation, the building was used for storage of pallets of plastic bags. The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition. No evidence of floor drains was noted, however a sewer cleanout was found in the front portion of the building.

During the investigation it was noted that occupancy of this portion of the building was extremely limited, with one individual occasionally entering to remove a pallet of materials from the building. It is not known if the typical use of this portion of the building has changed since the previous investigation completed in 1988.

The walk-through survey of this portion of the building did not indicate any areas of waist-level exposure above twice background. The front portion of the building had an average exposure rate of 0.03 to 0.04 mR/hr. The rear portion of the building had an average exposure value of 0.02 to 0.03 mR/hr (Figure 4). Survey of the subgrade sewer cleanout indicated a maximum contact measurement of 0.2 mR/hr of the vault walls on all sides. The vault is approximately 3 feet by 2 feet and approximately 2 feet deep. This was the first known radiological survey performed in this portion of this building.

4.1.7 Losquadro - 1139 Irving Avenue

This portion of the building is the third of three storage areas used by Losquadro Ice. At the time of the investigation, the building was used for storage of vending ice freezers and pallets of plastic bags. The floor was composed of concrete, and in general the floor appeared to be structurally sound and in good condition. No evidence of floor drains or sewer cleanouts was noted.

During the investigation it was noted that occupancy of this portion of the building was extremely limited, with one individual occasionally entering to remove a pallet of materials from the building. It is not known if the typical use of this portion of the building has changed since the previous investigation completed in 1988.

The walk-through survey of this portion of the building did not indicate any areas of waist-level exposure above twice background. The front portion of the building had an average exposure rate of 0.03 to 0.04 mR/hr. The rear portion of the building had an average exposure value of 0.02 to 0.03 mR/hr (Figure 4). Survey of the subgrade sewer cleanout indicated maximum contact measurement of 0.2 mR/hr on contact with the vault walls on all sides. The vault is approximately 3 feet by 2 feet and approximately 2 feet deep. This was the first known radiological survey performed in this portion of this building.

Wolff Alport: Sample Survey Results

Interior Limited Gamma Radiation Survey

Figure #1: Primo Storage Area

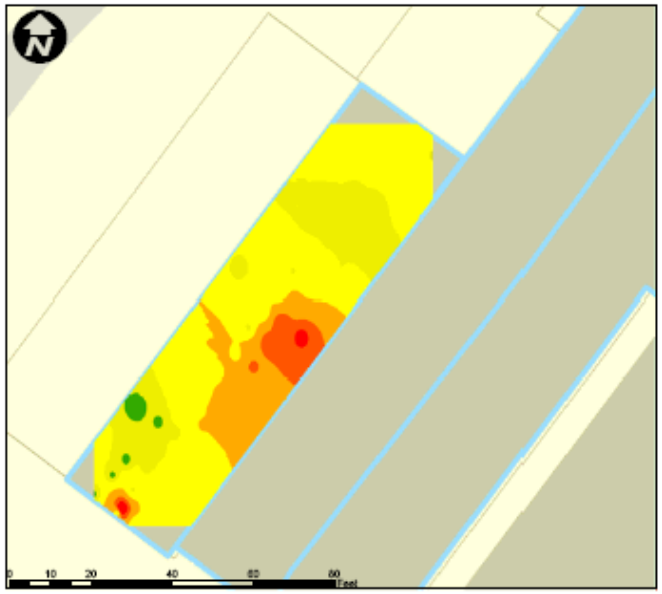


Figure #2: Primo Auto Body

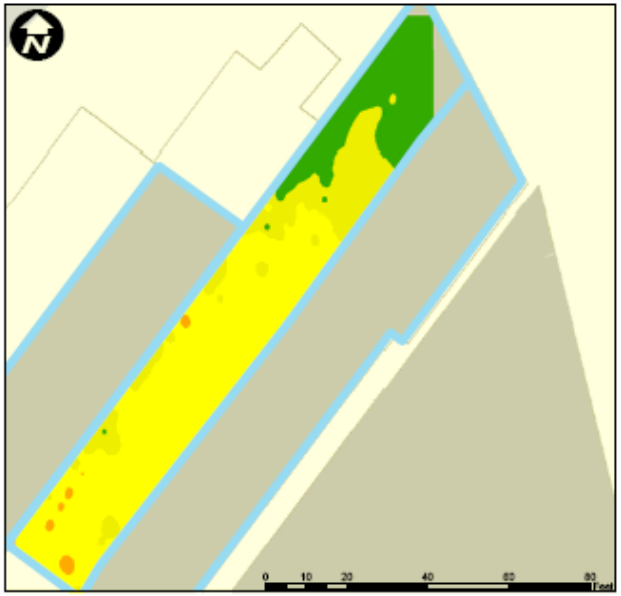
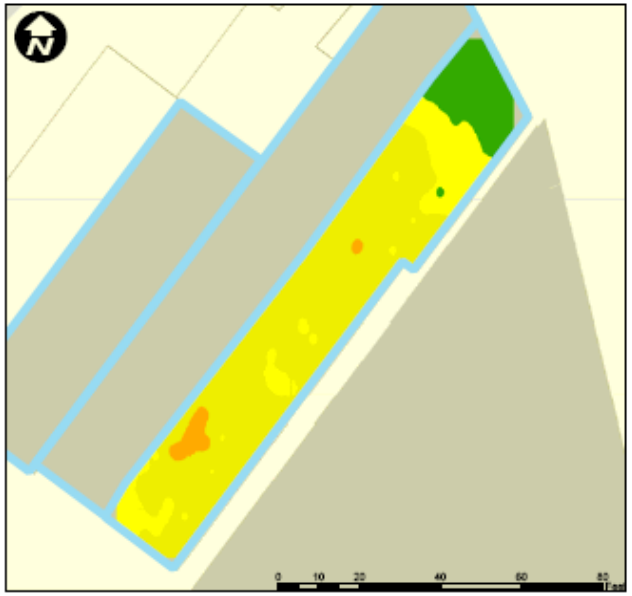
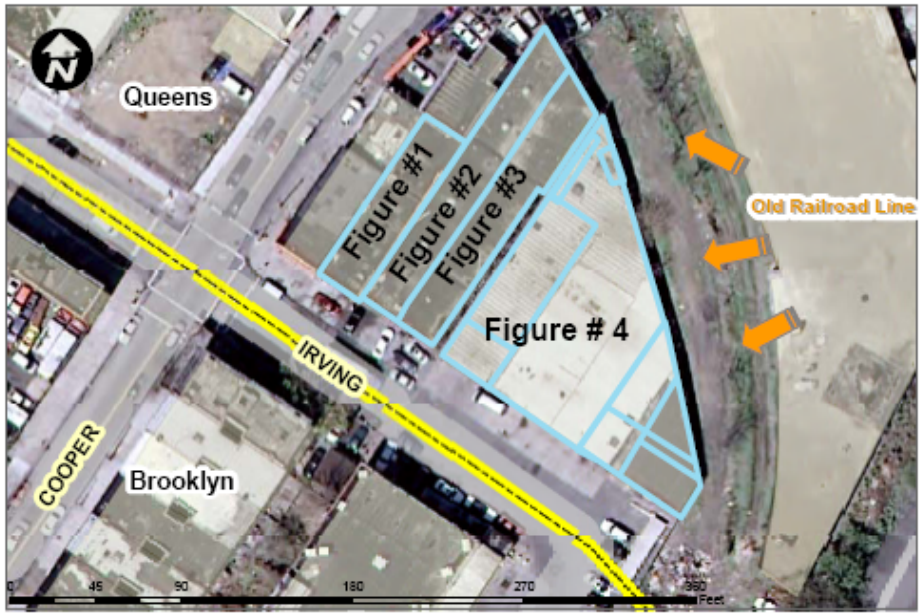


Figure #3: L.J. Iron Works Inc.





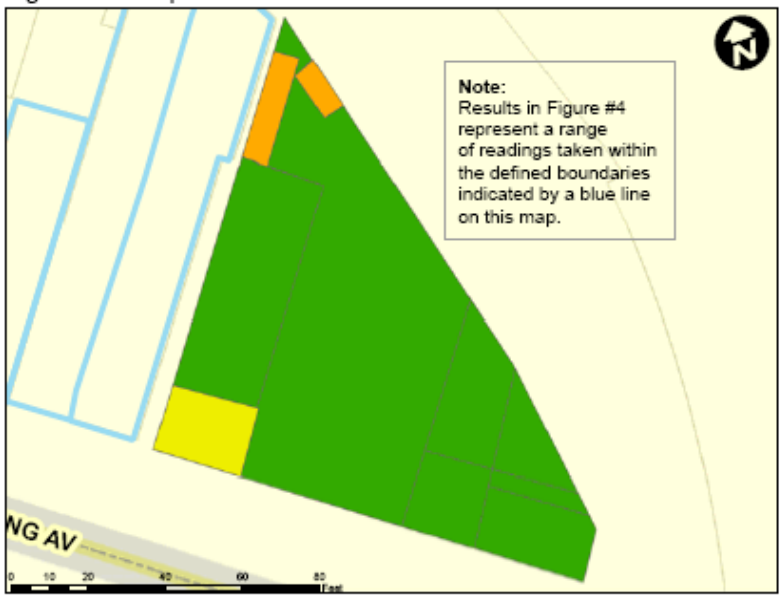
Legend

- Indoor Survey Area
- Borough Boundaries
- Building Footprint

Gamma Radiation mR/hr**

- 0 - 0.040
- >0.040 - 0.080
- >0.080 - 0.200
- >0.200 - 0.400
- >0.400 - 0.600
- >0.600 - 0.999
- >0.999 - 1.000

Figure #4: Losquadro Ice Co. Inc.



Note: Indoor surveys were completed using Ludlum 2241 scaler/ratemeters with Ludlum 44-2 (1inch by 1inch sodium iodide scintillation detectors). All survey values are contact readings. Please refer to report for calibration dates and serial numbers.

**Result values were interpolated using Inverse Distance Weighting with a power of 2. Interpolations are bound by the Wolff Alport Study Area limiting the interpolation to the walls of the buildings in question.

NYC DOHMH
Environmental Sciences and Engineering

Author: Basia Morofsky
Michael Funaro

Date: July 30, 2007

4.2 Outdoors

4.2.1 Analytical Results

The two soil samples were analyzed by gamma spectroscopy on the Department's Canberra Reverse Electrode High-Purity Germanium Detector, using Genie 2000 MCA software. These were screening-level analyses, performed to identify the radionuclides present and obtain an estimate of the concentrations. The results are presented in Table 2. Sampling locations are presented in Figure 5.

TABLE 4
ANALYTICAL RESULTS

	SAMPLE NO. 5060701 BEHIND 1129 IRVING AVE		SAMPLE NO. 5060702 OFF MOFFAT STREET	
	pCi/g	+/-	pCi/g	+/-
K-40	N.D		8.4	0.51
Cs-137	N.D.		0.08	0.18
U series				
Th-234	N.D.		1.4	0.2
Pb-214	40	1.	2.3	0.14
Bi-214	39	1.	2.2	0.09
Th series				
Ac-228	299	5.	3.9	0.13
Ra-224	420	21	2.6	0.51
Pb-212	283	11	4.1	0.18
Bi-212	259	8	N.D.	
Tl-208	98	2.	1.27	0.06

N.D. = not detected

4.2.2 Sidewalks

The surveys of both the sidewalks on Cooper and Irving Avenues found the presence of residual contamination. This finding supports the earlier survey reports that found residual contamination present.

4.2.3 Yard Behind 1125 - 1133 Irving Avenue

The soil directly behind 1129 Irving Avenue is clearly contaminated with radioactive materials. The one sample collected from the location of the highest count rate (390,000 cpm) contains thorium and its decay products in concentrations of approximately 285 pCi/g, and radium-226 and its decay products, in concentrations of about 40 pCi/g (the radium-226 concentration is inferred from the Pb-214 and Bi-214 gamma spec results). This is consistent with historical descriptions of the waste produced by the Wolff Alport Chemical Company. The waste is widespread behind the building, and appears to be more

concentrated closer to the building, and in particular, around the two doorways surveyed.

The slightly elevated count rates along the former rail spur do not appear to be due to waste from Wolff Alport. Based on the analytical results, uranium and thorium series radionuclides, are present in equilibrium. The concentrations are slightly higher than found in some soils, but are commonly found in sand and gravel, which was probably used in constructing the rail spur.

5.0 PRELIMINARY DOSE ASSESSMENT

Based on the limited assessment of the work activities in all the impacted and potentially impacted buildings at the site, it appears that the employees of Primo Auto Body (1127A Irving Avenue) are likely to receive the highest radiation dose. During the site visits, DOHMH staff witnessed employees laying on the shop floor while repairing a vehicle. It is possible that an employee of Primo Auto Body could exceed the radiation dose limits for individual members of the public of 100 mrem/yr [NYC HC Article 175.03(d).] Although this limit is for exposure to licensed material, the Department uses it as guidance for acceptable exposures to unlicensed or uncontrolled sources of radiation. The following estimations were used to formulate this assessment:

- Four brake/undercarriage repairs per week by one individual
- Each brake/undercarriage repair requires 2 hours of laying/kneeling/sitting on the concrete floor (8 hours at 0.3 mR/hr per week)
- Six day work week with 50 week work year
- Maximum recorded gamma exposure level with background subtracted is 0.3 mR/hr

Using these assumptions, an individual would additionally receive approximately 120 mR/yr above their background dose. This assessment may be low as it does not include the following:

- The estimate does not include the potential internal exposure from elevated levels (above background) of radon and thoron gas in the atmosphere of the building.
- The estimate does not include additional external (above background) dose an individual would receive while completing other types of work during the typical workday.

6.0 RECOMMEDATIONS

This investigation confirmed the presence of radiological contamination at the former Wolff-Alport site. It also identified radiological contamination off-site, on all four properties bordering the site. Based on the results of the field investigation, a full-scale site assessment needs to be completed at the former Wolff-Alport site and the adjacent properties to determine the nature and extent of contamination in the area. The full-scale assessment should include the following:

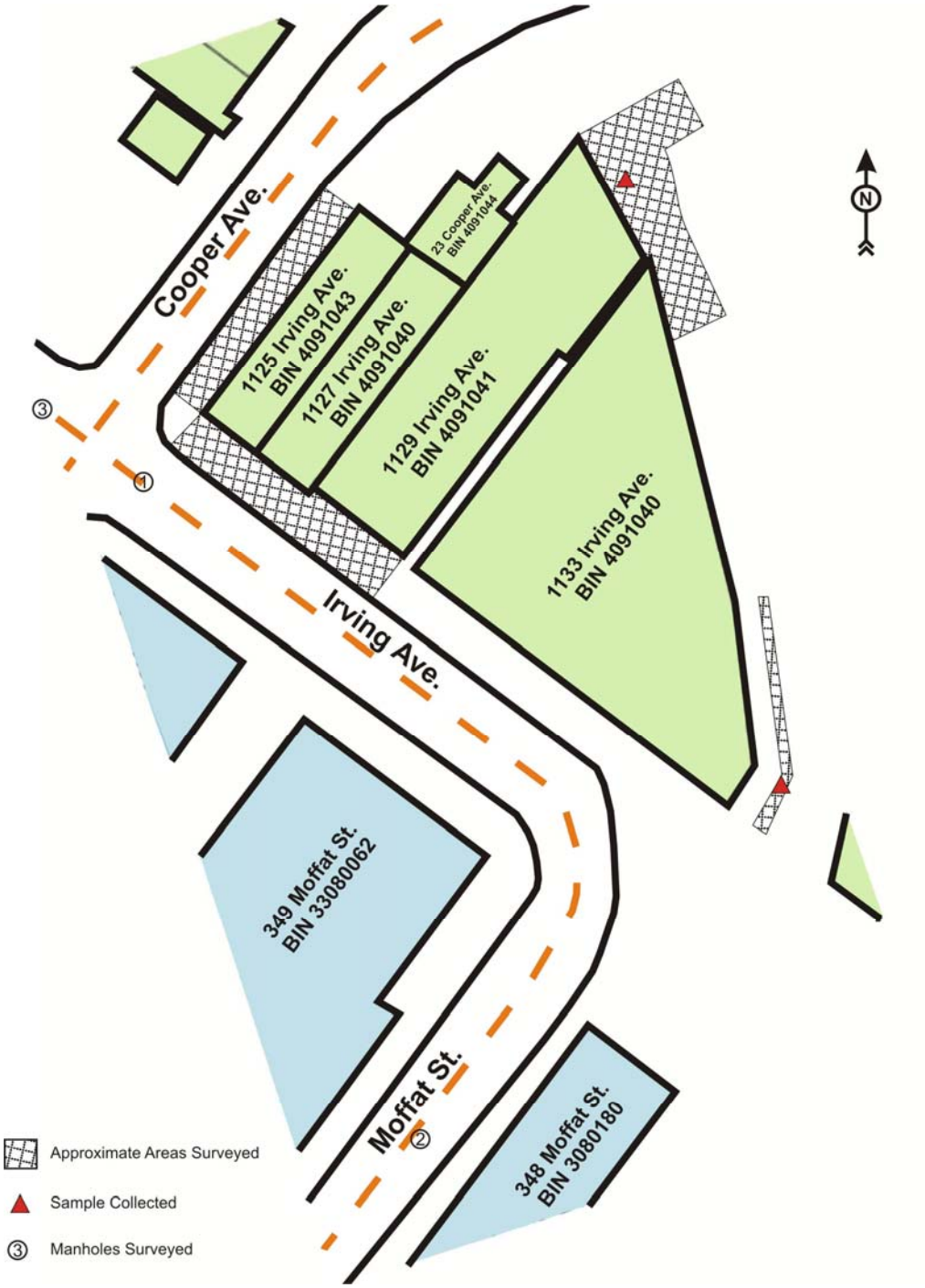
- A more detailed determination of radon and thoron (radon-220) concentrations in all of the impacted buildings.
- A more detailed dose assessment for current employees of Primo Auto Body working in the active auto body shop portion of 1127 Irving Avenue (1127A Irving Avenue Designation), for employees of LJ Ironworks, and for employees of Losquadro Ice Company.
- A more detailed determination of the nature and extent of radiologically contaminated soil both on- and off-site. The depth of soil contamination also needs to be ascertained to determine the total volume of soil impacted. This investigation must include a determination if other neighboring properties are impacted.
- Determination if other contaminants are present in the soil. Due to the nature of work completed at the site, there is also concern for metals contamination in the soil.

It is also recommended that some interim measures be taken to reduce the exposures to individuals working adjacent to or on areas of elevated gamma measurements. Actions may include but are not be limited to placing shielding on the floor or delineating those areas to be avoided by workers.

7.0 CONCLUSIONS

Past practices at the former Wolff-Alport site did impact the site as identified in the 1988 and 2000 field investigations. It appears individuals working in Primo Auto Body may receive doses above regulatory levels outlined in Article 175 of the NYC Health Code. None of the field investigations completed to date were of sufficient scope to definitively determine what the contamination effects are for the health and safety of the workers and the public that may use the impacted buildings or the immediate outdoor areas surrounding this site. Both DOHMH and DEC are recommending that a full site assessment of the impacted buildings and immediate surrounding outdoor areas be performed so that this determination can be made and followed by any decontamination and remediation work that may be deemed necessary.

FIGURE 5 – Areas Surveyed by NYS



APPENDIX E
ANALYSIS OF HISTORIC GROUNDWATER FLOW

Analysis of Historic Groundwater Flow in the Area Surrounding the Wolff-Alport Chemical Corporation Site 1125-1139 Irving Avenue Queens, New York 11385

At the request of the New York City Department of Design and Construction, Louis Berger and Assoc., P.C. (Berger) conducted analysis of historic groundwater flow in the area surrounding the Wolff-Alport Chemical Corporation Site at 1125-1139 Irving Avenue Queens, New York (hereinafter referred to as the Site) since 1903. Below is a summary of the analysis of historic groundwater flow over this time. To graphically support the findings of the analysis, a series of figures depicting groundwater in the region are included.

Groundwater Flow over time:

Based on a review of historic groundwater elevations in the region, Berger has interpreted groundwater flow in the vicinity of the Site dating back to the early 1900's. Figures 1 - 9 depict regional groundwater elevation contours for Kings and Queens Counties based on several published sources (Buxton et al, 1981; USGS, 1997; USGS, 2006).

Figure 1 (1903), demonstrates a time with minimal pumping influence in the region, as such, groundwater flow was generally to the south at the Site with a local groundwater divide situated to the north and west of the Site.

First evident in the 1936 mapping effort (Figure 2) and continuing through the 1960's (Figures 3 and 4), heavy pumping west of the Site greatly influenced groundwater elevations in the region. This pumping activity resulted in groundwater at the Site flowing to the west.

By 1961 and through the mid-1970's regional groundwater flow again changes direction as shown on Figures 5 and 6. This period is characterized by pumping activity to the east of the Site, resulting in an east-southeast groundwater flow and a general flattening of the regional groundwater table.

In 1981 (Figure 7), groundwater in the region is not largely affected by pumping activity resulting in a return to a more natural groundwater condition in the area with groundwater near a divide but once again (as in 1903, Figure 1) flowing to the south.

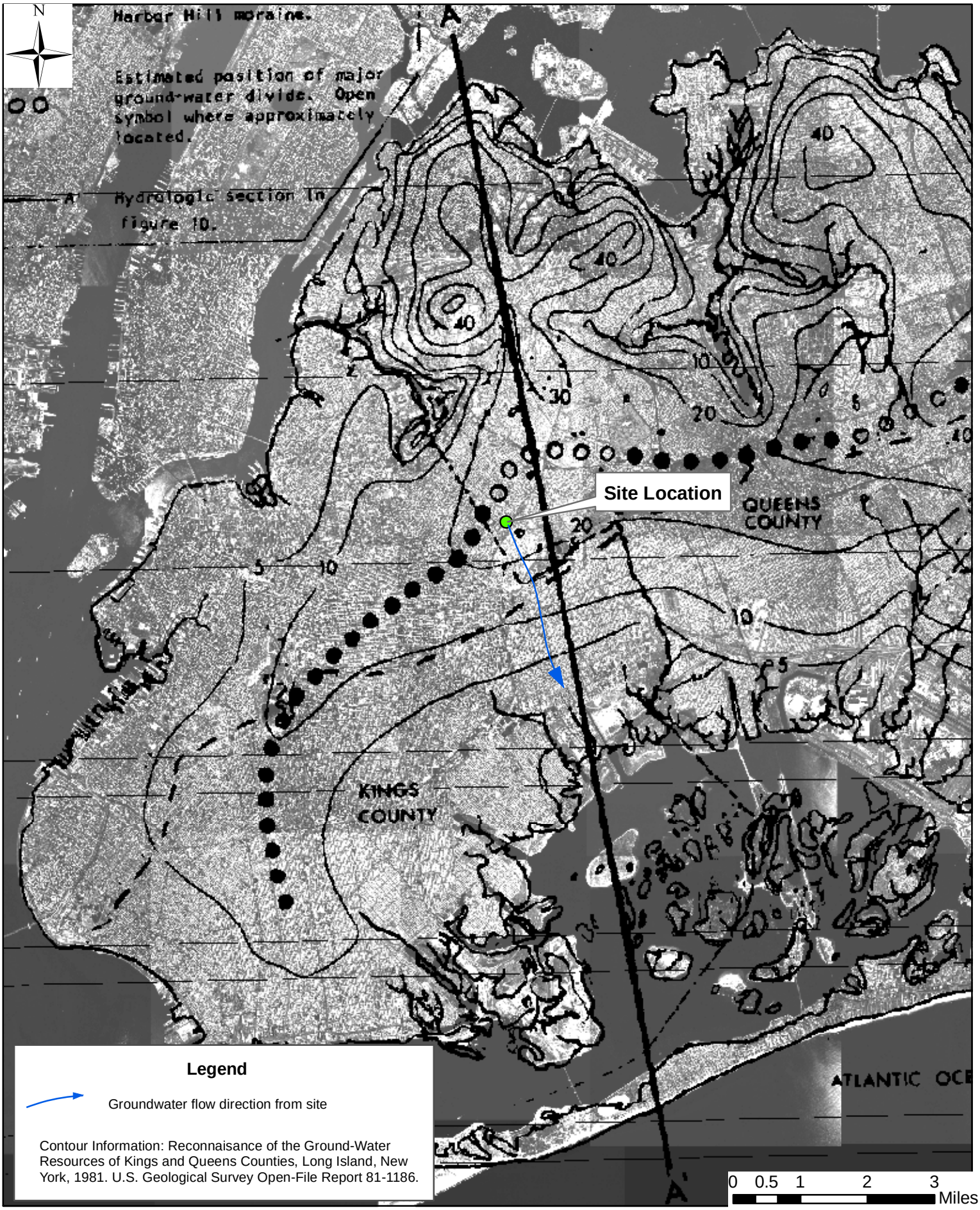
Similarly in 1997 and 2006 (Figures 8 and 9), there is no evidence of large scale pumping activities in the region. The Site is situated on a regional divide where groundwater can be interpreted as having a westerly or southerly flow.

References:

Buxton et al, 1981. *Reconnaissance of the Ground-Water Resources of Kings and Queens Counties, Long Island, New York.* United States Geological Survey Open File Report 81-1186.

USGS, 1997. *Water-Table Altitude in Kings and Queens Counties, New York, in March 1997.* USGS Fact Sheet FS-134-97, November 1997.

USGS, 2006. *Water-Table and potentiometric surface altitudes in the Upper Clacial, Magothy and Lloyd Aquifers beneath Long Island, New York, March-April 2006*. USGS, March 2007.



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NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1903

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 1

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Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1936

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FIGURE 2

NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1943

The Louis Berger Group, Inc.
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Morristown, NJ 07960

FIGURE 3

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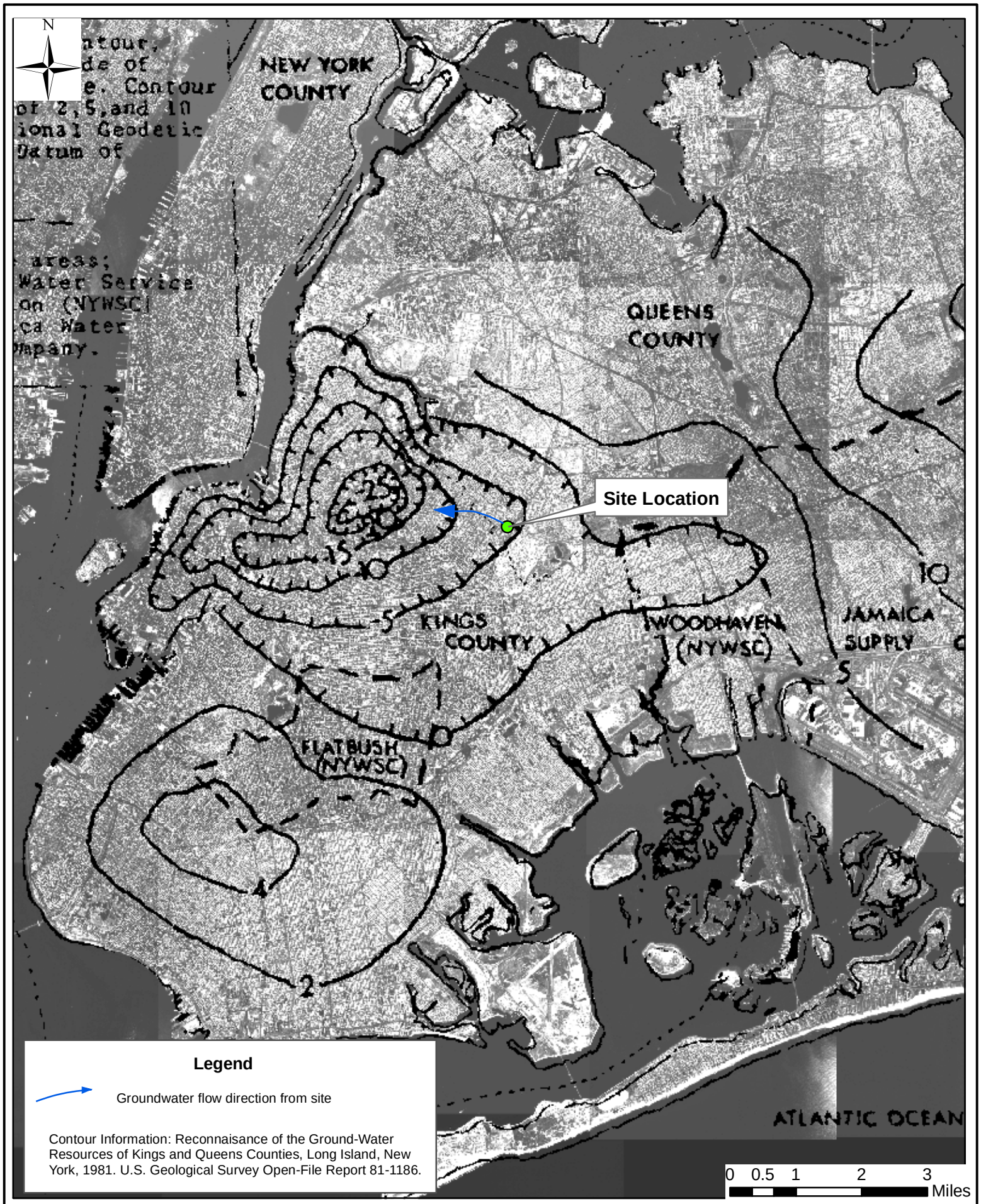

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NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1951

The Louis Berger Group, Inc.
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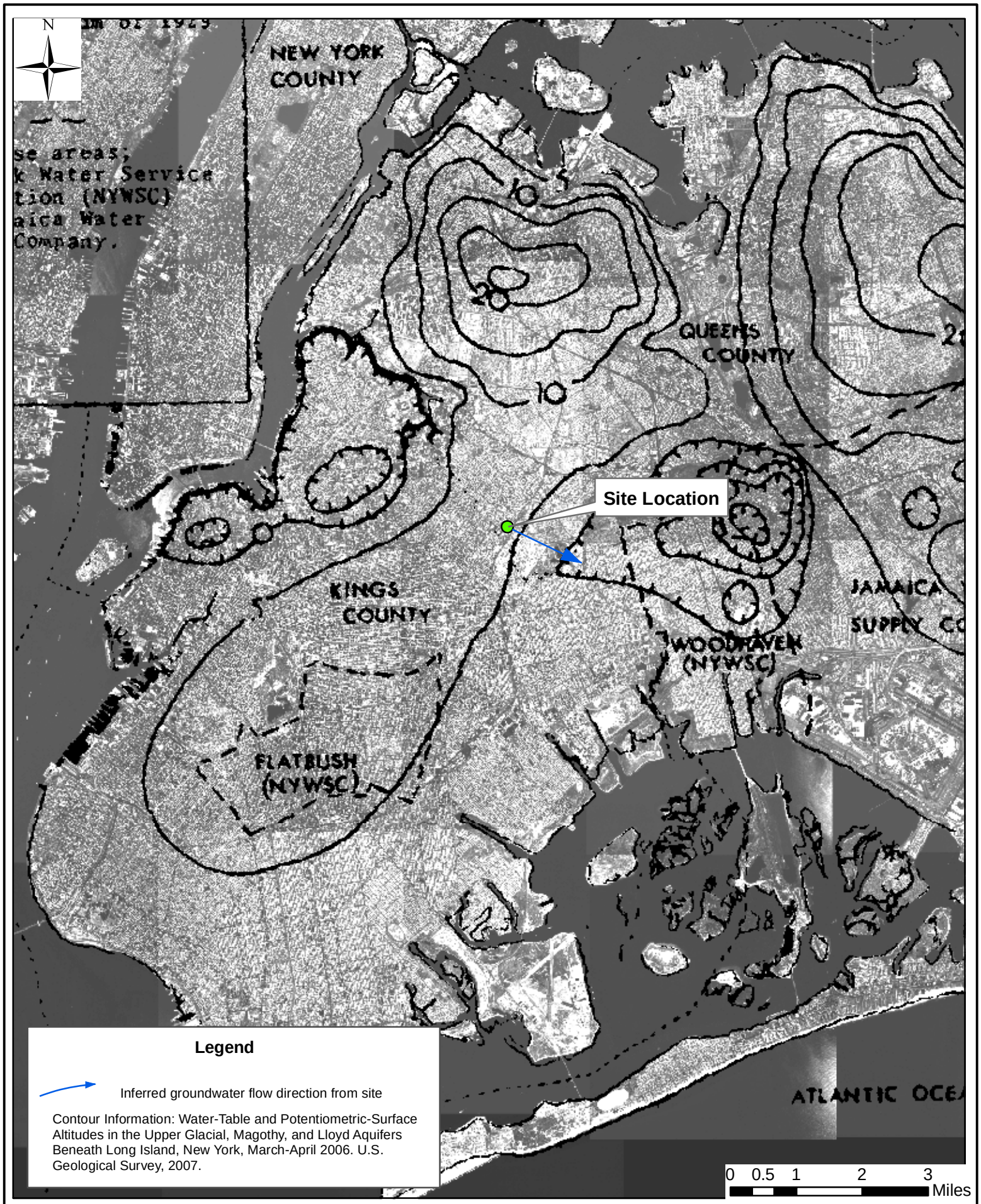
Morristown, NJ 07960

FIGURE 4



NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1961

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 5

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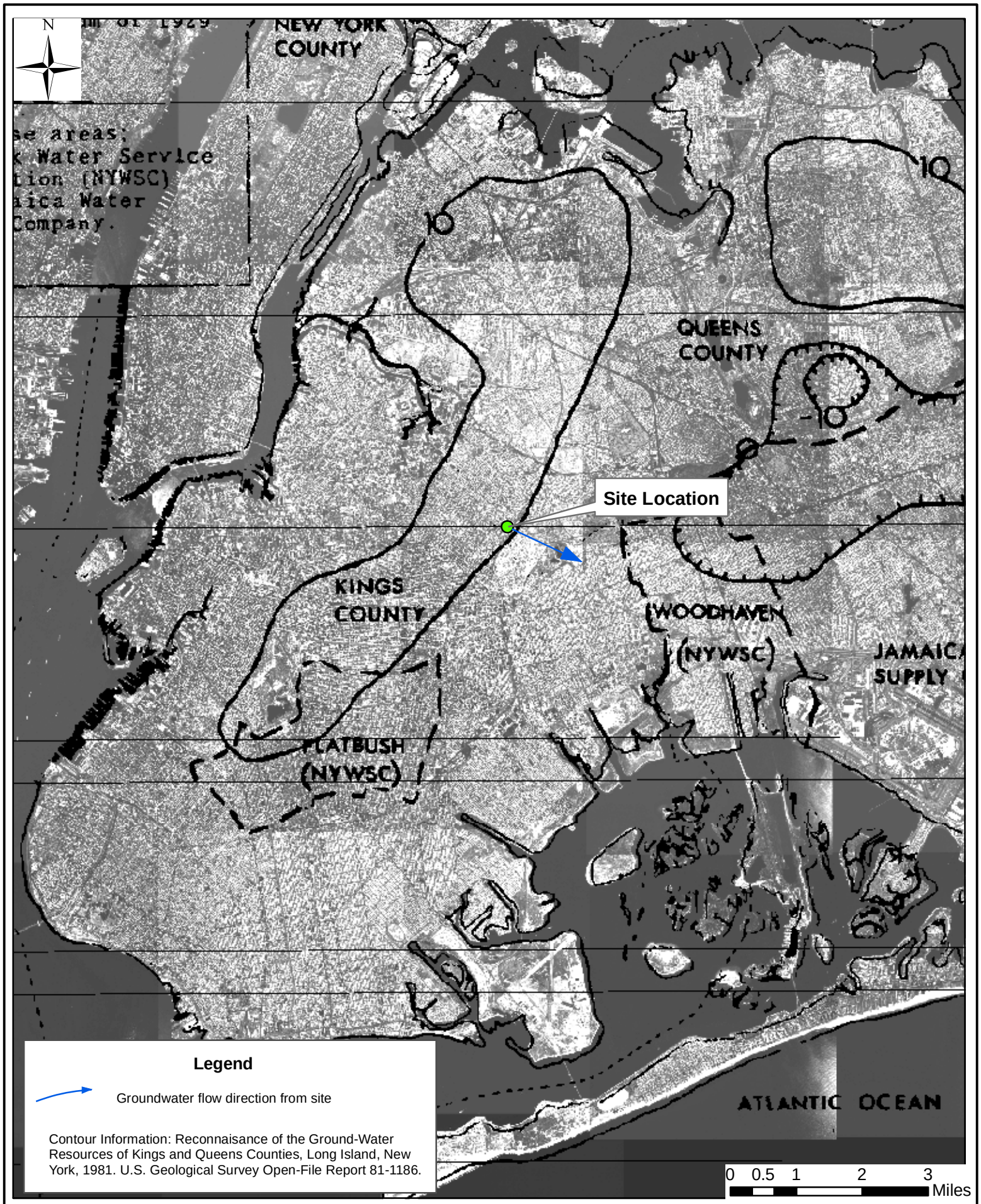

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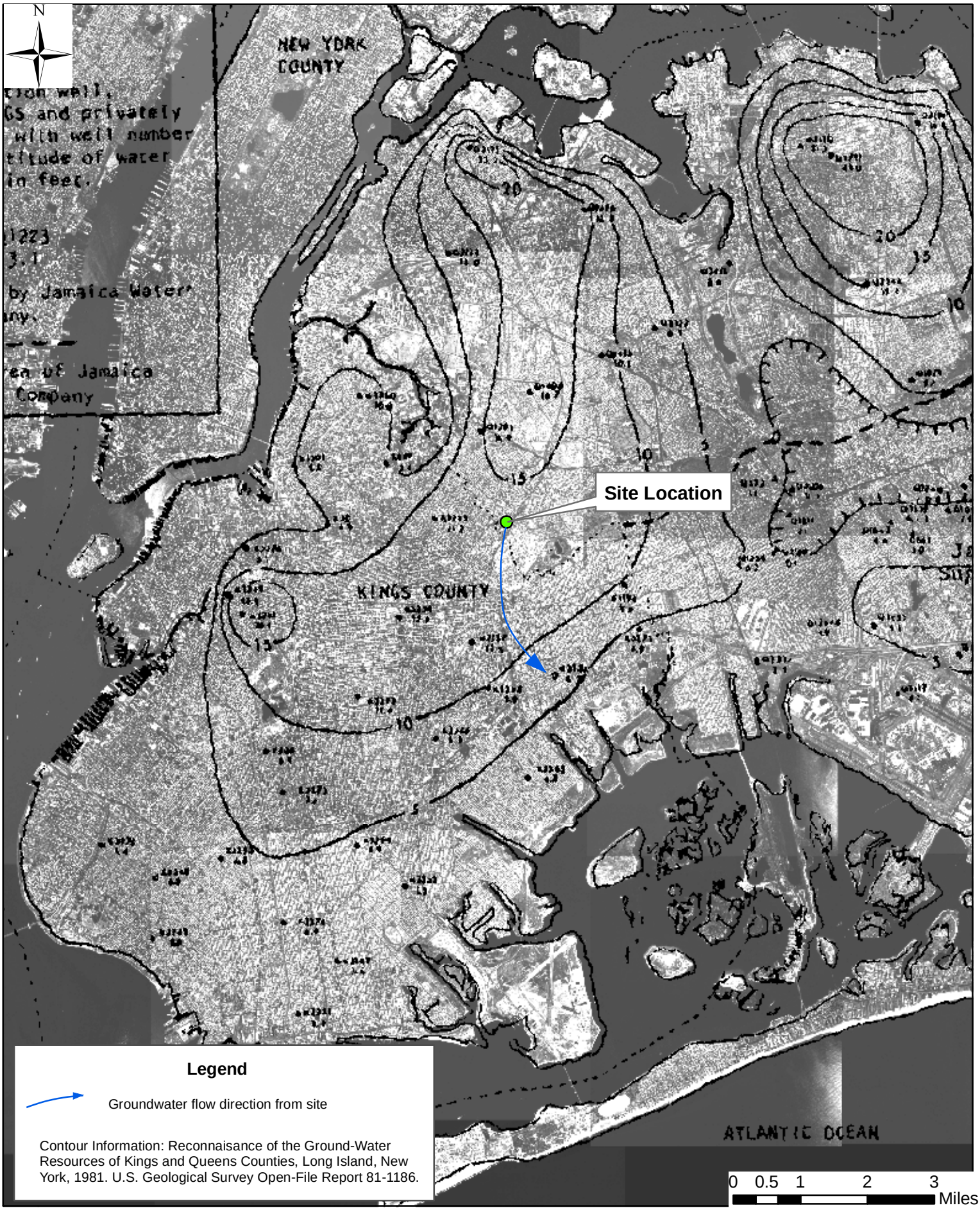
NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1974

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 6



NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1981

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 7

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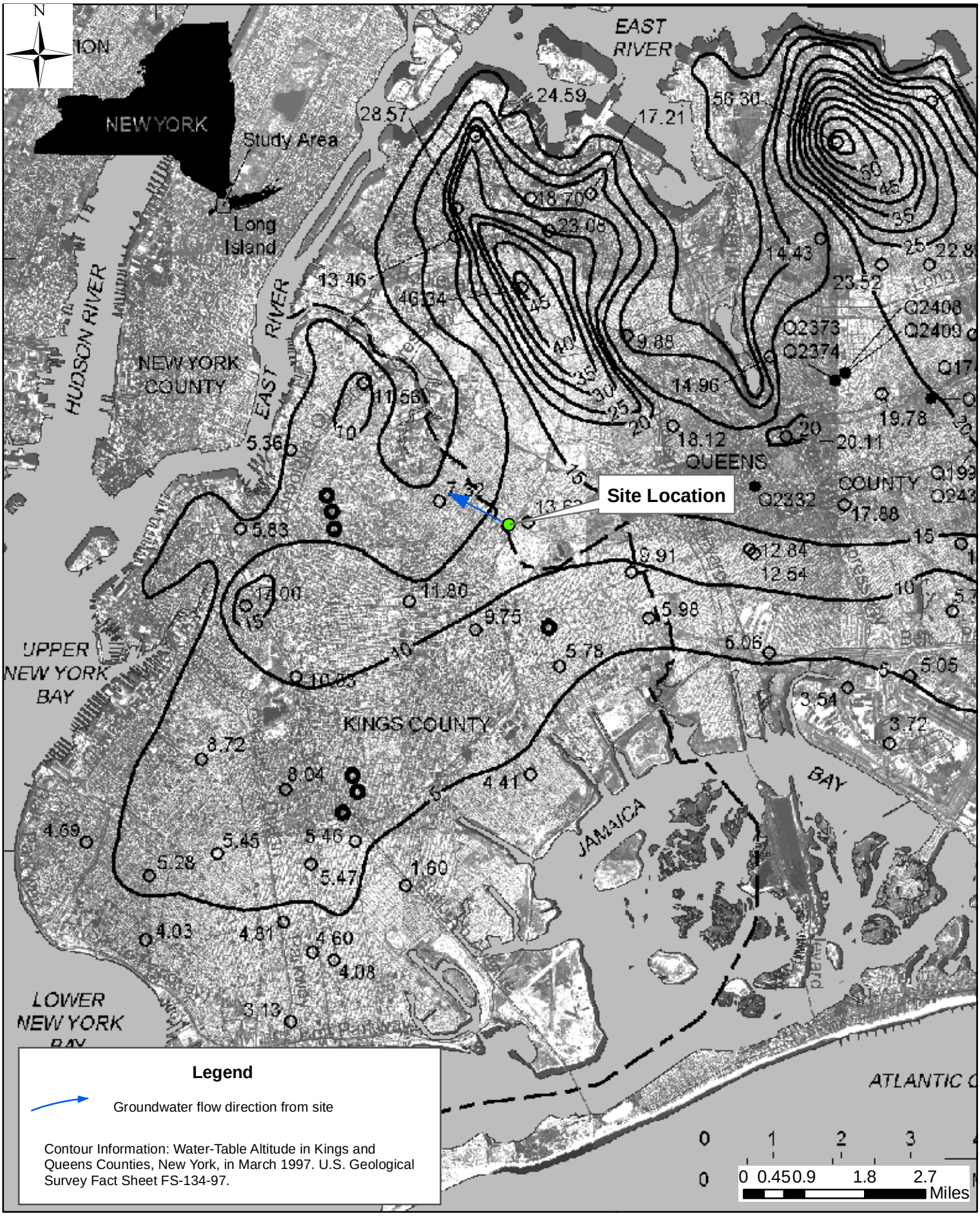

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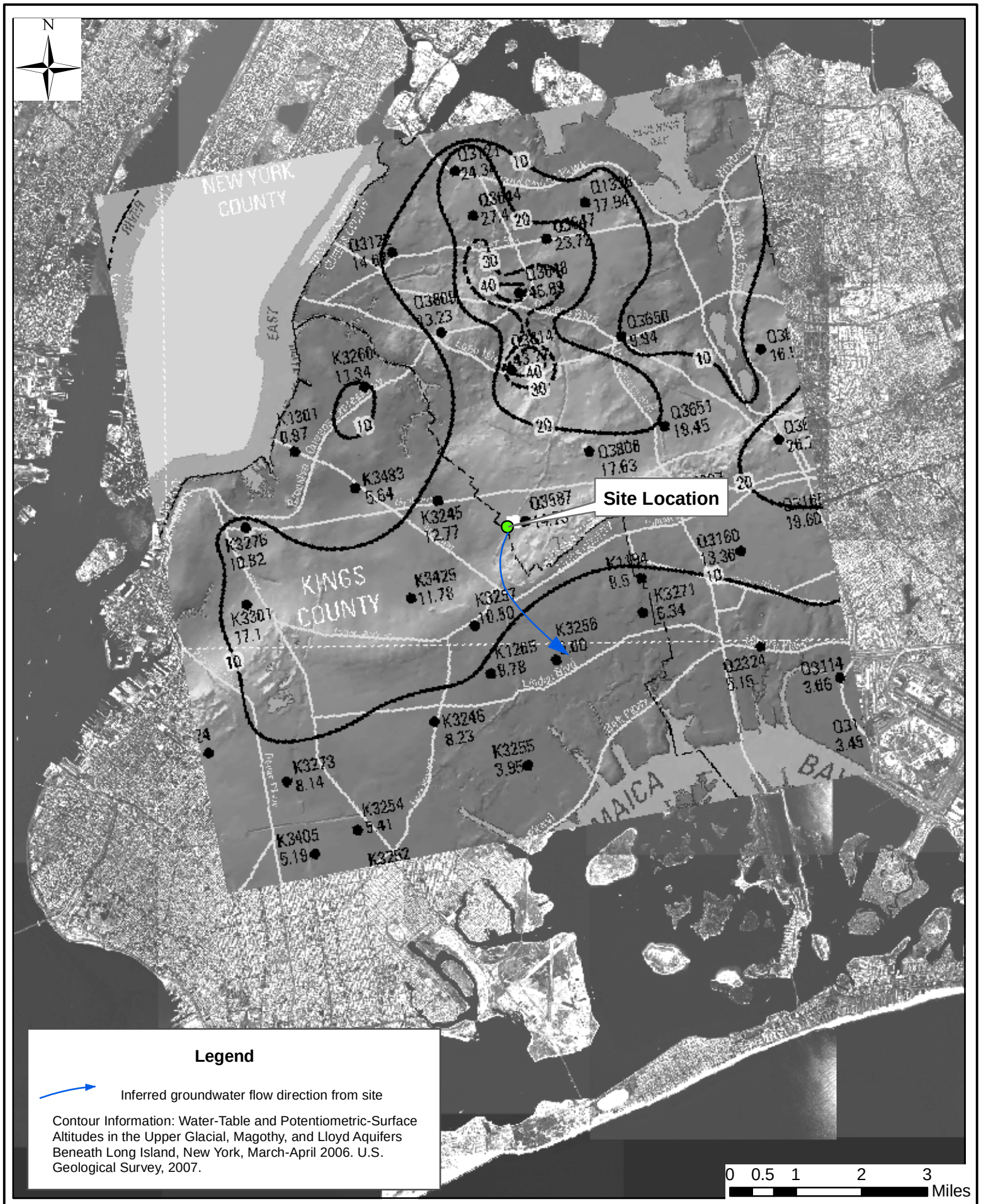
NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 1997

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 8



NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Former Wolff Alport Chemical Corporation, Queens, New York

Groundwater Elevation Contours - 2006

The Louis Berger Group, Inc.
412 Mt. Kemble Ave.
Morristown, NJ 07960

FIGURE 9

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APPENDIX F

NYCDOHMH FACT SHEETS

Information on Radiation Survey at the
Former Wolff-Alport Chemical Corporation
1127-1129 Irving Avenue, Queens, NY
September 5, 2007

Information on Radiation Survey at the
Former Wolff-Alport Chemical Corporation
1127-1129 Irving Avenue, Queens, NY
August 26, 2009

THE CITY OF NEW YORK

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Michael R. Bloomberg
Mayor

Thomas R. Frieden, M.D., M.P.H.
Commissioner

nyc.gov/health

Information on Radiation Survey at the Former Wolff-Alport Chemical Corporation 1127-1129 Irving Avenue, Queens, NY September 5, 2007

This fact sheet summarizes the results of a preliminary radiation survey performed at the former Wolff-Alport Chemical Corporation at 1127-1129 Irving Avenue and at 1133 Irving Avenue, all located at the Brooklyn/Queens border. Currently, the buildings are occupied by the Primo Auto Body Shop, LJ Iron Works, Inc., and Losquadro Ice Company. Losquadro Ice Company uses 1133 Irving Avenue for storage of equipment and salt. The survey was performed in May 2007 by the New York City Department of Health and Mental Hygiene (DOHMH) and the New York State Department of Environmental Conservation (DEC), with the U.S. Environmental Protection Agency (EPA) Region II providing observational support. The information in this fact sheet is based on preliminary findings and will be updated when a formal site assessment is completed.

What are the results of the radiation survey at 1127-1129 and 1133 Irving Avenue?
In May 2007, DEC and DOHMH tested the site previously occupied by Wolff-Alport Chemical Corporation and found slightly elevated radiation levels. These levels do not indicate immediate health concerns for current building occupants or people passing by. However, more testing is needed to fully understand the nature of the radiation sources and the need for remediation. Radiation levels in the surrounding neighborhood are not elevated and do not pose any health risk for the nearby residents.

What is the Wolff-Alport Chemical Corporation?
The Wolff-Alport Chemical Corporation was located at 1127-1129 Irving Avenue, at the Brooklyn/Queens border. The company operated from 1920 until 1954. In 1940, the company began processing monazite sand[1] to concentrate rare metals for use by industry.

How did the radiation get into the Wolff-Alport building?
The monazite sand contained small amounts of thorium, a radioactive material. The process of extracting the rare metals produced a concentrated thorium residue. This residue was considered a waste product, so the company dumped it into the sewer system. It is possible that small amounts of thorium remain in the sewers, buildings and soil around the building. In 1947, the federal government ordered Wolff-Alport to stop dumping the thorium into the sewer. The company then

[1] Monazite sand is naturally occurring and found in North Carolina, South Carolina, Idaho, Colorado, Montana, and Florida in the United States, and in Brazil, India, Australia, and South Africa. Monazite sand is a source of materials, such as rare metals, that are used in the manufacture of television and computer screens, fluorescent light bulbs, and highly efficient batteries, among other industrial applications. It also contains, Thorium, a radioactive material.

packaged the thorium and sold it to the government for military uses. The business closed in 1954.

Was the building previously tested for radiation?
In 1987, the federal government informed the city that the site could have been contaminated with thorium during processing of the monazite sands. In 1988, the City and the EPA identified radiation slightly above background levels at several spots around 1127 Irving Avenue. These levels were below the regulatory limits that were currently in effect. In 2000, DEC and DOHMH conducted additional sampling on the sidewalks in front of the buildings. Once again, the tests revealed slightly elevated levels that were not considered a public health risk.

What are the background levels for radiation in NYC?
Background levels of radiation exist from many sources including radiation from the sun, soil, rocks and water as well as man-made sources such as medical X-rays, building materials, televisions and smoke detectors (see attached chart for estimated radiation levels for sources). Allowable exposures from licensed sources are measured in millirem (mrem)[2] per year. In New York City, the average dose from background sources is about 360 mrem per year. Workers in industries that use or manufacture radioactive materials have an allowable dose limit of 5,000 mrem/year. The standard for public exposure to radiation has been lowered since the 1980s. For the general public, the designated limit is now 100 mrem per year above the average dose received from background sources.

Why are government agencies re-examining this site now?
As part of an assessment of background levels of radiation in NYC, the DOHMH identified the former Wolff-Alport site as having levels above the typical background level in NYC. To further reassess this site, the DOHMH conducted this preliminary survey.

Are there any health concerns for the workers in the buildings?
There are no immediate health concerns for workers in these buildings. Preliminary analysis suggests that people working at the former Wolff-Alport site might receive an exposure that is above the 100 mrem limit over the course of a year. The highest level in the shop area where workers performed their duties was 0.3 mrem per hour. Based on this reading and depending on how much time a worker spent in the area, the estimated exposure would range from slightly above background to twice background. These levels do not pose an immediate concern for workers in these buildings.

Are there any health concerns for neighborhood residents?
Although there are some elevated radiation levels in the sidewalk in front of 1127-1129 Irving Avenue, it is unlikely that area residents would spend enough time in these areas to be exposed to radiation above background levels. Radiation readings were normal directly across the street from the Irving Avenue property, and in the surrounding areas.

What can be done to reduce the radiation at 1127-1129 Irving Avenue?
The City is planning a full site assessment to better evaluate levels of contamination and any potential health risks to the workers. In order to reduce potential radiation exposure to workers at 1127-1129 Irving Avenue, the Health Department recommends some protective measures in some areas of Primo Auto Body prior to a full assessment of radiation doses. These measures

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[2] A rem is a large amount of radiation, so the **millirem** (**mrem**), which is one thousandth of a rem, is often used for the dosages commonly encountered, such as the amount of radiation received from medical x-rays and background sources.

include reducing the time workers spend in areas with higher levels and using lead shielding on the floor areas to block radiation exposure.

In addition, both DOHMH and DEC are planning a more thorough site assessment for the affected buildings and the surrounding outdoor areas. The assessment should include:

1. A detailed study of thorium contamination under the cement floor and in the walls of the buildings and testing for the presence of radon and thoron gases in the buildings
2. A detailed dose assessment for current workers of Primo Auto Body, LJ Ironworks, Inc. and Losquadro Ice Company
3. A detailed study of the nature and extent of the contaminated soil surrounding the buildings;
4. A determination of the extent (if any) of contamination outside the site
5. A plan to identify building and outdoor areas requiring radiation source reduction and best ways to decontaminate and remediate these areas.

NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Thomas A. Farley, M.D., M.P.H.
Commissioner

August 26, 2009

Information on Radiation Survey at the Former Wolff-Alport Chemical Corporation 1127-1129 Irving Avenue, Queens, NY

Summary

The New York City Health Department will soon begin a radiation survey and Phase II investigation at the site of the former Wolff-Alport Chemical Corporation, in Queens. The US Environmental Protection Agency's Office of Brownfield Assessment has approved and funded the effort. It will start in summer 2009 and continue through spring 2010. The radiation survey and site investigation will examine Wolff-Alport's possible contamination of the site. The Health Department will share its findings with the community in a final report on the inquiry.

Background

In the 1940s and early 1950s, the former Wolff-Alport Chemical Corporation occupied what is now 1127-1129 Irving Avenue, on the border of Brooklyn and Queens. The company processed imported monazite sand to extract certain rare earth elements. The process generated a radioactive byproduct called thorium, which was flushed into the sewer until 1947, when the Atomic Energy Commission ordered a halt to the practice. The company then began concentrating the waste as a precipitate and selling it to the federal government. During the 1970s and 1980s, the New York City Health Department, the New York State Department of Environmental Conservation (DEC) and the U.S. Environmental Protection Agency (EPA) conducted informal surveys that found radioactive contamination within portions of the buildings and in the soil and sewers adjacent to them. The detected levels did not exceed regulatory exposure limits at the time, but federal exposure limits have since been lowered. In 2007, a joint survey by DEC and the Health Department confirmed that radiation at the site exceeded normal background levels. The Health Department concluded that a formal site assessment was needed and obtained EPA funding to accomplish this. The Health Department is now conducting additional surveys to determine whether exposure levels at the site exceed the new limits.

What to Expect

The environmental investigation includes three phases.

- Phase I (completed in July) involved a non-invasive survey of the streets, sewers and backyard areas using scanning instrumentation.
- Phase II will involve drilling borings into the soil under Irving Avenue, Cooper Avenue and Moffat Street.

- Phase III will involve surface scanning and drilling soil borings inside selected buildings along Irving Avenue between Cooper Avenue and Moffat Street.

Project Location

- To the southwest: Irving Avenue from the intersection of Cooper Avenue past Moffat Street to the fence for the rail line. Boundaries are the far curbs of the respective streets
- To the northwest: Cooper Avenue (far curb of street) to a location even with the building behind (east of) the site
- To the east: Up to (but not including) the west wall of the building behind the site
- The sewer lines in front of 1127-1129 Irving Avenue and downstream as necessary
- For details on specific areas, see attachments 1 and 2.

Personnel Involved

- New York City Department of Design and Construction (DDC) has hired two environmental consultants – Louis Berger & Associates, PC and CoPhysics Corporation – to survey the sewers and collect wipe samples from the buildings' outdoor surfaces.
- Personnel from the New York City Department of Environmental Protection removed and replaced sewer grates so that contractors could survey for radiation contamination within the sewer system.
- Health Department personnel will observe the process and address any questions or concerns that local residents and workers may have.

Work Schedule

- **Phase I: Outdoor grounds, sewers, and building surface surveys**

  The formal site assessment began on July 23, 2009. This phase of the surveying work involved outdoor areas including the sewer lines in front of the buildings on Irving Avenue, Cooper Avenue and Moffat Street. Initial survey results indicate that the sewer under Irving Ave. from Cooper St to Eldert St. has elevated gamma radiation levels.
  The radiation levels encountered were not hazardous to health but are an indication of deposited radioactive material. Workers entering these areas will be required to follow a Site Health and Safety Plan (HASP) when entering these areas and/or performing excavation..

- **Phase II: Borings on the streets**

  The second phase of the work will involve driving borings into the streets along Irving Avenue, Cooper Avenue, Moffat Street and the backyard of 1127-1129 Irving Avenue. DDC has retained the environmental consultants Louis Berger & Associates, PC and CoPhysics Corporation to perform the soils and groundwater testing. Zebra Drilling Inc. will handle the drilling and traffic control.

DDC and the Health Department will coordinate the street work to minimize inconvenience to the surrounding community. Work may take place at night and on the weekends. This phase is tentatively scheduled for some time in September.

- **Phase III: Building Interior Survey**

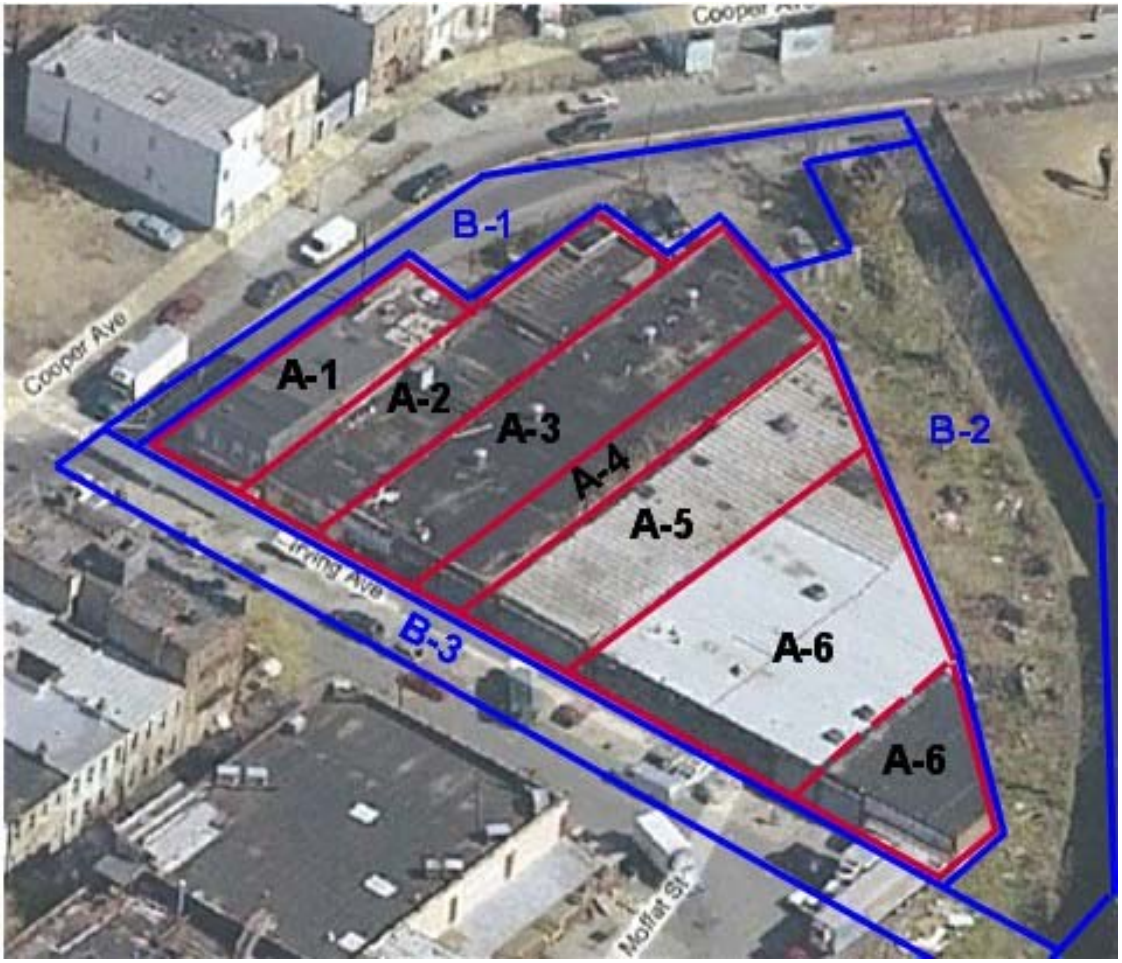
  The third phase of the site assessment will involve surveying and sampling the building interiors. Work will commence when access agreements have been signed by all affected parties. In order to minimize work disruption, the surveyors may work on evenings and weekends.

Final Report

The Health Department will use the results of the assessment to evaluate potential health risks to the area's workers and residents. The agency's report and recommendations will be made available once the surveying and sampling are completed.

Questions about this site assessment can be directed to Sean Laffey, a radiological response specialist at the Health Department (212-676-1575)

Attachment 1. Aerial view of the site as it exists today.



Attachment 2. Preliminary Survey Unit Map (not shown is unit C-1 which is comprised of the underground sewer lines leading away from the building.)

APPENDIX G

DOE HISTORICAL DOCUMENTS

Letter from James W. Wagoner II, Director
Off-Site/Savannah River Program Division, Office of Eastern Area Programs
Office of Environmental Restoration to
The Honorable William Kalish, Borough Chief,
Brooklyn, New York
December 10,1994

Memorandum regarding Monazite Sand
April 7,1948

Letter from James J. Fiore, Director
Division of Facility and Site Decommissioning Projects
Office of Nuclear Energy to
Dr. L. R. Solon, Director
Bureau of Radiation Control, NYCDOH
September 29, 1987

Summary Report and Designation/Elimination Analysis for
Wollf-Alport Chemical Corporation Brooklyn, New York
September 29, 1987

Letter to Jesse C. Johnson, Manager of Raw Materials Operation Office from
R. W. Cook, Director of Production regarding
Thorium Procurement
March 19, 1951

Letter to R. L. Faulkner, Assistant Director for Foreign Procurement,
Raw Materials Division, Washington from
F. H. Dowling, Director, Feed Materials Division, Oak Ridge regarding
Thorium-Nitrate Available from Wolf-Alport Company
July 19, 1954

Letter to Mr. Harry Wolff, Wolff-Alport Chemical Corporation from
F. H. Dowling, Director, Feed Materials Division, Oak Ridge
September 27, 1954

Letter to R. L. Faulkner, Assistant Director for Foreign Procurement,
Raw Materials Division, Washington from
F. H. Dowling, Director, Feed Materials Division, Oak Ridge regarding
Crude Thorium Oxalate Available from Wolf-Alport Company
September 28, 1954

Memorandum to F. H. Dowling, Director, Feed Materials Division, Oak Ridge from
R. L. Faulkner, Acting Director, Raw Materials Division, Washington
Crude Thorium Oxalate Available from Wolf-Alport Company
October 11, 1954

Letter to C. J. Rodden, Director, New Brunswick Laboratory from
C. I. Karl, Area Manager, USAEC regarding
Crude Thorium Oxalate Available from Wolf-Alport Company
November 8, 1954

Letter to J. C. Johnson, Director, Raw Materials Division from
M. H. Spirio, Manager, Oak Ridge Operations
Crude Thorium Oxalate Available from Wolf-Alport Company
November 9, 1954

Federal Register, Vol. 69 No. 162, Pages 51825-51831
DOE Energy Employees Occupational Illness Compensation Program Act of 2000:
Revision to List of Covered Facilities
August 23, 2004

http://www.hss.energy.gov/healthsafety/fwsp/advocacy/faclist/showfacility.cfm
DOE Energy Employees Occupational Illness Compensation Program
Facility List Record for Wolff-Alport Chemical Corp.
Last Updated May 7, 2008 Accessed February 23, 2010

Department of Energy
Washington, DC 20585

DEC 16 1994

The Honorable William Kalish
Borough Chief
120 Schererman Street
Brooklyn, New York 11201

Dear Mayor Kalish:

Secretary of Energy Hazel O'Leary has announced a new approach to openness in the Department of Energy (DOE) and its communications with the public. In support of this initiative, we are pleased to forward the enclosed information related to the Wolff Alport site in your jurisdiction that performed work for DOE's predecessor agencies. This information is provided for your information, use, and retention.

DOE's Formerly Utilized Sites Remedial Action Program is responsible for identification of sites used by DOE's predecessor agencies, determining their current radiological condition and, where it has authority, performing remedial action to cleanup sites to meet current radiological protection requirements. A conservative set of technical evaluation guidelines is used in these investigations to assure protection of public health, safety and the environment. Where DOE does not have authority for proceeding, the available site information is forwarded to the appropriate Federal or State Agency.

DOE studied the historical records of the Wolff Alport site, and it determined that it did not have the authority to perform remedial action at the site.

If you have any questions, please feel free to call me at 301-427-1721 or Dr. W. Alexander Williams (301-427-1719) of my staff.

Sincerely,

John F. Phringer
FOR:

James W. Wagoner II
Director
Off-Site/Savannah River Program Division
Office of Eastern Area Programs
Office of Environmental Restoration

RECEIVED
NYSDEC
JUN 03 1999
BUREAU OF RADIATION &
HAZARDOUS SITE MANAGEMENT
DIVISION OF SOLID &
HAZARDOUS MATERIALS

Enclosures

cc:
Wolff Alport and Co., Brooklyn, NY
P. Merges, State of New York

RECEIVED
DEC 22 1994
BUREAU OF RADIATION
DIVISION OF HAZARDOUS
SUBSTANCES REGULATION

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MONAZITE SAND

Monazite Sand is a phosphate of cerium and the rare earths usually containing a small percentage of thorium. It is widely distributed as an accessory mineral in various metamorphous rocks and in pegmatite dikes. Commercially it is found as an erosion product in sands, generally beach sands which have been subject to concentration by wave action. It is usually found together with such heavy minerals as, garnet, magnetite, zircon, ilmenite, rutile, thorite, gold, chromite and sometimes diamond.

An approximate analysis of monazite shows from 6 to 8% Thorium (Indian monazite is usually higher in Thorium content); about 60% of the Rare Earths; 30% Phosphates and the balance Silica, etc.

Brazilian production started in 1895 and that country continued to be the major source until after 1911 when the Indian deposits were opened. The latter are the largest known deposits. At the present time Indian exports have been stopped by embargo of the Indian Government.

Prices have varied with the available supply. Monazite was priced at $90.00 per short ton in 1897, rose to $240.00 in 1910, fell to $31.00 in 1932 (due to the Indian production) and is now about $105.00 with an increase being demanded by the producer.

In the United States practically all the Monazite Sand is processed by one of three companies. These are the Lindsay Light and Chemical Company of West Chicago, Illinois; the Maywood Chemical Works of Maywood, New Jersey; and the Wolff-Alpert Chemical Corporation of 1127 Irving Avenue, Brooklyn, New York.

A more detailed account of the operations of each of these companies follows as well as brief statements concerning some of the main consuming companies and available resources for processing.

CLASSIFICATION CANCELLED
OR CHANGED TO
BY AUTHORITY OF DOE/DPC
LEHARD M. SAFRANSKI 4/7/83
REVIEWED BY DATE

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[redacted]

LINDSAY LIGHT AND CHEMICAL COMPANY

The Lindsay Light Company was organized and incorporated under Illinois laws on May 10, 1904, by Charles R. Lindsay, Jr. The present name was adopted in 1935 and in 1937 Charles R. Lindsay, III, succeeded his father as President of the company. In addition to Mr. Lindsay the following are officials of the company or members of the Board of Directors: Mark Eichelburger, Vice President and Treasurer; John Furty; Alexander Ferguson; Robert Little; Arthur Welton; and Clifford Stabenau, Secretary. As originally incorporated the company called for 25,000 shares of 7% Cumulative Preferred stock and 60,000 shares of Common stock. Early in 1948 the Directors authorized the increase of the common stock to 100,000 shares. This increase has not been issued but is being held in the Treasury.

Earnings have been steady since 1925 and in 1946 amounted to $3.50 per common share and in 1947 to $6.52 per common share after payment of preferred dividends.* Prospects for 1948 appear, at the moment, to be bright, provided stocks of basic raw materials, particularly Monazite Sand, can be maintained. In March 1946 quotations on the stock rose from about $7.00 to $31.00 per share. At the present time it is quoted at about $70.00 per share. As of this date (4/7/48), Treasury Notes held by the company amount to approximately $500,000, Accounts Receivable to about $300,000 and Accounts Payable are nil. Insurance on plant and equipment is about $700,000. Total sales in 1945 amounted to roughly $1,470,000, in 1946 to $1,700,000, and in 1947 to $2,500,000.

Sales during 1947 were approximately as follows:

Thorium sales	- not including material processed	$ 250,000.00
Mantle sales		570,000.00
Chemical sales	- aside from Thorium	1,600,000.00

* See attached Balance Sheets

[redacted]

The Gross Profit on sales for the year were reported as $866,209.55."

The company has about 275 employees of which about one-half are women, the payroll amounting to from $400,000 to $450,000 per year. The employees are not organized, attempts to do so having been twice defeated in elections held in 1939 and again in 1942. At the moment the employees are petitioning for a pay increase.

The main plant and offices of the Lindsay Light and Chemical Company are located at West Chicago, Illinois, with a branch plant (mantles) at Morris, Illinois.

Originally, the business of the company was limited to the manufacture of incandescent mantles, the Welsbach Company of Gloucester, New Jersey, being acquired in 1940. At the present time mantles constitute about 20% of the business and the chemical derivities of the rare earths, the balance or about 80%.

Altho Monazite Sand is widely disseminated the two principal commercial sources are in India, (Travancor) and in Brazil. Exports from India are negligible if not entirely lacking at the moment due to an embargo set up by the Indian Government. In the past, a major portion came from this source, largely through Travancor Minerals, Ltd., controlled by Imperial Chemicals Ltd., and DuPont, Hopkins and Williams of London and Peres and Company of India.

In Brazil, Boris Davidovitch is the principal exporter through his company the Ilmenite e Monazita de Brazil (MIBRA). Davidovitch has seven concessions granted by the Brazilian Government and at present operates two or three of the concessions in the vicinity of Victoria - Esperito Santos, his production in 1947 being estimated at approximately 1600 metric tons.

Davidovitch is anxious to expand his operations by enlisting foreign

capital and has offered a quarter interest with equal voting rights for $250,000. He claims a reserve of 50,000 tons at a value of $20.00 per ton. The ore is transported from the mines to the coast by truck or barge where it is processed and/or concentrated and then by ship from Victoria.

At the moment Lindsay has a contract with Davidovitch for 2,600 tons @ $112.00, F.O.B. Victoria, Brazil, to be delivered in the last half of 1947 and thru 1948. Up to date 1,056 tons of this have been received and an additional 300 tons has been, or shortly will be, shipped. On the balance of the contract, or 1,244 tons, Davidovitch is demanding $150.00 per ton, F.O.B. Victoria, Brazil or threatening to close his mines. He bases this price on a reported sale to a Harry Mandell, Vice President of U. S. Bronze Powder Company, of Closter, New Jersey of 50 tons @ $200.00, F.O.B. New York. Mr. Mandell is also reported to have purchased a larger tonnage of a very low grade sand from other Brazilian sources.

A second potential source of Monazite Sand in Brazil is the Foote Mineral Company (Formil). This company has five or six concessions, also near Victoria, and estimate their production in 1948 at about 1500 M.T. Their reserves are not known. Lindsay advanced $35,000 to Formil for milling equipment, the advance to be repaid at $10.00 per ton on the first 3,500 tons shipped to Lindsay. This contract covers all production of 95% Monazite Sand thru 1950 at a price of $105.00 per ton, F.O.B. Victoria, Brazil.

Stocks of Monazite on hand at the Lindsay Plant amount to about 2,000 tons. This stock, plus the 300 tons expected from Brazil (Davidovitch), will supply their requirements for about a year. These stocks include the 30% belonging to the National Carbon Company, which are purchased thru Lindsay and processed by them for National Carbon.

Stocks on hand as of March 31, 1948 as reported by the New York Office

of the Atomic Energy Commission are as follows:

Monazite Sand

Gross Weight	Thorium Content (ThO_2)
4,288,144 lbs.	214,407 lbs.

Residues

1,158,819 lbs.	57,940 lbs.

Refined Material

53,694 lbs.	26,318 lbs.

The breaking down of the Monazite Sand into its various components is roughly outlined on the attached flow-sheet. No attempt has been made to outline the details, but rather to give a general idea of the order of production together with some of the more important uses and consumers.

The annual current requirements of the Lindsay Company are estimated at about 2,400 metric tons per year and orders received but not scheduled would increase this by 1,500 to 2,000 tons. The potential production of the company is greater than the current output but present production is geared to current and anticipated supply.

The production of thorium averages about 50,000 pounds per month. Of this about half or 25,000 pounds is made into a nitrate, of which about 8,000 pounds goes into mantles and the balance (17,000 pounds) is going to the Atomic Energy Commission under a contract for 200,000 pounds, which expires on June 30, 1948. Of the 8,000 pounds about two-fifths is processed by Lindsay; two-fifths by Coleman and Company of Wichita, Kansas; and one-fifth by Aladdin Industries of Alexandria, Indiana. The total production of mantles in the United States amounts to 25,000,000 to 30,000,000 units in about the same proportion as the consumption of the nitrate by the three producing companies. 80% to 90% of the mantles produced by Lindsay are exported thru the Sunflame

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Appliance Company of Richfield, New Jersey, as agents. Nitrate exports, as such, are handled by Pfaltz and Bauer for foreign manufacturers of mantles.

The balance of the thorium produced or about 25,000 pounds per month is stocked in the yards at the plant as "sludge". The British Government has requested permission to buy this surplus material but no contracts have been signed pending advices from the Atomic Energy Commission License Department.

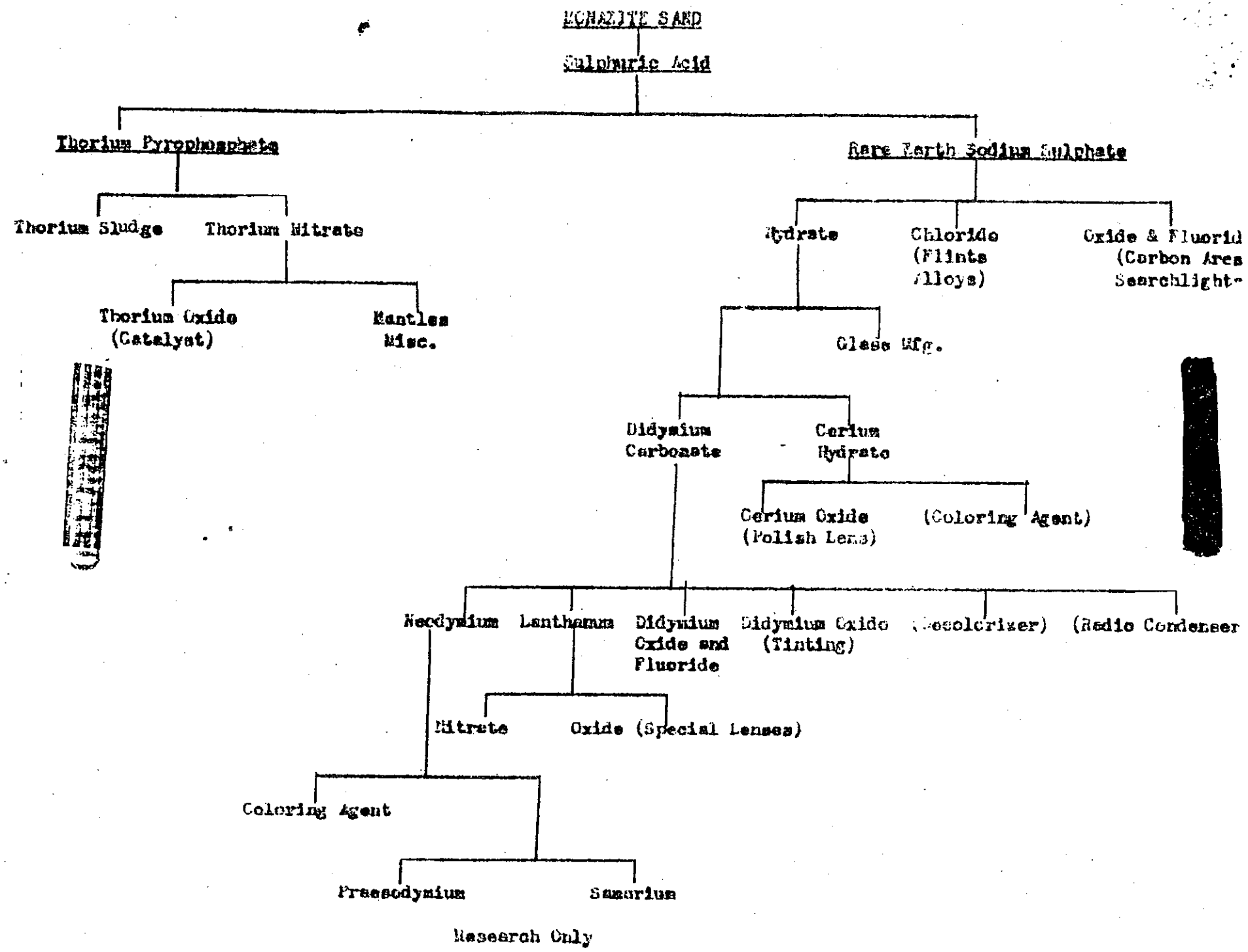
The Rare Earths constitute about 60% of the contents of the Monazite Sand. Of this amount approximately 85% is recovered in the processing of the sand and in breaking it up approximately one-third goes into the hydrate, one-third to the chloride and the remaining one-third to the oxide and fluoride.

The principal uses and consumers of the various Rare Earths products, as supplied by Lindsay, are as follows:

Thorium Sludge	To Lindsay stockpile.
Thorium Nitrate	Welsbach mantles and miscellaneous small uses. To AEC, Coleman and Company, Aladdin Industries, Export, Lindsay (mantle manufacturing), Radio Industry and Research (Universities, etc.).
Thorium Oxide	Catalyst, to oil refineries.
Rare Earth Oxids and Fluoride	Carbon arcs, searchlights, etc. To National Carbon (fluoride approximately 74,000 lbs. and oxide approximately 10,000 lbs. per month).
Rare Earth Chloride	Flints and alloys - to Cerium Metals, Inc. 70,000 lbs - New Process Company (Ronson) 50,000 lbs. - Kent Metal Works 25,000 lbs. Belgo-Canadian Company - 20,000 lbs. and Miscellaneous 25,000 lbs. per month.

[redacted]

Rare Earth Hydrate	Glass manufacturers (Pittsburgh Plate Glass and others) 4,000 lbs. per month.
Cerium Hydrate	Coloring glass - to Pittsburgh Plate Glass and others 10,000 lbs. Miscellaneous 10,000 lbs. per month.
Cerium Oxide	Glass polishing industry.
Didymium Oxide and Fluoride	Substitute for Rare Earth Oxide and Fluoride - to National Carbon - 50,000 lbs.
Lanthanum Nitrate	To Hanford - United States of America
Lanthanum Oxide	Special lenses - to Eastman 1,000 lbs. per month.


MONAZITE SAND
Sulphuric Acid
Thorium Pyrophosphate
Rare Earth Sodium Sulphate
Thorium Sludge
Thorium Nitrate
Hydrate
Chloride (Flints Alloys)
Oxide & Fluorid (Carbon Arcs Searchlight-
Thorium Oxide (Catalyst)
Mantles Misc.
Glass Mfg.
Didymium Carbonate
Cerium Hydrate
Cerium Oxide (Polish Lens)
(Coloring Agent)
Neodymium
Lanthanum
Didymium Oxide and Fluoride
Didymium Oxide (Tinting)
(Decolorizer)
(Radio Condenser
Nitrate
Oxide (Special Lenses)
Coloring Agent
Praesodymium
Samarium
Research Only

[redacted] -

MAYWOOD CHEMICAL WORKS

This company, located at Maywood, New Jersey, was organized in 1918 and was a consolidation of the Schaefer Alkaloid Works, the Thorium Chemical Company and the Standard Essence Company. The Hermann Delaire Schaefer Company of Maywood was also taken over. The present officers and directors of the company are as follows:

President	M. J. Harting
Vice President	H. H. Nichols
Treasurer and Manager	A. J. Turner
Assistant Treasurer	D. R. Van Landt
Director	Mrs. Bertha Hoemple
"	Mrs. Anna Schaefer
"	L. R. Lydecker
"	Dr. J. J. Kennedy
"	Harold Boynton (Alien Custodian's Office)

The outstanding shares of the company are reported as follows:

24,606	shares	-	Cumulative Preferred - No par.	
193,126½	"	-	Participating Preferred	"
29,999½	"	-	Common	"

About 30% is owned by German citizens and is under the control of the Alien Custodian's Office which is represented on the Board by Harold Boynton.

The business of this company is the production of pharmaceuticals and rare earth products - the former comprising, in normal times, About 95% of the business and at present 98% or 99%. The principal products may be listed as follows:

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Acetanilid

Aromatics (Ionones, Iraldeines, etc.)

Caesium Salts

Caffeine Alkaloid

Cocaine

Coumarin

Dimethyl Sulphate

Ethyl Vanillin

Lithium Metal

Lithium Salts

Rare Earth Salts (Cerium, Lanthanum, Neodymium, etc.)

Rubidium Salts

Theobromine Alkaloid

Thorium Salts

Vanillin

Maypon (A Wetting Agent)

The Monazite Sand is treated in much the same manner as at the Lindsay Light and Chemical Company (see flow sheet of latter's company). The Thorium, as a nitrate, is partially exported and the balance is currently sold to the United States Government. Exports are handled by Michelson and Sternberg, Inc. of 23 West 47th Street, New York City.

The "Rare Earths" are, in the main, broken down into the Cerium Oxide and the Chlorides, altho small amounts of the rarer products such as Lanthanum, Neodymium and Praesidium are occasionally produced and sold. Most of the Cerium Oxide goes into a glass or lens polishing compound and the chlorides are used for water-proofing textiles and the manufacture of Flints by Kent Metal Works.

Consumption of Monazite Sand at present averages about thirty tons per month or about 50% of the available capacity. Stocks on hand as of March 31, 1948, are reported by the New York Office of Atomic Energy Commission as follows:

Monazite Sand

Gross Weight	Thorium Content (ThO_2)
1,506,995 lbs.	120,315 lbs.

Residues

382,645 lbs. 47,218 lbs.

Refined Material

18,435 lbs. 5,659 lbs.

This amount of raw materials at the current rate of consumption is sufficient for from eighteen months to two years. Anticipated receipts during the balance of 1948 are in the neighborhood of 200 tons.

Supplies of the Monazite Sand are purchased in the open market when available - of recent years largely from Davidovitch of Brazilian Material. Lindsay has also been cooperative by supplying Maywood from his stocks in emergencies.

Future operations by the Maywood Company in the Rare Earths field are almost entirely a matter of dollars and cents. This branch of their business is so small, in comparison to the other departments, that any shortage of raw material or material reduction in profits would cause the company to cease production in this field. This in spite of a certain amount of pride in being one of the first operators in the field. Mr. A. J. Turner, Treasurer and General Manager, would appear to be the controlling factor at this moment in determining the policies of the company.

[redacted]

WOLFF-ALPORT CHEMICAL COMPANY

This company, located at 1127 Irving Avenue, Brooklyn, New York, was founded in 1920 as the Hirsch Laboratories, the name being changed to Wolff-Alport in 1923. The company is small and is controlled and practically owned by Mr. Harry Wolff who is also the President. In addition to Mr. Wolff the company employs only six men, two of whom are sons-in-law of Mr. Wolff and who will probably take over the complete management of the business in the near future as Mr. Wolff's health is not good.

The business of the company consists of the production of Thorium and the Rare Earths from the Monazite and the manufacture of rubber accelerators - a catalyst used in vulcanizing. The former activity comprises about two-thirds of the total business of the company, and the accelerators about one-third.

The Monazite is broken down into its Thorium and Rare Earth components, by treatment with sulphuric acid and heat. The Rare Earths are further treated and become Rare Earth Nitrates or Rare Earth Chlorides which are, in general, the end-products and are sold as such. At present about 75% of the product goes to Kent Metals; 15% to the New Process Company, and from 5% to 10% to Cerium Metals. A small amount of the Rare Earth Fluoride is made on occasion - about 10,000 lbs. in 1947 and estimated production in 1948 is 30,000 lbs. This goes to the Rotary Electric Steel Company. All the current production of Thorium is sold to the United States Government.

Stocks on hand as of March 31, 1948 are reported by the Atomic Energy Commission Offices in New York as follows:

Monazite Sand

Gross Weight	Thorium Content (ThO_2)
169,344 lbs.	9,391 lbs.

[redacted]

Residues

88,201 lbs. 26,460 lbs.

Refined Material

239 lbs. 97 lbs.

Consumption amounts to about thirty to forty tons per month of Monazite. As of May 5, Wolff had fifty tons in transit from Chicago. Supplies, as in the case of Haywood, are purchased wherever available with the other processors aiding in case of emergency.

The Wolff-Alpert Company is definitely a one-man organization with a very limited overhead which would permit a shut-down with a minimum of hardship. On the other hand, as the Rare Earth Department of the business constitutes about 65% of the total, a prolonged shortage of Monazite would probably be very serious.

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NATIONAL CARBON COMPANY

This company with offices at 42nd Street and Madison Avenue, New York, is primarily interested in the use of the Rare Earth Oxide and Fluoride in the manufacture of carbon arcs for the photographic industry, the movies and the United States Government (searchlights, etc.). The company has an arrangement with the Lindsay Company whereby 30% of the latter's purchase of Monazite Sand is for the account of the former and processed by Lindsay who in turn re-purchases those products not used by National Carbon. Current requirements are equivalent to a usage of Monazite of about 1,000 metric tons per year. The peak war usage was about 1,400 tons per year. Exhaustive research has as yet, failed to develop a suitable substitute, particularly for the projection and photography of motion pictures and to secure the high intensity necessary for the long-range projection of searchlight beams.

The following memorandum is a detailed account of the uses and the importance of Rare Earth products by the National Carbon Company. The memorandum was prepared by Mr. W. A. Steiner, Product Manager of that company.

[redacted]

NATIONAL CARBON COMPANY

Rare Earth Chemicals and the Carbon Arc

Introduction

The purpose of this memorandum is to describe how and why rare earth chemicals of the cerium family are essential to the carbon arc, and the vital importance of the carbon arc to the motion picture industry, also other photo-industrial uses, and military searchlights.

Arc carbons are small carbon cylinders cored with rare earth chemicals, and serve as the terminal electrodes of the electric arc to produce a light which rivals, in brilliancy and color, the sun itself. The carbon arc is the brightest practicable light source, and is particularly adapted to the photography and projection of motion pictures, searchlights, and other applications requiring intense special qualities of illumination, such as photo-engraving and photolithography.

Types of Carbon Arcs Using Rare Earths

There are two types of carbon arcs which use carbons cored with rare earths, the "flame arc" and the "high intensity arc".

In the flame arc, the rare earth compounds volatilize from the core into the arc stream and radiate their characteristic line spectra. The entire arc stream becomes luminous and, due to the radiating characteristics of rare earths, becomes an efficient light source with the spectral energy distribution needed for photo-chemical processes. The flame arc is shown in Figure 8 of the booklet "Radiant Energy" included with this memorandum.

[redacted]

[redacted]

In the high intensity arc, the rare earth compounds are so volatilized and concentrated by the higher current density (400 to 1,000 amp per sq. in.) that a very bright crater is formed on the end of the positive carbon. The concentration of light emission from the cup-shaped crater produces the exceptionally high brightness characteristic of the high intensity arc, which is well suited to collection by an optical system and projection in various shapes of beams. The appearance of typical high intensity arcs is shown in Figs. 12 and 13.

The importance of brightness is evident from the well-known principle of optics that the intensity in a projected beam is dependent on the brightness of the source. Brightness is the amount of light radiated per unit area of the source, usually expressed as candlepower per sq. mm. The brightness of high intensity arcs ranges from 600 to 950 candles per sq. mm. for commercial arcs, and up to 2,000 for experimental arcs. Incandescent tungsten lamps reach a maximum brightness of about 50 and fluorescent lamps are in the neighborhood of 1/100 candle per sq. mm. Therefore, the high intensity arc is far superior in brightness to other common light sources; the experimental arcs even surpass the sun's brightness, which is about 1,600 at surface of the earth.

In addition to brightness, the use of rare earths in arc carbons is also important for the attainment of the required specific characteristics of spectral energy distribution. As shown by Fig. 16 the spectral energy distribution can be made to closely approximate that of sunlight, or can be reinforced in the blue and the near ultra-violet, as shown by Fig. 9. In contrast, the incandescent tungsten lamp is deficient in the violet-blue range, having only about 50% of the energy of the high intensity carbon arc at 4000 - 4500 Angstrom wave lengths and only about 6% at 5000 Angstroms.

[redacted]

The carbon arc reaches efficiencies of more than 70 lumens per arc watt, compared to a maximum of a little more than 30 lumens per watt for incandescent tungsten.

Summarizing, the rare earths of the cerium family, as derived from monazite, are essential to produce the brightness, the color and spectral energy distribution, and the luminous efficiency of the carbon arcs. No other materials have these distinctive radiating properties and performance characteristics in the carbon arc.

The following paragraphs describe briefly the correlation of these various properties of the carbon arc to the major industrial and military applications.

Projection of Motion Pictures

The 17,000 theaters in the U. S. A. depend upon the carbon arc as their light source for the projection of motion pictures to an audience of more than 90,000,000 persons per week. These theaters represent an investment of almost $2,000,000,000 and pay about $500,000,000 per year to a total of approximately 150,000 employees.

All of the light falling on the motion picture screen must pass through an aperture of the size of an individual frame of 35 mm film, less than the size of a postage stamp, or $\frac{1}{4}$ square inch area. After passing through the film the light is spread over the screen area which is up to 200,000 times greater than that of the aperture. The only way in which sufficient light can be projected to illuminate theater screens is by means of an extremely bright light source. Motion pictures in color are made to be projected by a "daylight" color of light. The only light source which fulfills these requirements is the carbon arc employing rare earth materials.

Figs. 27 - 30 show typical carbon arc projection lamps for motion pictures.

Photography of Motion Pictures

Motion picture studios of a total plant investment of about $125,000,000 spend approximately $4000,000,000 to produce around one thousand features and short subjects per year.

The rare earth cored carbons are essential for all color processes, because these processes are designed for a daylight spectral energy distribution to allow the mixing of daylight and arc light. The daylight quality of the carbon arc has a relatively low infra-red content, which results in a welcome "coolness" with the 400 - 800 foot-candle levels of set illumination used for color photography.

Powerful arc lamps are necessary to furnish the large quantities of light needed for the large studio sets. Spot lamps with the high intensity carbon arc are used to supply directed light, while the flame arc is employed to furnish non-directional general illumination. Spot lamps use as much as 17 kilowatts, and literally hundred of carbon arc lamps are required on some large sets. Figs. 19 - 22 show typical carbon arc studio lamps.

Projection type arc carbons are also used in studios to project a motion picture background on a screen at the rear of the set to be photographed together with the live action. This is called rear-projection or process photography. Here, the highest brightness is essential to obtain sufficiently high intensity on the screen to match the levels of illumination on the set.

Graphic Arts

There are approximately 2500 graphic arts establishments in this country engaged in commercial photography, photo-engraving, photolithography and rotogravure. These industries have been built up depending on the white flame carbon arc light source. Light is essential for two principal purposes --

for reproduction of copy on photographic negatives and for various operations in the preparation of the printing surface of the metal cylinders or plates. In the case of color reproduction, it is necessary to prepare several photographic negatives and printing plates, each corresponding to one of the colors. The white flame arc gives a plentiful supply of light of all wavelengths in the visible region enabling the reproduction of all colors. The strong radiation in the long wave ultra-violet just below the blue end of the visible spectrum coincides closely with the peak sensitivity of the photosensitive substances such as bicromated gelatin which are used on the metal printing surfaces prior to the engraving operations. Many of these operations are carried out by contact printing and the small dimensions of the carbon arc light source are essential to throw sharp shadows and produce well-defined images.

As many as four arcs each using 5 kilowatts of power may be necessary to obtain intensities sufficient to reduce the exposure times to the desired values. The properties of the carbon arc which render it essential to the graphic arts are color quality, small size of light source and high power input and radiation output per lamp. Rare earth cored carbons are a necessary item in the activities of the 2500 graphic arts establishments, for which typical carbon arc lamps are shown by Figs. 17 - 18b.

Accelerated Weathering and Fading Testing

There are approximately 350 test machines employing the white flame type arc for the accelerated testing and ageing of paints, fabrics, rubber, dyes, etc. These may run 24 hours a day to determine quickly and reproducibly under controlled conditions the long time effects of exposure to sunlight. The plentiful supply of visible and ultra-violet radiation from rare earth cored

carbons provides a good duplication of the effects of sunlight and are essential for many tests. These tests are a recognized part of governmental and commercial specifications on many manufactured products. Typical carbon arc accelerated testing lamps are shown by Figs. 34 - 36.

Searchlights

Due to the outstanding brightness of the crater of the high intensity carbon arc, it is an unmatched light source for the long-range projection of a searchlight beam. The experience of the past two World Wars proves that arc carbons are essential for military purposes, not only for present known uses, but also for new developments resulting from technological advances in warfare.

During the second World War the National Carbon Company developed and manufactured large numbers of the special arc carbons needed for anti-aircraft, naval, beach landing, aircraft and other military purposes. An example of the importance of these arc carbon developments is furnished by the special tank searchlight for night assaults. This was a top secret development which was of considerable value in the crossing of the Rhine and other battles. The attached photostat "Shop Tractor T 10 Dazzles Enemy" is from the publication of the Office, Chief of Ordnance, and describes this development.

The National Carbon Company is now engaged in active collaboration with the Army Engineer Board in the development of new types of searchlight carbons.

The military uses of arc carbons require the characteristics of brightness for which rare earth core materials are essential. Some typical searchlights are shown in Figs. 23 - 26.

RESTRICTED

W.A.S./J
May 10, 1948

[redacted]

MANDELL ET AL

Mr. Mandell is reported to be a Vice President of U. S. Bronze Powder Company of Closter, New Jersey, and also associated with Messrs. Hemlinger and Morgan in Rare Earths, Inc. The latter company is said to have a pilot plant for processing Monazite Sand located at Preakness, New Jersey, just outside Patterson, New Jersey.

Mr. Mandell purchased fifty tons of Monazite from Davidovitch at a reported price of from $180.00 to $200.00 per ton. It is also reported that he purchased 100 tons of low-grade Monazite at a lesser figure.

It is not believed that this outfit has either the equipment nor the technical knowledge to break down this material. Mr. Mandell approached some of the other processors, in particular The Foote Mineral Company, for this purpose.

It is believed that this company is interested in investigating the Thorium and Rare Earth business, but are not factors at the moment except to the extent that they tend to upset the market for raw material.

[redacted]

THE FOOTE MINERAL COMPANY

The Foote Mineral Company's offices are located at 10 E. Chelton Avenue, Philadelphia, Pennsylvania (North Philadelphia) and their plant is at Exton, Pennsylvania. Mr. H. C. Meyer is President and Mr. G. A. Chambers, Vice-President of the company. Mr. Chambers served in the U. S. Army during the War and is a member of one or more Advisory Committees of the Government at the present time.

The Foote Mineral Company is not processing nor consuming Monazite Sand at this time except for a small amount being used in a pilot plant. They have the equipment and technical knowledge to handle large quantities of the sand should a demand arise.

This company is, however, producing Monazite through their subsidiary, Foote Minerios Industrializadas, Ltd., of Victoria, Espirito Santo, Brazil, known as "Formil of Brazil". Several concessions are being developed and some ore is being shipped to the Lindsay Light and Chemical Company. The reserves of the company have not been determined but Mr. Chambers estimates them roughly at 61,000 tons. (For detailed account of "Formil" operations, see article by Chambers in "Foote Notes" which accompanies this report.)

Domestic Production of Monazite Sand

Domestic production of Monazite is negligible at the moment. The principal prospects are:

(1) Idaho - where one Leland Waggoner is operating an alluvial deposit for gold with an undetermined production of Monazite as a by-product. This production, for whatever it may be worth, is under contract to Lindsay.

(2) Florida - the Florida Ore Processing Company. This company, located

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at Melbourne, Florida, is reported to be well financed, with equipment on the ground, and preparing to go into production in the near future. The principal products will be ilmenite and rutile, said to be under contract to the Foote Mineral Company. The quantity of Monazite recoverable is still undetermined but has been estimated at 700 tons per year.

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[redacted]

ROHM AND HAAS

This company, located at Washington Square, Philadelphia, Pennsylvania, has done a large amount of laboratory work on the production of Thorium and the Rare Earths and are reported to have carried their processing technique to a higher state of perfection than other companies in the field. It is reported that they have readily available all necessary equipment for producing in large quantities should such facilities be required. At present they are not operating these facilities for this purpose.

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GOVERNMENT AGENCIES

Aside from the Atomic Energy Commission, Government Agencies using the products of Monazite Sand, as such, are of minor importance. Such uses are confined almost entirely to research and to minor uses in the research organizations of the Government such as, the Bureau of Standards, the Naval Research Laboratory, etc.

In general, Government Agencies interested in the products of Monazite use the material in its final form such as carbon arcs (both "flame" and "high intensity") and in various kinds of glass and photographic lenses and equipment. Such equipment is usually purchased by the Government according to specific standards and the ingredients are not known or are of minor interest to the purchaser.

SUMMARY

The three principal processors of Monazite Sand are currently using approximately 3,200 tons of raw material per year. Current demand for the Rare Earth products is greatly in excess of available supply and it is probable that 5,000 to 6,000 tons of raw material would be used if they were available. Facilities for processing are adequate.

Supply is probably sufficient for the current year but much depends on the fulfillment of present contracts by the producers, extension of present operating properties and the rapid development of new operations.

The most important Rare Earth products at this time are the oxides and fluorides for lighting and photographic uses, the chloride for flints and hydrate for the glass manufacturers. The use of lanthanum in special photographic lenses and equipment is also important. Of the Thorium products the Welsbach mantle is still the most important commercially.

It is reported that a new use of cerium has been developed in manufacturing malleable iron. If this proves to be as important as has been indicated it will require supplies of that element much in excess of amounts now available.

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MATERIALS

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CWL item?

Department of Energy
Washington, DC 20545

SEP 2 9 1987

RECEIVED
Dept. of Env. Conv.
OCT 8 1987
DIVISION OF
REGULATORY AFFAIRS

Dr. L. R. Solon, Director
Bureau of Radiation Control
New York City Department
of Health
111 Livingston Street
New York, New York 11201

Dear Dr. Solon:

As was noted in a telephone discussion between you and Mr. Andrew Wallo of my staff, the Department's records investigations conducted as part of the Formerly Utilized Sites Remedial Action Program have identified a site within your jurisdiction that is potentially contaminated with residual radioactive material. The company, Wolff-Alport Chemical Corporation, was a commercial producer of rare earths from monazite sands and operated during the late 1940's and early 1950's. The facility was located at 1127 Irving Avenue, Brooklyn, New York. The enclosed summary report provides the results of our investigations regarding this site.

The analysis of records collected indicated that the company sold residues from its commercial operations to the Atomic Energy Commission (AEC). However, the operation was commercial in nature and the AEC was not involved in its operation. The residues were tailings from its commercial operation. As a result, the Department does not have authority under the Atomic Energy Act of 1954, as amended, to conduct remedial actions at the site if they are determined to be needed. We are, therefore, notifying your Bureau and the State and the U.S. Environmental Protection Agency, by copy of this letter, of these findings so that appropriate reviews can be accomplished.

If we can be of assistance in the radiological evaluation of this site, or if you have any questions regarding this letter or the enclosed material, please call Andrew Wallo at 301-353-5439.

Sincerely,

J. Fiore

James J. Fiore, Director
Division of Facility and Site
Decommissioning Projects
Office of Nuclear Energy

Enclosure

cc:
P. Merges, NYDEC (2)
B. Pastalove, EPA II
W. Black, EPA II
S. Luftig, EPA II
P. Giardina, EPA II

SUMMARY REPORT AND DESIGNATION/ELIMINATION ANALYSIS FOR WOLFF-ALPORT CHEMICAL CORPORATION BROOKLYN, NEW YORK

INTRODUCTION

The U.S. Department of Energy (DOE), Office of Nuclear Energy, Office of Remedial Action and Waste Technology, Division of Facility and Site Decommissioning Projects has reviewed the past activities of the former Wolff-Alport Chemical Corporation in Brooklyn, New York. Based on the type of work that may have been performed by this company at its Brooklyn location, it is possible that there could be residual contamination from processing operations and storage of naturally occurring radioactive materials. However, no evidence, such as radiological survey reports, have been discovered to support any conclusions concerning the potential for radiological exposure. Records assembled to date indicate that Wolff-Alport was a supplier of process residues containing thorium oxide to the Atomic Energy Commission (AEC). However, no documents have been found that would provide DOE authority to conduct remedial action under the Formerly Utilized Sites Remedial Action Program at this site. Therefore, the site has been eliminated from further consideration under this program.

BACKGROUND

Site Function

The Wolff-Alport Chemical Corporation supplied thorium compounds to the AEC in the late 1940's to very early 1950's. A 1949 listing of manufacturing companies in New York State, held in the Buffalo Municipal Library reference collection, shows an address of 1127 Irving Avenue, Brooklyn, New York for Wolff-Alport. The company is not listed in the 1953 edition.

Wolff-Alport processed monazite sands in order to recover rare

earths for commercial markets. The company had disposed of the thorium content of the monazite by running the liquors to a sewer (Ref. 10). This practice was ordered to a halt in the Fall of 1947 by the AEC. Thereafter, the thorium was precipitated as an oxalate sludge and sold to the AEC, which subsequently stored the materials at Middlesex.

To provide an indication of the magnitude of Wolff-Alport's operations, available records were examined for references to amounts of materials handled. A summary of the oxalate sludge which was sold to the AEC in the 1948 to 1951 time period is shown below (Ref. 1, 2, 9, 11):

1948	10,899 kg thorium oxalate sludge
1949	at least 3,406 kg sludge
1950	6,111 kg thorium oxalate sludge
1951	(7,762 lbs of thorium oxalate sludge in June inventory)

In addition, Mr. Harry W. Wolff, presumably one of the principals of the firm, sold 238 drums of thorium oxalate and/or 400 lbs. of thorium nitrate to the AEC in 1954 (Ref. 3, 6, 8, 13). The nitrate had allegedly been in storage for 15 years prior to the sale offering. Concerns of health and safety problems due to the accumulation of thoron gas were raised at the time, but there is no evidence that any actions were taken (Ref. 3).

Site Description

The 1127 Irving Avenue property is located in a mixed light industrial-residential area, on the end block of Irving Avenue (Figure 1). Although it is referred to as Brooklyn, this last block of Irving Avenue is actually in the Borough and County of Queens. In addition, street signage indicates that this one block of Irving Avenue east of Cooper Street is now called Cooper Avenue. Local usage still favors Irving Avenue. The legal description of 1127 Irving Avenue is Block 3725, Lot 44 in Queens.

There appears to be one building on 1127 Irving Avenue, which is

about 20 feet wide and 12 feet high. It has one garage door and one entrance door facing Irving Avenue. There is an unused rail siding behind the building. The area behind the building is covered with dense brush and may be inaccessible from the street.

Two businesses have placed signs on the building:

Lynda Knitwear 1127 Irving Avenue Ridgewood, NY 11385 phone 718-497-2478	Meadows Knitting Mill, Inc. 1127 Irving Avenue Ridgewood, NY 11385 no phone listing

There is one property between the subject property and the intersection of Irving Avenue and Cooper Street (Figure 2). It is the location of:

Ridgewood Supermarket.
Cooper St. and Irving Ave.
Ridgewood, NY 11385
no phone listing

On the other side of the property is located a beverage distributor:

Bett-A-Way Beverage Dist. Inc.
1129A Irving Avenue
Ridgewood, NY 11385
718-898-4050

Radiological History and Status

No information on the radiological history of the 1127 Irving Avenue site has been discovered to date. The present radiological status of the site is unknown. Based on the type of work that may have been performed by Wolff-Alport at the Irving Avenue location, it is possible that there could be residual contamination from processing operations and storage of radioactive materials.

AUTHORITY ANALYSIS

Wolff-Alport was a commercial producer of rare earths and the sale of thorium process residues to the AEC was incidental to the operation of that process. It would, in general, have resulted in the reduction of residual radioactivity at the site or properties in its vicinity.

Information collected to date indicates that the AEC neither owned nor controlled the property or the operation. It appears that the owner had responsibility for the processing operation and controlled its health and safety aspects as well. On the basis of the information collected and the associated analysis, the Department of Energy has no authority under the Atomic Energy Act of 1954, as amended, to conduct remedial action at this site. Therefore, the site has been eliminated from further consideration under the Formerly Utilized Sites Remedial Action Program. However, due to the quantity of material processed and the evidence suggesting the possibility of sewer contamination, further investigations, including radiological surveys, may be warranted to assess the potential for radiological contamination at the former Wolff-Alport site. This information will be transmitted to appropriate Federal, State, and local agencies that may have authority to address this site.

REFERENCES

1. Belmore, F. M. (Production Division) to Merritt, P. L. (Division of Raw Materials), "Raw Material Feed for FMPC Thorium Plant" (October 22, 1951).

2. Cook, R. W. (Director of Production) to Johnson, J. C. (Raw Materials Operations), "Thorium Procurement" (March 19, 1951).

3. Dowling, F. R. (Feed Materials Division) to Faulkner, R. L. (Raw Materials Division), "TNT Available from Wolff-Alport Company" (Oak Ridge, Tennessee: July 19, 1954).

4. Dowling, F. R. (Feed Materials Division) to Wolff, H. W., letter acknowledging receipt of letter from Mr. Wolff (Oak Ridge, Tennessee: September 27, 1954).

5. Dowling, F. R. (Feed Materials Division) to Faulkner, R. L. (Raw Materials Division), "Crude Thorium Oxalate Available from Wolff-Alport Company" (Oak Ridge, Tennessee: September 28, 1954).

6. Faulkner, R. L. (Raw Materials Division) to Dowling, F. R. (Feed Materials Division), "Crude Thorium Oxalate Available from Wolff-Alport Company" (Washington, D.C.: October 11, 1954).

7. Fry, H. B. (Production Division) to Belmore, F. M. (Production Division), "Financial Plan, F. Y. 1952, Thorium Inventory" (September 7, 1951).

8. Karl, C. L. (Fernald Area) to Rodden, C. J. (New Brunswick Laboratory), "Crude Thorium Oxalate from Wolff Alport Chemical Company" (Cincinnati: November 8, 1954).

9. Kelley, W. E. (New York Operations Office) to Youngs, W. C., Jr., (SF Materials Accountability Branch), "Monthly Thorium Accountability Report - October, 1948" (New York: November 29, 1948); also reports for November 1948 (December 22, 1948), December 1948 (January 26, 1949), August 1949 (September 20, 1949), October 1949 (November 16, 1949).

10. Kelley, W. E. (New York Operations Office) to Gustafson, J. K. (Raw Materials Operations), "Monazite" (New York: January 26, 1949).

11. Marvin, G. G. (Feed Materials Branch) to Gustafson, J. K. (Raw Materials Operations), "Thorium" (April 18, 1949).

12. Robinson, B. M. (Raw Materials Operations) to Wilson, E. F. (Raw Materials Operations), "Monazite Processes" (April 22, 1949).

13. Sapirie, S. R. (Oak Ridge Operations) to Johnson, J. C. (Raw Materials Division), "Crude Thorium Oxalate Available from Wolff-Alport Company" (Oak Ridge, Tennessee: November 16, 1954).

14.8

UNITED STATES GOVERNMENT

TO : Jesse C. Johnson, Manager of Raw Materials Operations Office

DATE: MAR 19 1951

Suitland 326-71-8 Box 15

FROM : R. W. Cook, Director of Production

SUBJECT: THORIUM PROCUREMENT

SYMBOL: PMFM:TBU

The following list of suppliers of thorium and the amounts of materials procured from them by the New York Operations Office during calendar year 1950 is being supplied in accordance with Mr. Spelman's telephone request of March 19.

	Thorium (kilograms)
Lannett Bleachery	179
Linde Air Products Co.	-
Lindsey Light & Chemical Co.	38,232
Miscellaneous	-
NYO Liscensing Division	3
Rare Earths, Inc.	4,210
Wolff-Alport	6,111
Total -	48,735 =

CLASSIFICATION CANCELLED
~~OR CHANGED TO~~
BY AUTHORITY OF DOE/DPC
LENARD M. SAITANSKI
REVIEWED BY
DATE

WG S 3/20
JCJ 3/21
RLF RB 3/21

R. L. Faulkner, Assistant Director
for Foreign Procurement, Raw Materials
Division, Washington

F. R. Dowling, Director, Feed Materials
Division, Oak Ridge

July 19, 1954

THT AVAILABLE FROM WOLFF-ALPORT COMPANY

YMBOL: OFD:BS

Mr. Wolff, formerly of the Wolff-Alport Company, visited New York on June 16, 1954, to discuss with F. B. Huke, George Rennich and Bert Schwartz the possibility of the Commission purchasing 400 pounds of thorium nitrate which he now has in storage in a New York warehouse.

We accepted a small vial, allegedly a sample of Mr. Wolff's nitrate, and forwarded it to New Brunswick for analysis. I have enclosed a copy of their results.

It is interesting to note that Mr. Wolff claims the material to be 15 years old. I understand it to be in closed storage; therefore presenting a health and safety problem because of the accumulation of thoron gas. It is my impression that this material, if not of interest as a small increment to your Raw Materials purchasing program, may be of interest somewhere within the Commission because of its age.

In view of the fact that the Raw Materials Division is actively pursuing all possible sources of thorium raw materials, I have forwarded this information to you for whatever action you deem appropriate.

Mr. Wolff has left the country for the summer, but will contact us at Oak Ridge when he returns. I will refer him to you.

F. R. Dowling

NFF

Enclosure:
Analysis Report

Schwartz/ms

OFFICE ▶	Feed Materials Division					
SURNAME ▶	Schwartz	Rennich	Dowling			
DATE ▶			Dowling			

Form AEC-318

U. S. GOVERNMENT PRINTING OFFICE 16—62701-2

OFO:ES

Oak Ridge, Tennessee
September 27, 1954

Mr. Harry W. Wolff
340 Riverside Drive
New York City, New York

Dear Mr. Wolff:

Thank you for your letter to George Rennich of September 14, 1954, indicating your interest to contract for our purchase of the Grade Thorium Oxalate which you now have in storage in New York City.

The procurement of all thorium raw materials is now handled by the Raw Materials Division in Washington. We have forwarded your letter to them and expect that you will hear from them shortly.

The contact in Washington is:

Mr. R. L. Faulkner, Assistant Director
for Foreign Procurement
Raw Materials Division
U. S. Atomic Energy Commission
1901 Constitution Avenue, NW
Washington 25, D. C.

Very truly yours,

F. R. Dowling, Director
Feed Materials Division

OK cc: R. L. Faulkner

Schwartz/ms

OFFICE ▶	Feed Materials Division					
SURNAME ▶	Schwartz	Dowling				
DATE ▶	9-27-54					

Form AEC-318

U. S. GOVERNMENT PRINTING OFFICE 16—63761-2

44

SEP 28 1954

R. L. Faulkner, Assistant Director for Foreign Procurement, Raw Materials Division, Washington

F. R. Dowling, Director, Feed Materials Division, Oak Ridge

CRUDE THORIUM OXALATE AVAILABLE FROM WOLFF-ALPORT COMPANY

SYMBOL: OFO:BS

Reference is made to my memorandum dated July 19, 1954 informing you of certain thorium materials owned by Mr. Harry W. Wolff and available for purchase by the Commission.

We have received a letter (enclosed) from Mr. Wolff which proposes our purchase of certain crude thorium oxalate materials now in storage in New York City.

In accordance with my above referred to memorandum, I am referring this matter to you.

I will be pleased to confer with you if you have any questions on this matter.

F. R. Dowling

Enclosure:
Ltr fm HWWolff to GRennich, dtd 9/14/54

cc: H. H. Woodruff

Schwartz/ms

OFFICE ▶	Feed Materials Division					
SURNAME ▶	Schwartz	Dowling				
DATE ▶	9-27-54	9-28				

Form AEC-318

U. S. GOVERNMENT PRINTING OFFICE 16—63781-2

Office Memorandum • UNITED STATES GOVERNMENT

TO : F.R. Dowling, Director, Feed Materials Division DATE: October 11, 1954
Oak Ridge

FROM : R.L. Faulkner, Acting Director, Division of Raw Materials,
Washington

SUBJECT: CRUDE THORIUM OXALATE AVAILABLE FROM WOLFF-ALPORT COMPANY
Symbol: RM:CWT

Reference is made to your memorandum of September 28, 1954 transmitting letter from Mr. Harry W. Wolff offering to sell certain crude thorium oxalate material now in storage in New York City.

We intend to accept this offer and direct the vendor to ship the material to National Lead Company, Fernald, Ohio.

Will you kindly advise whether such an arrangement would be satisfactory. Any further comments or suggestions you may have, particularly with respect to shipping instructions, will be appreciated.

NY.30

Mat. 7-4

C. J. Rodden, Director, New Brunswick Laboratory, New Brunswick, New Jersey

November 8, 1954

C. L. Karl, Area Manager, USAEC, Fernald Area, Cincinnati

CRUDE THORIUM OXALATE FROM WOLFF ALBORT CHEMICAL COMPANY

SYMBOL: O:OJT

The Division of Raw Materials has purchased from the Wolff Albort Chemical Company of New York City, 238 drums of crude thorium oxalate. The oxalate is to have a minimum ThO_2 content of twenty percent on a dry basis.

Samples of the above material are to be sent to your laboratory by National Lead for the official assay. When the assay report is completed, it is requested that it be sent directly to Mr. R. L. Faulkner, Assitant Director for Foreign Procurement, Division of Raw Materials, Washington.

ORIGINAL SIGNED BY
C. L. KARL
AREA MANAGER

C. L. Karl

cc: F. R. Bowling, OPOO
R. L. Faulkner, Washington

Turnelle/bjm

NOV 10 1954

-4

J. C. Johnson, Director, Raw Materials
Division, Washington
(Thru) E. J. Bloch, Director, Production Division, Washington
S. H. Sapirie, Manager
Oak Ridge Operations

CRUDE THORIUM OXALATE AVAILABLE FROM WOLFF-ALPORT COMPANY

XREFL: OFO:BR

Reference is made to the memorandum on the above subject from R. L. Faulkner to F. R. Bowling, dated October 11, 1954, subject: CRUDE THORIUM OXALATE AVAILABLE FROM WOLFF-ALPORT COMPANY.

Your arrangement to have the Wolff-Alport Company ship various crude thorium oxalate materials to Fernald is satisfactory with us. However, please make arrangements for this shipment, in advance, with our Fernald Area and notify them of the form, weight and content of the material to be shipped.

ORIGINAL SIGNED BY
E. A. WENDE

for S. H. Sapirie

cc: W. Hendrix
C. L. Karl, Fernald Area
H. H. Woodruff

Schwartz/ms

OFFICE ▶	Feed Materials Division				Dep. Mg
SURNAME ▶	Schwartz	Ruch	Woodruff	Sapirie	
DATE ▶	11-9-54	11/10/54	11/10		11/10

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Dated: August 18, 2004.

Sally L. Stroup,

Assistant Secretary for Postsecondary Education.

[FR Doc. 04–19277 Filed 8–20–04; 8:45 am]

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DEPARTMENT OF ENERGY

Energy Employees Occupational Illness Compensation Program Act of 2000; Revision to List of Covered Facilities

AGENCY: Department of Energy.

ACTION: Notice of revision of listing of covered facilities.

SUMMARY: Periodically, the Department of Energy ("Department" or "DOE") publishes a list of facilities covered under the Energy Employees Occupational Illness Compensation Program Act of 2000 ("Act"), Title 36 of Public Law 106–398 (66 FR 4003; 66 FR 31218). The Act establishes a program to provide compensation to individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities and at certain federally owned facilities in which radioactive materials were used. This notice revises the previous lists and provides additional information about the covered facilities, atomic weapons employers, and beryllium vendors. The original notice provides detailed background information about this matter. Previous lists were published on July 21, 2003, December 27, 2002, June 11, 2001, and January 17, 2001.

FOR FURTHER INFORMATION CONTACT: Office of Worker Advocacy, 1–877–447–9756.

ADDRESSES: The Department welcomes comments on this list. Individuals who wish to suggest changes should provide information to: Office of Worker Advocacy (EH–8), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585; e-mail: *worker_advocacy@eh.doe.gov;* toll free: 1–877–447–9756; URL: *http://www.eh.doe.gov/advocacy/.*

SUPPLEMENTARY INFORMATION:

Purpose

The Energy Employees Occupational Illness Compensation Program Act of 2000 ("Act"), Title 36 of Public Law 106–398, establishes a program to provide compensation to individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities and at certain federally owned facilities in which radioactive materials were used. On December 7, 2000, the President issued Executive Order 13179 ("Order") directing the Department of Energy ("Department" or "DOE") to list covered facilities in the **Federal Register**. This notice revises the previous lists and provides additional information about the covered facilities, atomic weapons employers, and beryllium vendors.

Section 2.c.iv of the Order instructs the Department to designate, pursuant to sections 3621(4)(B) and 3622 of the Act, atomic weapons employers (AWE's). In addition, Section 2.c.vii of the Order instructs the Department to list three types of facilities defined in the Act:

(1) Atomic weapons employer facilities, as defined in section 3621(4);

(2) Department of Energy facilities, as defined by section 3621(12); and

(3) Beryllium vendors, as defined by section 3621(6).

Compensation options and mechanisms are defined differently for each of these facility categories. The atomic weapons employer category includes atomic weapons employer facilities in which the primary work was not related to atomic weapons, and consequently these facilities are not commonly known as atomic weapons facilities. Their inclusion in this list is consistent with the Act, and is not intended as a classification for any other purpose.

The list at the end of this notice represents the Department's best efforts to date to compile a list of facilities under these three categories. This listing includes 363 facilities in 46 jurisdictions. Today's publication of the list newly designates General Electric's X-ray Division in Milwaukee, WI as an AWE, and additionally designates the Nevada Site Office as a DOE facility. It also alters slightly the designation for Blockson Chemical (broadens it by saying "building 55 and related activities" which is meant to include the AEC-funded laboratory, pilot plant and oxidation process). Other corrections include: B&T Metals (OH) (the DOE designation was in error and has been removed), Foote Mineral (PA) (the BE designation has been on the program's Web site (noted below) since inception, but was inadvertently missing from the **Federal Register** notice), Swenson Evaporator (is located in Harvey, not Chicago, IL) and C.H. Schnorr, PA (previously Schnoor). This notice also deletes the listing for Ledoux (NY) entirely because it was learned that no radioactivity was used at that location.

In addition to continuing its research efforts, the Department has developed information dissemination mechanisms to make facility-specific data available to the public. Information about each listed facility, including the dates and type of work done there, is available by contacting the Office of Worker Advocacy. These descriptions are available in print form and also electronically (via the World Wide Web at *http://tis.eh.doe.gov/advocacy/*).

The list that follows covers facilities under the three categories of employers defined by the Act: atomic weapons employers ("AWE"), Department of Energy facilities ("DOE"), and beryllium vendors ("BE"). Each of the categories has been defined in the original notice and include:

1. Atomic Weapons Employers and Atomic Weapons Employer Facilities

The lines between research, atomic weapons production, and non-weapons production are often difficult to draw. For the purposes of this notice, and as directed by the Act, only those facilities whose work involved radioactive material that was connected to the atomic weapons production chain are included. This includes facilities that received radioactive material that had been used in the production of an atomic weapon, or the "back end" of the production cycle, such as waste handling or reprocessing operations. For the purposes of this listing, the Department considers commercial nuclear fuel fabrication facilities to be covered facilities for those periods when they either supplied radioactive materials to the Department or received radioactive materials that had been used in the Department's production reactors.

Corporate information regarding many of the listed facilities is often not readily available. The Department welcomes comments or additional information regarding facilities that may have supported atomic weapons production that are not on this list, as well as information that clarifies the work done at facilities named below.

2. Department of Energy Facilities

The listing of Department of Energy facilities is only intended for the context of implementing this Act and does not create or imply any new Departmental obligations or ownership at any of the facilities named on this list.

3. Beryllium Vendors and Beryllium Vendor Facilities

Section 3621(6) of the Act defines beryllium vendor as the following:

"(A) Atomics International.

(B) Brush Wellman, Incorporated, and its predecessor, Brush Beryllium Company.

(C) General Atomics.

(D) General Electric Company.

(E) NGK Metals Corporation and its predecessors, Kawecki-Berylco, Cabot Corporation, BerylCo, and Beryllium Corporation of America.

(F) Nuclear Materials and Equipment Corporation.

(G) StarMet Corporation, and its predecessor, Nuclear Metals, Incorporated.

(H) Wyman Gordan, Incorporated.

(I) Any other vendor, processor, or producer of beryllium or related products designated as a beryllium vendor for purposes of this title under Section 3622."

The list identifies facilities that processed, produced, or provided beryllium metal for the Department, as defined by the Act.

Jurisdiction and facility name	Location	Facility type	State
AL—Southern Research Institute	Birmingham	AWE	Alabama.
AL—Speedring, Inc.	Culman	BE	Alabama.
AL—Tennessee Valley Authority	Muscle Shoals	AWE	Alabama.
AK—Amchitka Nuclear Explosion Site	Amchitka Island	DOE	Alaska.
AK—Project Chariot Site	Cape Thompson	DOE	Alaska.
AZ—Ore Buying Station at Globe	Globe	DOE	Arizona.
CA—Arthur D. Little Co	San Francisco	AWE	California.
CA—Atomics International	Los Angeles County	BE DOE	California.
CA—California Research Corp	Richmond	AWE	California.
CA—Ceradyne, Inc	Costa Mesa	BE	California.
CA—Ceradyne, Inc	Santa Ana	BE	California.
CA—City Tool & Die MFG	Santa Clara	BE	California.
CA—C.L. Hann Industries	San Jose	BE	California.
CA—Dow Chemical Co	Walnut Creek	AWE	California.
CA—EDM Exotics	Hayward	BE	California.
CA—Electro Circuits, Inc	Pasadena	AWE	California.
CA—Electrofusion	Fremont	BE	California.
CA—Energy Technology Engineering Center (ETEC)	Santa Susana, Area IV	DOE	California.
CA—General Atomics	La Jolla	AWE BE DOE	California.
CA—General Electric Vallecitos	Pleasanton	AWE DOE	California.
CA—Hafer Tool	Oakland	BE	California.
CA—Hexcel Products	Berkeley	BE	California.
CA—Hunter Douglas Aluminum Corp	Riverside	AWE	California.
CA—Jerry Carroll Machining	San Carlos	BE	California.
CA—Lab. for Energy-Related Health Research	Davis	DOE	California.
CA—Lab. of Biomedical & Environmental Sciences	Los Angeles	DOE	California.
CA—Lab. of Radiobiology and Environmental Health	San Francisco	DOE	California.
CA—Lawrence Berkeley National Laboratory	Berkeley	DOE	California.
CA—Lawrence Livermore National Laboratory	Livermore	DOE	California.
CA—Lebow	Goleta	BE	California.
CA—Philco-Ford	Newport Beach	BE	California
CA—Pleasanton Tool & Manufacturing	Pleasanton	BE	California.
CA—Poltech Precision	Fremont	BE	California.
CA—Robin Materials	Mountain View	BE	California.
CA—Ron Witherspoon, Inc	Campbell	BE	California.
CA—Sandia Laboratory, Salton Sea Base	Imperial County	DOE	California.
CA—Sandia National Laboratories—Livermore	Livermore	DOE	California.
CA—Stanford Linear Accelerator	Palo Alto	DOE	California.
CA—Stauffer Metals, Inc	Richmond	AWE	California.
CA—Tapemation	Scotts Valley	BE	California.
CA—University of California	Berkeley	AWE DOE	California.
CO—Coors Porcelain	Golden	BE	Colorado.
CO—Grand Junction Operations Office	Grand Junction	DOE	Colorado.
CO—Green Sludge Plant	Uraven	DOE	Colorado.
CO—Project Rio Blanco Nuclear Explosion Site	Rifle	DOE	Colorado.
CO—Project Rulison Nuclear Explosion Site	Grand Valley	DOE	Colorado.
CO—Rocky Flats Plant	Golden	DOE	Colorado.
CO—Shattuck Chemical	Denver	AWE	Colorado.
CO—University of Denver Research Institute	Denver	AWE BE	Colorado.
CO—Uranium Mill in Durango	Durango	DOE	Colorado.
CT—American Chain and Cable Co	Bridgeport	AWE	Connecticut.
CT—Anaconda Co	Waterbury	AWE	Connecticut.
CT—Bridgeport Brass Co., Havens Laboratory	Bridgeport	AWE	Connecticut.
CT—Combustion Engineering	Windsor	AWE	Connecticut.
CT—Connecticut Aircraft Nuclear Engine Laboratory	Middletown	BE DOE	Connecticut.
CT—Dorr Corp.	Stamford	AWE	Connecticut.
CT—Fenn Machinery	Hartford	AWE	Connecticut.
CT—Machlett Laboratories	Springdale	BE	Connecticut.
CT—New England Lime Co	Canaan	AWE	Connecticut.

Jurisdiction and facility name	Location	Facility type	State
CT—Seymour Specialty Wire	Seymour	AWE DOE	Connecticut.
CT—Sperry Products, Inc	Danbury	AWE	Connecticut.
CT—Torrington Co	Torrington	AWE	Connecticut.
DE—Allied Chemical and Dye Corp	North Claymont	AWE	Delaware.
DC—National Bureau of Standards	Washington	AWE	District of Columbia.
DC—Naval Research Laboratory	Washington	AWE DOE	District of Columbia.
FL—American Beryllium Co	Sarasota	BE	Florida.
FL—Armour Fertilizer Works	Bartow	AWE	Florida.
FL—Gardinier, Inc	Tampa	AWE	Florida.
FL—International Minerals and Chemical Corp.	Mulberry	AWE	Florida.
FL—Pinellas Plant	Clearwater	DOE	Florida.
FL—University of Florida	Gainesville	AWE	Florida.
FL—Virginia-Carolina Chemical Corp	Nichols	AWE	Florida.
FL—W.R. Grace Co., Agricultural Chemical Div	Ridgewood	AWE	Florida.
HI—Kauai Test Facility	Kauai	DOE	Hawaii.
ID—Argonne National Laboratory—West	Scoville	DOE	Idaho.
ID—Idaho National Engineering Laboratory	Scoville	DOE	Idaho.
ID—Northwest Machining & Manufacturing	Meridian	BE	Idaho.
IL—Allied Chemical Corp. Plant	Metropolis	AWE	Illinois.
IL—American Machine and Metals, Inc	E. Moline	AWE	Illinois.
IL—Argonne National Laboratory—East	Argonne	DOE	Illinois.
IL—Armour Research Foundation	Chicago	AWE	Illinois.
IL—Blockson Chemical Co. (Building 55 and related activities).	Joliet	AWE	Illinois.
IL—C–B Tool Products Co	Chicago	AWE	Illinois.
IL—Crane Co	Chicago	AWE	Illinois.
IL—Dow Chemical (Madison Site)	Madison	AWE	Illinois.
IL—ERA Tool and Engineering Co	Chicago	AWE	Illinois.
IL—Fansteel Metallurgical Corp	North Chicago	BE	Illinois.
IL—Fermi National Accelerator Laboratory	Batavia	DOE	Illinois.
IL—Granite City Steel	Granite City	AWE DOE	Illinois.
IL—Great Lakes Carbon Corp	Chicago	AWE	Illinois.
IL—GSA 39th Street Warehouse	Chicago	AWE	Illinois.
IL—International Register	Chicago	AWE	Illinois.
IL—Kaiser Aluminum Corp	Dalton	AWE	Illinois.
IL—Lindsay Light and Chemical Co	W. Chicago	AWE	Illinois.
IL—Metallurgical Laboratory	Chicago	AWE BE DOE	Illinois.
IL—Midwest Manufacturing Co	Galesburg	AWE	Illinois.
IL—Museum of Science and Industry	Chicago	AWE	Illinois.
IL—National Guard Armory	Chicago	AWE DOE	Illinois.
IL—Podbeliniac Corp	Chicago	AWE	Illinois.
IL—Precision Extrusion Co	Bensenville	AWE	Illinois.
IL—Quality Hardware and Machine Co	Chicago	AWE	Illinois.
IL—R. Krasburg and Sons Manufacturing Co	Chicago	AWE	Illinois.
IL—Sciaky Brothers, Inc	Chicago	AWE	Illinois.
IL—Swenson Evaporator Co	Harvey	AWE	Illinois.
IL—W.E. Pratt Manufacturing Co	Joliet	AWE	Illinois.
IL—Wyckoff Drawn Steel Co	Chicago	AWE	Illinois.
IN—American Bearing Corp	Indianapolis	AWE	Indiana.
IN—Dana Heavy Water Plant	Dana	DOE	Indiana.
IN—General Electric Plant	Shelbyville	AWE	Indiana.
IN—Joslyn Manufacturing and Supply Co	Ft. Wayne	AWE	Indiana.
IN—Purdue University	Lafayette	AWE	Indiana.
IA—Ames Laboratory	Ames	DOE	Iowa.
IA—Bendix Aviation (Pioneer Division)	Davenport	AWE	Iowa.
IA—Iowa Ordnance Plant	Burlington	DOE	Iowa.
IA—Titus Metals	Waterloo	AWE	Iowa.
KS—Spencer Chemical Co., Jayhawk Works	Pittsburgh	AWE	Kansas.
KY—Paducah Gaseous Diffusion Plant	Paducah	DOE	Kentucky.
LA—Ethyl Corp	Baton Rouge	BE	Louisiana.
MD—Armco-Rustless Iron & Steel	Baltimore	AWE	Maryland.
MD—W.R. Grace and Company	Curtis Bay	AWE	Maryland.
MA—American Potash & Chemical	West Hanover	AWE	Massachusetts.
MA—C.G. Sargent & Sons	Graniteville	AWE	Massachusetts.
MA—Chapman Valve	Indian Orchard	AWE DOE	Massachusetts.
MA—Edgerton Germeshausen & Grier, Inc	Boston	AWE	Massachusetts.
MA—Fenwal, Inc	Ashland	AWE	Massachusetts.
MA—Franklin Institute	Boston	BE	Massachusetts.
MA—Heald Machine Co	Worcester	AWE	Massachusetts.
MA—La Pointe Machine and Tool Co	Hudson	AWE	Massachusetts.
MA—Massachusetts Institute of Technology	Cambridge	AWE BE	Massachusetts.
MA—Metals and Controls Corp	Attleboro	AWE	Massachusetts.
MA—National Research Corp	Cambridge	AWE	Massachusetts.
MA—Norton Co	Worcester	AWE BE	Massachusetts.

Jurisdiction and facility name	Location	Facility type	State
MA—Nuclear Metals, Inc	Concord	AWE BE	Massachusetts.
MA—Reed Rolled Thread Co	Worcester	AWE	Massachusetts.
MA—Shpack Landfill	Norton	AWE	Massachusetts.
MA—Ventron Corporation	Beverly	AWE DOE	Massachusetts.
MA—Watertown Arsenal	Watertown	AWE	Massachusetts.
MA—Winchester Engineering & Analytical Center	Winchester	DOE	Massachusetts.
MA—Woburn Landfill	Woburn	AWE	Massachusetts.
MA—Wyman Gordon Inc	Grayton, North Grafton	BE	Massachusetts.
MI—AC Spark Plug	Flint	AWE BE	Michigan.
MI—Baker-Perkins Co	Saginaw	AWE	Michigan.
MI—Bridgeport Brass Co	Adrian	AWE DOE	Michigan.
MI—Brush Beryllium Co	Detroit	AWE	Michigan.
MI—Carboloy Co	Detroit	AWE	Michigan.
MI—Extruded Metals Co	Grand Rapids	AWE	Michigan.
MI—Gerity-Michigan Corp	Adrian	BE	Michigan.
MI—Mitts & Merrel Co	Saginaw	AWE	Michigan.
MI—Oliver Corp	Battle Creek	AWE	Michigan.
MI—Revere Copper and Brass	Detroit	AWE BE	Michigan.
MI—Speedring Systems, Inc	Detroit	BE	Michigan.
MI—Star Cutter Corp	Farmington	AWE	Michigan.
MI—University of Michigan	Ann Arbor	AWE	Michigan.
MI—Wolverine Tube Division	Detroit	AWE BE	Michigan.
MN—Elk River Reactor	Elk River	DOE	Minnesota.
MS—Salmon Nuclear Explosion Site	Hattiesburg	DOE	Mississippi.
MO—Kansas City Plant	Kansas City	DOE	Missouri.
MO—Latty Avenue Properties	Hazelwood	AWE DOE	Missouri.
MO—Mallinckrodt Chemical Co., Destrehan St. Plant	St. Louis	DOE	Missouri.
MO—Medart Co	St. Louis	AWE	Missouri.
MO—Roger Iron Co	Joplin	AWE	Missouri.
MO—St. Louis Airport Storage Site (SLAPS)	St. Louis	AWE	Missouri.
MO—Tyson Valley Powder Farm	St. Louis	AWE	Missouri.
MO—United Nuclear Corp	Hematite	AWE	Missouri.
MO—Weldon Spring Plant	Weldon Spring	DOE	Missouri.
NE—Hallam Sodium Graphite Reactor	Hallam	DOE	Nebraska.
NV—Nevada Site Office	North Las Vegas	DOE	Nevada.
NV—Nevada Test Site	Mercury	DOE	Nevada.
NV—Project Faultless Nuclear Explosion Site	Central Nevada Test Site	DOE	Nevada.
NV—Project Shoal Nuclear Explosion Site	Fallon	DOE	Nevada.
NV—Tonopah Test Range	Tonopah	DOE	Nevada.
NV—Yucca Mountain Site Characterization Project	Yucca Mountain	DOE	Nevada.
NJ—Aluminum Co. of America (Alcoa)	Garwood	AWE	New Jersey.
NJ—American Peddinghaus Corp	Moonachie	AWE	New Jersey.
NJ—Baker and Williams Co	Newark	AWE	New Jersey.
NJ—Bell Telephone Laboratories	Murray Hill	AWE	New Jersey.
NJ—Bloomfield Tool Co	Bloomfield	AWE	New Jersey.
NJ—Bowen Laboratory	North Branch	AWE	New Jersey.
NJ—Callite Tungsten Co	Union City	AWE	New Jersey.
NJ—Chemical Construction Co	Linden	AWE	New Jersey.
NJ—Du Pont Deepwater Works	Deepwater	AWE DOE	New Jersey.
NJ—International Nickel Co., Bayonne Laboratories	Bayonne	AWE	New Jersey.
NJ—J.T. Baker Chemical Co	Philipsburg	AWE	New Jersey.
NJ—Kellex/Pierpont	Jersey City	AWE DOE	New Jersey.
NJ—Maywood Chemical Works	Maywood	AWE	New Jersey.
NJ—Middlesex Municipal Landfill	Middlesex	AWE DOE	New Jersey.
NJ—Middlesex Sampling Plant	Middlesex	DOE	New Jersey.
NJ—National Beryllia	Haskell	BE	New Jersey.
NJ—New Brunswick Laboratory	New Brunswick	DOE	New Jersey.
NJ—Picatinny Arsenal	Dover	AWE	New Jersey.
NJ—Princeton Plasma Physics Laboratory	Princeton	DOE	New Jersey.
NJ—Rare Earths/W.R. Grace	Wayne	AWE DOE	New Jersey.
NJ—Standard Oil Development Co. of NJ	Linden	AWE	New Jersey.
NJ—Stevens Institute of Technology	Hoboken	BE	New Jersey.
NJ—Tube Reducing Co	Wallington	AWE	New Jersey.
NJ—U.S. Pipe and Foundry	Burlington	BE	New Jersey.
NJ—United Lead Co	Middlesex	AWE BE	New Jersey.
NJ—Vitro Corp. of America (New Jersey)	West Orange	AWE	New Jersey.
NJ—Westinghouse Electric Corp (New Jersey)	Bloomfield	AWE	New Jersey.
NJ—Wykoff Steel Co	Newark	AWE	New Jersey.
NM—Accurate Machine & Tool	Albuquerque	BE	New Mexico.
NM—Albuquerque Operations Office	Albuquerque	DOE	New Mexico.
NM—Chupadera Mesa	Chupadera Mesa	DOE	New Mexico.
NM—Los Alamos Medical Center	Los Alamos	DOE	New Mexico.
NM—Los Alamos National Laboratory	Los Alamos	DOE	New Mexico.
NM—Lovelace Respiratory Research Institute	Albuquerque	DOE	New Mexico.

Jurisdiction and facility name	Location	Facility type	State
NM—Ore Buying Station at Grants	Grants	DOE	New Mexico.
NM—Ore Buying Station at Shiprock	Shiprock	DOE	New Mexico.
NM—Project Gasbuggy Nuclear Explosion Site	Farmington	DOE	New Mexico.
NM—Project Gnome Nuclear Explosion Site	Carlsbad	DOE	New Mexico.
NM—Sandia National Laboratories	Albuquerque	DOE	New Mexico.
NM—South Albuquerque Works	Albuquerque	DOE	New Mexico.
NM—Trinity Nuclear Explosion Site	White Sands Missile Range	DOE	New Mexico.
NM—Waste Isolation Pilot Plant	Carlsbad	DOE	New Mexico.
NY—Allegheny-Ludlum Steel	Watervliet	AWE	New York.
NY—American Machine and Foundry	Brooklyn	AWE	New York.
NY—Ashland Oil	Tonawanda	AWE	New York.
NY—Baker and Williams Warehouses	New York	AWE DOE	New York.
NY—Bethlehem Steel	Lackawanna	AWE	New York.
NY—Bliss & Laughlin Steel	Buffalo	AWE	New York.
NY—Brookhaven National Laboratory	Upton	DOE	New York.
NY—Burns & Roe, Inc	Maspeth	BE	New York.
NY—Carborundum Company	Niagara Falls	AWE	New York.
NY—Colonie Site (National Lead)	Colonie (Albany)	AWE DOE	New York.
NY—Crucible Steel Co	Syracuse	AWE	New York.
NY—Electro Metallurgical	Niagara Falls	DOE	New York.
NY—Environmental Measurements Laboratory	New York	DOE	New York.
NY—Fairchild Hiller Corporation	Farmingdale	BE	New York.
NY—General Astrometals	Yonkers	BE	New York.
NY—Hooker Electrochemical	Niagara Falls	AWE	New York.
NY—International Rare Metals Refinery, Inc	Mt. Kisco	AWE	New York.
NY—Ithaca Gun Co	Ithaca	AWE	New York.
NY—Lake Ontario Ordnance Works	Niagara Falls	DOE	New York.
NY—Linde Air Products	Buffalo	AWE	New York.
NY—Linde Ceramics Plant	Tonawanda	AWE DOE	New York.
NY—New York University	New York	AWE	New York.
NY—Peek Street Facility[1]	Schenectady	DOE	New York.
NY—Radium Chemical Co	New York	AWE BE	New York
NY—Rensselaer Polytechnic Institute	Troy	BE	New York.
NY—Sacandaga Facility[1]	Glenville	DOE	New York.
NY—SAM Laboratories, Columbia University	New York	DOE	New York.
NY—Seaway Industrial Park	Tonawanda	AWE	New York.
NY—Seneca Army Depot	Romulus	AWE	New York.
NY—Separations Process Research Unit (at Knolls Lab.)[1].	Schenectady	DOE	New York.
NY—Simonds Saw and Steel Co	Lockport	AWE	New York.
NY—Staten Island Warehouse	New York	AWE	New York.
NY—Sylvania Corning Nuclear Corp.—Bayside Lab	Bayside	AWE BE	New York.
NY—Sylvania Corning Nuclear Corp.—Hicksville Plant	Hicksville	AWE	New York.
NY—Titanium Alloys Manufacturing	Niagara Falls	AWE	New York.
NY—Trudeau Foundation	Saranac Lake	BE	New York.
NY—University of Rochester Atomic Energy Project	Rochester	DOE	New York.
NY—Utica St. Warehouse	Buffalo	AWE	New York.
NY—West Valley Demonstration Project	West Valley	AWE DOE	New York.
NY—Wolff-Alport Chemical Corp	Brooklyn	AWE	New York.
NC—Beryllium Metals and Chemical Corp	Bessemer City	BE	North Carolina.
NC—University of North Carolina	Chapel Hill	BE	North Carolina.
OH—Ajax Magnethermic Corp	Youngstown	AWE	Ohio.
OH—Alba Craft	Oxford	AWE DOE	Ohio.
OH—Associated Aircraft Tool and Manufacturing Co	Fairfield	AWE DOE	Ohio.
OH—B & T Metals	Columbus	AWE	Ohio.
OH—Baker Brothers	Toledo	AWE DOE	Ohio.
OH—Battelle Laboratories—King Avenue	Columbus	AWE BE DOE	Ohio.
OH—Battelle Laboratories—West Jefferson	Columbus	AWE DOE	Ohio.
OH—Beryllium Production Plant (Brush Luckey Plant)	Luckey	BE DOE	Ohio.
OH—Brush Beryllium Co. (Cleveland)	Cleveland	AWE BE	Ohio.
OH—Brush Beryllium Co. (Elmore)	Elmore	BE	Ohio.
OH—Brush Beryllium Co. (Lorain)	Lorain	BE	Ohio.
OH—Cincinnati Milling Machine Co	Cincinnati	AWE	Ohio.
OH—Clifton Products Co	Painesville	BE	Ohio.
OH—Copperweld Steel	Warren	AWE	Ohio.
OH—Du Pont-Grasselli Research Laboratory	Cleveland	AWE	Ohio.
OH—Extrusion Plant (Reactive Metals Inc.)	Ashtabula	DOE	Ohio.
OH—Feed Materials Production Center (FMPC)	Fernald	DOE	Ohio.
OH—General Electric Company (Ohio)	Cincinnati/Evendale	AWE BE DOE	Ohio.
OH—Gruen Watch	Norwood	AWE	Ohio.
OH—Harshaw Chemical Co	Cleveland	AWE	Ohio.
OH—Herring-Hall Marvin Safe Co.	Hamilton	AWE DOE	Ohio.
OH—Horizons, Inc	Cleveland	AWE	Ohio.
OH—Kettering Laboratory, University of Cincinnati	Cincinnati	BE	Ohio.

Jurisdiction and facility name	Location	Facility type	State
OH—Magnus Brass Co	Cincinnati	AWE	Ohio.
OH—McKinney Tool and Manufacturing Co	Cleveland	AWE	Ohio.
OH—Mitchell Steel Co	Cincinnati	AWE	Ohio.
OH—Monsanto Chemical Co	Dayton	AWE	Ohio.
OH—Mound Plant	Miamisburg	DOE	Ohio.
OH—Painesville Site (Diamond Magnesium Co.)	Painesville	AWE	Ohio.
OH—Piqua Organic Moderated Reactor	Piqua	DOE	Ohio.
OH—Portsmouth Gaseous Diffusion Plant	Piketon	DOE	Ohio.
OH—R. W. Leblond Machine Tool Co	Cincinnati	AWE	Ohio.
OH—Tech-Art, Inc	Milford	AWE	Ohio.
OH—Tocco Induction Heating Div	Cleveland	AWE	Ohio.
OH—Vulcan Tool Co	Dayton	AWE	Ohio.
OK—Eagle Picher	Quapaw	BE	Oklahoma.
OK—Kerr-McGee	Guthrie	AWE	Oklahoma.
OR—Albany Research Center	Albany	AWE DOE	Oregon.
OR—Wah Chang	Albany	AWE	Oregon.
PA—Aeroprojects, Inc	West Chester	AWE BE	Pennsylvania.
PA—Aliquippa Forge	Aliquippa	AWE DOE	Pennsylvania.
PA—Aluminum Co. of America (Alcoa) (Pennsylvania)	New Kensington	AWE	Pennsylvania.
PA—Beryllium Corp. of America (Hazleton)	Hazleton	BE	Pennsylvania.
PA—Beryllium Corp. of America (Reading)	Reading	BE	Pennsylvania.
PA—Birdsboro Steel & Foundry	Birdsboro	AWE	Pennsylvania.
PA—C.H. Schnorr	Springdale	AWE DOE	Pennsylvania.
PA—Carnegie Institute of Technology	Pittsburgh	AWE	Pennsylvania.
PA—Carpenter Steel Co	Reading	AWE	Pennsylvania.
PA—Chambersburg Engineering Co	Chambersburg	AWE	Pennsylvania.
PA—Foote Mineral Co	East Whiteland Twp	AWE/BE	Pennsylvania.
PA—Frankford Arsenal	Philadelphia	AWE	Pennsylvania.
PA—Heppenstall Co	Pittsburgh	AWE	Pennsylvania.
PA—Jessop Steel Co	Washington	AWE	Pennsylvania.
PA—Koppers Co., Inc	Verona	AWE	Pennsylvania.
PA—Landis Machine Tool Co	Waynesboro	AWE	Pennsylvania.
PA—McDanel Refractory Co	Beaver Falls	BE	Pennsylvania.
PA—Nuclear Materials and Equipment Corp. (NUMEC)	Apollo	AWE BE	Pennsylvania.
PA—Nuclear Materials and Equipment Corp. (NUMEC)	Parks Township	AWE BE	Pennsylvania.
PA—Penn Salt Co	Philadelphia/Wyndmoor	AWE	Pennsylvania.
PA—Philadelphia Naval Yard	Philadelphia	AWE	Pennsylvania.
PA—Shippingport Atomic Power Plant [1]	Shippingport	DOE	Pennsylvania.
PA—Superior Steel Co	Carnegie	AWE	Pennsylvania.
PA—U.S. Steel Co., National Tube Division	McKeesport	AWE	Pennsylvania.
PA—Vitro Manufacturing (Canonsburg)	Canonsburg	AWE BE	Pennsylvania.
PA—Westinghouse Atomic Power Dev. Plant	East Pittsburgh	AWE	Pennsylvania.
PA—Westinghouse Nuclear Fuels Division	Cheswick	AWE	Pennsylvania.
PR—BONUS Reactor Plant	Punta Higuera	DOE	Puerto Rico.
PR—Puerto Rico Nuclear Center	Mayaguez	DOE	Puerto Rico.
RI—C.I. Hayes, Inc	Cranston	AWE	Rhode Island.
SC—Savannah River Site	Aiken	DOE	South Carolina.
SD—Ore Buying Station at Edgemont	Edgemont	DOE	South Dakota.
TN—Clarksville Facility	Clarksville	DOE	Tennessee.
TN—Manufacturing Sciences Corp	Oak Ridge	BE	Tennessee.
TN—Oak Ridge Gaseous Diffusion Plant (K–25)	Oak Ridge	DOE	Tennessee.
TN—Oak Ridge Hospital	Oak Ridge	DOE	Tennessee.
TN—Oak Ridge Institute for Science Education	Oak Ridge	DOE	Tennessee.
TN—Oak Ridge National Laboratory (X–10)	Oak Ridge	DOE	Tennessee.
TN—S–50 Oak Ridge Thermal Diffusion Plant	Oak Ridge	DOE	Tennessee.
TN—Vitro Corporation of America (Tennessee)	Oak Ridge	AWE BE	Tennessee.
TN—W.R. Grace (Tennessee)	Erwin	AWE	Tennessee.
TN—Y–12 Plant	Oak Ridge	DOE	Tennessee.
TX—AMCOT	Ft. Worth	AWE	Texas.
TX—Mathieson Chemical Co	Pasadena	AWE	Texas.
TX—Medina Facility	San Antonio	DOE	Texas.
TX—Pantex Plant	Amarillo	DOE	Texas.
TX—Sutton, Steele and Steele Co	Dallas	AWE	Texas.
TX—Texas City Chemicals, Inc	Texas City	AWE	Texas.
UT—Ore Buying Station at Marysvale	Marysvale	DOE	Utah.
UT—Ore Buying Station at Moab	Moab	DOE	Utah.
UT—Ore Buying Station at Monticello	Monticello	DOE	Utah.
UT—Ore Buying Station at White Canyon	White Canyon	DOE	Utah.
UT—Uranium Mill in Monticello	Monticello	DOE	Utah.
VA—BWXT	Lynchburg	AWE BE	Virginia
VA—Thomas Jefferson National Accelerator Facility	Newport News	DOE	Virginia.
VA—University of Virginia	Charlottesville	AWE	Virginia.
WA—Hanford	Richland	DOE	Washington.
WA—Pacific Northwest National Laboratory	Richland	DOE	Washington.

Jurisdiction and facility name	Location	Facility type	State
WV—Huntington Pilot Plant	Huntington	DOE	West Virginia.
WI—Allis-Chalmers Co	West Allis, Milwaukee	AWE	Wisconsin.
WI—A.O. Smith	Milwaukee	BE	Wisconsin.
WI—Besley-Wells	South Beloit	AWE	Wisconsin.
WI—General Electric (X-Ray Division)	Milwaukee	AWE	Wisconsin.
WI—LaCrosse Boiling Water Reactor	LaCrosse	DOE	Wisconsin.
WI—Ladish Co	Cudahy	BE	Wisconsin.
WY—Ore Buying Station at Crooks Gap	Crooks Gap	DOE	Wyoming.
WY—Ore Buying Station at Riverton	Riverton	DOE	Wyoming.
MR—Pacific Proving Ground [2]	Marshall Islands	DOE	Marshall Islands.

[1] Consistent with the Act, coverage is limited to activities not performed under the responsibility of the Naval Nuclear Propulsion program.
[2] Pacific Proving Ground includes Bikini Atoll, Enewetak Atoll, Johnston (U.S. nuclear weapons testing activities only), and Christmas Island (U.S. nuclear weapons testing activities only).

Issued in Washington, DC, August 17, 2004.

T.A. Rollow,

Director, Office of Worker Advocacy, Office of Environment, Safety and Health.

[FR Doc. 04–19228 Filed 8–20–04; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Nevada

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Nevada Test Site. The Federal Advisory Committee Act (Pub. L. No. 92–463, 86 Stat. 770) requires that public notice of these meetings be announced in the **Federal Register**.

DATES: Wednesday, September 8, 2004, 6 p.m.–8:30 p.m.

ADDRESSES: Bob Ruud Community Center, 150 North Highway 160,Pahrump, NV.

FOR FURTHER INFORMATION CONTACT: Kay Planamento, Navarro Research and Engineering, Inc., 2721 Losee Road, North Las Vegas, Nevada 89130, phone: 702–657–9088, fax: 702–295–5300, e-mail: *NTSCAB@aol.com*.

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Advisory Board is to make recommendations to DOE in the areas of environmental restoration, waste management, and related activities.

Tentative Agenda:

- Members of the CAB's Underground Test Area Committee will provide a briefing to update stakeholders on their work related to groundwater issues at the Nevada Test Site.
- CAB members will discuss technical committee focus areas and activities completed in fiscal year 2004.

Copies of the final agenda will be available at the meeting.

Public Participation: The meeting is open to the public. Written statements may be filed with the Committee either before or after the meeting. Individuals who wish to make oral statements pertaining to agenda items should contact Kelly Kozeliski, at the telephone number listed above. Requests must be received 5 days prior to the meeting and reasonable provision will be made to include the presentation in the agenda. The Deputy Designated Federal Officer is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business. Each individual wishing to make public comment will be provided a maximum of five minutes to present their comments.

Minutes: The minutes of this meeting will be available for public review and copying at the Freedom of Information Public Reading Room, 1E–190, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585 between 9 a.m. and 4 p.m., Monday–Friday, except Federal holidays. Minutes will also be available by writing to Kay Planamento at the address listed above.

Issued at Washington, DC, on August 18, 2004.

Rachel M. Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 04–19227 Filed 8–20–04; 8:45 am]

BILLING CODE 6450–01–P

ENVIRONMENTAL PROTECTION AGENCY

[OAR–2004–0228, FRL–7801–5]

Agency Information Collection Activities: Proposed Collection; Comment Request; Reporting and Recordkeeping Activities Associated With EPA's PFC Reduction/Climate Partnership for the Semiconductor Industry, EPA ICR Number 1823.03, OMB Control Number 2060–0382

AGENCY: Environmental Protection Agency.

ACTION: Notice.

SUMMARY: In compliance with the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), this document announces that EPA is planning to submit a continuing Information Collection Request (ICR) to the Office of Management and Budget (OMB). This is a request to renew an existing approved collection. This ICR is scheduled to expire on 11/30/2004. Before submitting the ICR to OMB for review and approval, EPA is soliciting comments on specific aspects of the proposed information collection as described below.

DATES: Comments must be submitted on or before October 22, 2004.

ADDRESSES: Submit your comments, referencing docket ID number OAR–2004–0228, to EPA online using EDOCKET (our preferred method), by e-mail to a-and-r-*Docket@epa.gov*, or by mail to: EPA Docket Center, Environmental Protection Agency, Air and Radiation Docket and Information Center, MC 6102T, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: Scott Bartos, Office of Atmospheric Programs, 6202J, Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460; telephone number: 202 343–9167; fax number: 202 343–2208; e-mail address: *bartos.scott@epa.gov*.

Energy Employees Occupational Illness Compensation Program

Facility List

There was one record found for the facility: Wolff-Alport Chemical Corp .

1 - Wolff-Alport Chemical Corp

State: New York **Location:** Brooklyn
Time Period: AWE 1949-1950; Residual Radiation 1951-July 2006
Facility Type: Atomic Weapons Employer

Facility Description: Wolff-Alport Chemical Corporation was under contract with the AEC (#AT-30-1-Gen-287) for the procurement of thorium containing sludge for stockpiling by the AEC. A March 1949 document mentions, "current contract expires June 30, 1949 and will probably be extended for another year. Cost is approximately $50,000 annually." This same document shows that almost 30,000 pounds of thorium oxalate sludge was provided the AEC that year..

During the period of residual contamination, as designated by the National Institute for Occupational Safety and Health and as noted in the dates above, employees of subsequent owners and operators of this facility are also covered under the Energy Employees Occupational Illness Compensation Program Act.

This page was last updated on May 07, 2007

APPENDIX H
SAMPLING, ANALYSIS, AND MONITORING PLAN
HEALTH AND SAFETY PLAN
FOR
FORMER WOLFF-ALPORT CHEMICAL CORPORATION

SAMPLING, ANALYSIS, AND MONITORING PLAN
FORMER WOLFF-ALPORT CHEMICAL CORPORATION
1127-1129 IRVING AVENUE
QUEENS, NEW YORK

Prepared for:

City of New York Department of Design and Construction
Bureau of Environmental and Geotechnical Services
30-30 Thomson Avenue
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Figure 1 Site Location: Topographic Map
Figure 2 Site Plan
Figure 3 Preliminary Survey Unit Map

APPENDICES

Appendix A Minimum Detectable Concentrations – Survey Instruments

ACRONYMS AND ABBREVIATIONS

AGV	Alternative Guidance Values
bgs	below ground surface
cm^2	square centimeters
cpm	counts per minute
$DCGL_w$	Derived Concentration Guideline Level (average)
$DCGL_{EMC}$	Derived Concentration Guideline Level (elevated measurement comparison)
DDC	New York City Department of Design and Construction
DEC	New York State Department of Environmental Conservation
DOH	New York City Department of Health and Mental Hygiene
dpm	disintegrations per minute
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
ESI	Environmental Site Investigation
FSS	Final Status Survey
FWACC	Former Wolff-Alport Chemical Company
g	gram
hr	hour
HSA	Historical Site Assessment
HVAC	Heating Ventilation and Air Conditioning
LBGR	Lower Bound of the Grey Region
LSC	liquid scintillation counter
m^2	square meters
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MSKCC	Memorial Sloan-Kettering Cancer Center
µ	micro
m	milli
mrem	millirem
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyls
PID	Photoionization Detector
QA	Quality Assurance
QC	Quality Control
RAM	radioactive materials
ROC	Radionuclide of Concern
RSCO	Recommended Soil Cleanup Objectives
R	Roentgen
SCO	Soil Cleanup Objectives
SOR	Sum of the Ratios
STARS	Spill Technology and Remediation Series
SU	survey unit
SVOC	semi-volatile organic compound
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List

ACRONYMS AND ABBREVIATIONS (Continued)

TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
TOGS	Technical and Operational Guidance Series
VOC	Volatile Organic Compound
WP	Scoping Survey Work Plan
yr	year

1.0 INTRODUCTION

1.1 Purpose and Objective

The purpose of this Sampling, Analysis, and Monitoring Plan (SAMP) is to guide the collection and analysis of samples in order to obtain data of sufficient quality and quantity to perform a radiological assessment and a Phase II Environmental Site Investigation (ESI) at 1127, 1129, and 1133 Irving Avenue, Queens, NY (the Site). The Site is the location of the Former Wolff-Alport Chemical Company (FWACC). This SAMP will contain the quality assurance requirements to meet the intent of a Quality Assurance Program Plan (QAPP). Currently, the buildings are occupied by the Primo Auto Body Shop, LJ Iron Works, Inc., and Losquadro Ice Company.

In May 2007, the New York State Department of Environmental Conservation (DEC) and the New York City Department of Health and Mental Hygiene (DOH) tested the Site and found slightly elevated radiation levels. These radiation levels did not indicate immediate health concerns for current building occupants or people passing by. However, more testing was deemed necessary to fully understand the nature of the radiation sources and the possible need for remediation. This SAMP contains the details for this additional testing.

1.2 Site Background

In an effort to produce a city-wide ground level radiation background map, the DOH, Bureau of Environmental Science and Engineering (ESE) completed vehicle-based background radiation survey throughout the city. During a portion of the survey, gamma activity was detected above background levels on Irving Avenue between Cooper Avenue and Moffat Street on the Brooklyn/Queens border. Gamma radiation measurements peaked at approximately 1.5 milliRoentgen per hour (mR/hr) in the street in front of 1129 Irving Avenue. Local gamma radiation background is roughly 0.02 mR/hr.

Through conversations with the NYS Department of Environmental Conservation (DEC) and the EPA, DOH was informed that FWACC was based at 1127 Irving Avenue. Documents produced by the U.S. Department of Energy indicate the owners of FWACC sold large amounts of thorium oxalate to the now defunct Atomic Energy Commission (AEC).

According to federal records, FWACC operated at the Site from approximately 1920 to about 1954. In about 1940, the company began importing Monazite sand from the Belgian Congo through the rail spur located in back of the property. Monazite sand is rich in thorium and rare earth elements, and FWACC extracted these rare earth elements and sold them to various commercial entities. Initially, the thorium (and presumably other radioactive decay products) was considered a waste product and disposed into the sewer. The company was ordered to halt sewer disposal in the fall of 1947 by the AEC. In order to minimize the waste volume, FWACC began concentrating the thorium as a precipitate and then sold the sludge to the AEC.

1.3 Site Description

The Site is located at 1127 Irving Avenue in the borough of Queens, an urban, light industrial area bordering with residential areas to the north and west (Figure 1). Immediately east of the Site is warehouse building space. Immediately west is a former deli/grocery that was heavily damaged by a fire in 2007. The rail line behind the Site is heavily overgrown and contains a significant amount of illegally dumped trash. The Cemetery of the Evergreens borders the Site to the south and east on the opposite side of the rail line. Figure 2 shows an aerial view of the triangular-shaped property, bordered by Irving Avenue, Cooper Avenue, and the abandoned rail spur/empty lot behind the buildings.

1.4 Former Land/Building Use

FWACC terminated operations at the Site in approximately 1954. Land use records after 1954 are limited. In 1988, the Site was occupied by Lynda Knitwear. In late 2000, the Site was used by the current rental occupants, Primo Auto Body.

1.5 Current Land/Building Use

The building which housed the FWACC operations appears to have been subdivided (access ways between the portions were sealed) at a later date. Most of the areas investigated during this field effort are used for storage or materials with limited/short term entry by individuals. The one exception is in the working area of Primo Auto Body, (1127A Irving Avenue) where individuals spend their entire working day in the building while completing various auto repairs and body work.

2.0 GENERAL APPROACH TO PROPERTY INVESTIGATION

This SAMP outlines proposed activities to perform a Scoping Survey (for radiological contaminants) and a Phase II ESI (for potential non-radiological contaminants). The approach to the Scoping Survey was designed in accordance with the guidance found in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The MARSSIM provides standardized and consistent approaches for planning, conducting, evaluating, and documenting environmental radiological surveys, with a specific focus on the final status surveys that are carried out to demonstrate compliance with cleanup regulations. The Scoping Survey efforts described herein are the first steps in the MARSSIM process. There are few records relating to specific locations of radioactive material use and storage on-site; therefore, the goal of the Scoping Survey is to more accurately determine the locations of residual radioactivity.

The objective of the Phase II ESI is to assess the potential presence of subsurface contamination resulting from former Site operations. The Phase II ESI sampling will be performed concurrently with the radiological assessment activities that are proposed for the Site, but will focus on non-radioactive contaminants that may be present in the underlying soil and groundwater. The Phase II ESI activities will be performed in accordance with the *Draft DER 10 Technical Guidance for Site Investigation and Remediation* (DEC, 2002).

2.1 Radionuclides of Concern

The Radionuclides of Concern (ROC) for this Scoping Survey were determined from the data provided by the DOH, and radionuclides consist of thorium-232 and its decay products. The Radionuclides of Concern are listed in Table 1.

The list of radionuclides indicates that instrumentation must be able to detect low energy to high energy beta and gamma radiation. Instrumentation will also detect alpha radiation, which may be present in naturally occurring materials and in short lived radioisotopes.

Table 1 - Radionuclides of Concern

Nuclide	Name	Half-Life	Principal Emissions	Comments	Source of Radionuclide
Th-232	Thorium-232	1.4 E+10 yr	Alpha: 4 MeV		Monazite Sand
Ra-228	Radium-228	5.8 yr	Beta: 0.06 MeV		Decay product of Th-232
Ac-228	Actinium-228	6.1 hr	Beta: 1.2 – 2.1 MeV, Gamma: 0.2 – 1.6 MeV	Gamma energies used to determine presence of Th-232	Decay product of Th-232
Th-228	Thorium-228	1.9 yr	Alpha: 5.4 MeV, Gamma: low abundance		Decay product of Th-232
Ra-224	Radium-224	3.6 days	Alpha: 5.5 MeV, Gamma: low abundance		Decay product of Th-232
Rn-220	Radon-220	55 seconds	Alpha: 6.3 MeV, Gamma: low abundance	Rn-220 is a gas	Decay product of Th-232
Po-216	Polonium-216	0.15 second	Alpha: 6.8 MeV, Gamma: low abundance		Decay product of Th-232
Pb-212	Lead-212	10.6 hr	Beta: 0.16 – 0.57 MeV, Gamma: 0.01 – 0.3 MeV		Decay product of Th-232
Bi-212	Bismuth-212	60 min	Alpha: 6.1 Mev, Beta: 1.6 – 2.2 MeV, Gamma: 0.04 – 1.6 MeV	36% alpha decay to Tl-208, and 64% beta decay to Po-212	Decay product of Th-232
Po-212	Polonium-212	< 1 second	Alpha: 8.8 MeV		Decay product of Th-232
Tl-208	Thallium-208	3 min	Beta: 1.3 – 1.8 MeV, Gamma: 0.5 – 2.6 MeV	Gamma energies used to determine presence of Th-232	Decay product of Th-232
Pb-208	Lead-208	stable	None	Shown for completeness of the decay chain – not radioactive.	Decay product of Th-232

2.2 Potential Non-Radiological Contaminants

It is understood that former site operations included the extraction of rare earth elements and radioactive materials from Monazite sand. However, FWACC may have utilized other potential contaminants on-site. The purpose of the Phase II ESI sampling is to assess whether contamination resulting from former Site operations may be present in the underlying soil and groundwater. Specific potential contaminants are unknown at this time; therefore, the proposed soil and groundwater samples (see Section 5.5) will be analyzed for target compound list (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs, and target analyte list (TAL) metals (i.e., full TCL/TAL analysis).

3.0 DATA QUALITY OBJECTIVES

3.1 Step 1: State the Problem

3.1.1 Problem Description

The Site has a history of radioactive material use over the time frame of approximately 1940 to 1954. Monazite sand was used to extract certain rare earth elements, and the thorium-containing sand was shipped to the Site, treated on-premises, and disposed of in the sewer and possibly by burial on-site. Higher concentrations of thorium may be present, since FWACC is reported to have concentrated the thorium as a precipitate from approximately 1947 to 1954. This concentrated thorium was then sold to the Atomic Energy Commission; however, some residual may be present on-site.

The purpose of this SAMP is to guide the collection and analysis of samples in order to obtain data of sufficient quality and quantity to perform a radiological assessment and a Phase II ESI at the Site. For the radiological Scoping Survey, data collection and evaluation will be performed using guidance found in the MARSSIM, and will include:

- Interior and exterior scan surveys for gamma radiation;
- Interior fixed point measurements for gamma and selected locations for alpha;
- Interior alpha contamination survey (smears) at selected locations;
- Surface soil samples;
- Subsurface soil samples, internal and external to buildings;
- Subsurface surveys (downhole gamma);
- Radon/thoron surveys inside buildings.

Soil and groundwater sampling will be performed in support of the Phase II ESI in accordance with the *Draft DER 10 Technical Guidance for Site Investigation and Remediation* (DEC, 2002), and will include the following:

- Screening of soils recovered from select borings to be installed during the radiological assessment;
- Collection of up to 10 soil samples for laboratory analysis
- Collection of one groundwater sample for laboratory analysis

3.1.2 Planning Team Members

Scoping survey planning is being performed by Louis Berger Associates (LBA), with technical assistance from certified health physicists Dennis Quinn and Ted Rahon.

3.1.3 Primary Decision Maker

This phase is for data gathering, and the final determination of the need for remediation will be made at a later time.

3.1.4 Available Resources

Subcontractors will include DAQ, Inc. of Hopewell, NY and CoPhysics Corporation of Orange Co., NY for radiological planning and surveys. Zebra Environmental is the planned subcontractor for geoprobe operations. CoPhysics Corp. will perform radiological analyses. CoPhysics maintains a radiological laboratory in Orange County, NY, and has a broad scope Radioactive Materials License (NYS 2691-3949) that authorizes laboratory analysis of radioactivity, instrument calibration, and handling of any type of radioactive materials in any quantity at remote sites for the purposes of assessment and decommissioning. The laboratory had successfully participated in the USDOE radiological laboratory intercomparison study when it existed prior to 2003 and now successfully participates in the IAEA radiological laboratory intercomparison study. The laboratory manager is certified by the American Board of Health Physics. The facility is 65 miles from the Site and contains the radioanalytical laboratory, an instrument calibration and repair shop, and supply warehouse to support field operations.

The Phase II ESI soil and groundwater samples will be analyzed by Accutest Laboratories of Dayton, NJ (NY Certification # 10983).

3.2 Step 2: Identify the Decision

3.2.1 Principal Study Questions

1. Do Th-232 concentrations at the Site exceed background levels by more than the preliminary Derived Concentration Guideline Levels (DCGL) for building surfaces, soil concentrations, and exposure rates, and if so, what is the nature and extent of the contamination?

2. Are gamma radiation levels at levels that necessitate short-term actions to protect the public?
3. Are other non-radiological contaminants of concern present at the site?

4. Recommend remedial options based on survey and sample results.

3.2.2 Decision Statements

- Determine whether surveyed buildings, land areas, and below ground soil concentrations exceed background Th-232 concentrations or exposure rates by more than the applicable DCGLs.

- Building surfaces found to exceed chosen DCGLs shall be classified as MARSSIM Class 1 or Class 2 for the Final Status Survey phase of the decommissioning project. If surveys indicate that exposure rates or Th-232 concentrations exceed background by more than the applicable limits, then affected areas may require decontamination. Note that further investigations and calculations, beyond this Scoping Survey, could alter this preliminary decision.
- Building surfaces found to be below chosen DCGLs shall be classified as MARSSIM Class 3 or as non-impacted.
- Other non-radiological contaminants will be compared to the applicable criteria (See Section 4.3) to determine whether additional investigation may be required.

3.3 Step 3: Identify Inputs to the Decision

3.3.1 Information Inputs

The following site characteristics must be determined in order to resolve applicable decision statements:

a) Concentrations of residual radioactive material in survey areas:

This information will be used to determine if an area is impacted. Obtaining this data will facilitate cost effective decision-making regarding the project's direction and duration.

b) Gamma exposure rates:

This information will be used to evaluate compliance with DOH exposure rate regulations (see Table 2 for details).

c) Concentrations of non-radiological contaminants:

If exceedances of the applicable criteria (see Section 4.3) are identified, additional investigation may be warranted.

3.3.2 Information Sources

a) Site historical information as provided by DOH and as discovered during additional reviews.

b) Interior and exterior scan surveys for gamma radiation, measurements for alpha radiation and contamination, surface and subsurface soil samples, groundwater samples, results of downhole gamma surveys, and results of radon/thoron surveys, and confirmatory laboratory analyses will provide sufficient information to enable determination of impacted areas requiring characterization.

c) Exposure rate measurements will provide sufficient information to enable direct comparison with DOH regulations.

d) Applicable regulatory standards or guidance documents as provided in Section 4.1.

3.4 Step 4: Define the Study Boundaries

3.4.1 Data Population

The data population of interest includes the gamma radiation measurements inside and outside the buildings at the Site, the concentrations of Th-232 in surface and subsurface soil samples, the concentrations of potential non-radiological contaminants in soil and groundwater, the gamma measurements in downhole gamma surveys, the alpha contamination levels on surfaces in the buildings, and the radon-222 (radon) and radon 220 (thoron) concentrations inside buildings. This population will be further subdivided into survey areas.

3.4.2 Spatial and Temporal Boundaries

Spatial boundaries for this investigation are limited to 1127 through 1133 Irving Avenue, with the extent of the boundary as follows:

Horizontal:

- To the southwest: Irving Avenue from the intersection of Cooper Avenue past Moffat Street to the fence for the rail line. Boundaries are the far curbs of the respective streets.
- To the northwest: Cooper Avenue (far curb of street) to a location even with the building behind (east of) the Site.
- To the east: up to (but not including) the west wall of the building behind (east of) the Site.

Vertical:

- In buildings, 6 feet above floor level
- Subsurface down to 20 feet below floor or ground level

If surveys at the horizontal or vertical boundaries described above indicate that there is contamination above the DCGLs (or other applicable criteria, for non-radiological contaminants) at or near the boundary, then these boundaries will be extended to determine the full extent of the contamination.

In addition, the sewer lines extending from the Site will be gamma logged by snaking a water-protected gamma detector through the pipes. The linear extent of the readings will be to background or to the limit of the technical capabilities of the measuring system (e.g., obstruction refusal, sharp turns, cable length, etc.)

Temporal:

Data collection and analyses should be performed in a time frame to support future remediation

decisions. The current schedule shows the completion of the Scoping Survey and report within 6 months after commencement of on-site work.

3.4.3 Constraints on Data Collection

Constraints on data collection during execution of the Scoping Survey include the continued occupancy and use of some of the buildings for business purposes. Surveys in the streets will require traffic control. Below ground surveys will be limited to locations free of utilities and other major obstructions.

Constraints on data surveys in the yard area also exist (overgrown weeds, trees); the land will be cleared prior to survey performance.

3.5 Step 5: State the Decision Rules

Applicable radiological measurements taken for this Scoping Survey will be consistent with the requirements of the DOH requirements for termination of licenses, NYC Health Code §175.101(h) (4) (v):

a. *Beta-gamma surveys at one centimeter and gamma surveys at one meter, in units of mrad/hr.*

b. *Removable and fixed contamination on surfaces, including alpha, in units of disintegrations per minute (dpm) per 100 cm^2.*

c. *Water samples, if any, in units of uCi/ml.*

d. *Solid samples, such as soil or concrete, in units of pCi/ml or pCi/g.*

3.5.1 Exposure Rate Measurements

Exposure rate surveys will be evaluated against two criteria:

1. 0.2 mR/hr above background - NYC Health Code §175.03, Appendix D. If the scan indicates less than 0.2 mR/hr above background, then short-term action is not needed for personnel protection.
2. 0.0125 mR/hr above background – 25 mrem/yr based on 8 hr per day x 250 days. This value is used to note the locations for the gamma radiation profile that will be used in the survey report. That is, instrumentation must sensitive enough to determine 0.0125 mR/hr above background or lower.

3.5.2 Removable Contamination Measurements

Removable contamination will be surveyed using smears and evaluated against the criteria of Table 2. Removable contamination surveys will be required for selected locations for alpha.

3.5.3 Soil Contamination Criteria

Soil samples will be evaluated by gamma spectroscopy against the criteria in Table 3 (5 pCi/g total thorium above background). In addition, the analytical results of the soil samples collected for potential non-radiological contaminants (full TCL/TAL) will be evaluated with regard to the applicable criteria (see Section 4.3).

3.6 Step 6: Define Acceptable Decision Errors

Constraints on decision error are not needed, because a statistical sampling plan is not required at the Scoping Survey phase of the project. The numbers of samples selected would likely be acceptable for a final status survey; however, no statistical evaluation is performed at this phase. Areas surveyed will be deemed impacted or non-impacted based on historical information, Scoping Survey results, and professional judgment.

3.7 Step 7: Optimize the Design

The variability of data will have an effect on the sampling design. If necessary, the sample frequency and the analytical procedures will undergo changes to optimize the design. Changes will occur concurrently for several steps with the DQO process. The design options, such as sample collection design, sample size, and analytical procedures will be evaluated based on cost and the ability to meet the DQOs. The proposed number of measurements and samples are provided in Table 7 and Table 8.

4.0 APPLICABLE REGULATORY CRITERIA

The primary purpose of both the Scoping Survey and the Phase II ESI is to gather information on the levels of contaminants at the Site. In addition, there may be sufficient information to make preliminary recommendations relating to the acceptability of the Site for current and/or future use. Those decisions on acceptability will be based on the regulatory criteria listed in this section. Measurements and analyses must be made at the necessary sensitivity to ensure compliance with regulatory criteria.

4.1 Decommissioning Regulatory Criteria (Radiological Contaminants)

There are several applicable references associated with acceptable levels of residual contamination, commonly termed "Release Limits" or "Release Criteria." Those that will be considered during decommissioning efforts at the Site (i.e., remedial actions or removal activities) are provided in the sections to follow.

4.1.1 NYCDOH

The City of New York regulates the use of radioactive materials through Article 175 of the NYC Health Code, "Radiation Control." Section 3 of Article 175, *Standards for the Protection Against Radiation* (§175.03) presents operational requirements and levels, as well as criteria for license termination and decommissioning activities. In addition, this Scoping Survey will be performed to be consistent with the requirements of NYC Health Code Article 175.101(h), which addresses "Expiration, renewal, and termination of licenses." NYCDOH generally follows U.S. Nuclear Regulatory Commission (NRC) decommissioning guidance provided in NUREG-1757, Vol. 1, *Consolidated NMSS Decommissioning Guidance* (NRC 2002). Radioactive surface contamination limits are provided in Appendix D of §175.03 and summarized in Table 2.

4.1.2 USNRC License Termination Criteria

The NRC requires licensees to meet a dose limit of 25 mrem per year to a member of the public to achieve release for unrestricted use. This is stated in Paragraph 1402 of Title 10, Part 20 of the Code of Federal Regulations (10CFR20), "Radiological Criteria for Unrestricted Use." Although the USNRC does not have jurisdiction at the Site, the 25-mrem dose criterion is likely to be implemented during decommissioning (remedial actions, removal actions, and closure/post-closure) since it is more stringent than the corresponding NYCDOH criteria, thus assuring that the end state of the Site complies with an As Low As Reasonably Achievable (ALARA) condition.

4.2 Residual Radioactivity Limits (DCGLs)

The EPA has utilized the Uranium Mill Tailings Control Act to specify cleanup guidelines for its Superfund sites such as the Welsbach/GGM site in Camden, NJ and the US Radium site in Orange, NJ. Typically, a 5 pCi/g DCGL is applied separately to total thorium (Th-232 + Th-230) and to total radium (Ra-228 + Ra-226). Because gamma spectroscopy will be used for soil analysis during this project, the radium-226 concentration via Bi-214 will be used as an estimate

of the Th-230 concentration and the Ac-228 concentration will be used as an estimate of the Th-232 concentration.

This 5 pCi/g guideline will be applied during this survey to surface and subsurface soil samples.

Table 2 - Radioactive Material Contamination Limits

	Alpha		Beta/Gamma	
Agency / Reference	**Total (dpm/100cm^2)**	**Removable (dpm/100cm^2)**	**Total (dpm/100cm^2)**	**Removable (dpm/100cm^2)**
NYCDOH §175.03 - Release of Materials or Facilities	2,500 (Max) 500 (Avg)[1]	100	0.2 mR/hr[2]	1,000
USNRC 10 CFR 20.1402 – dose after decommissioning < 25 mrem/yr	N/A	N/A	Gamma < 25 mrem/yr = <0.0125 mR/hr	N/A
UMTRCA (EPA)	Not listed	Not Listed	Thorium: 5 pCi/g	Not Listed

Notes: 1. Averaged over 1 m^2
2. Measured at 1 cm from the surface

Based on applicable regulatory criteria presented in Table 2, DCGL values for the Scoping Survey were chosen to be the lowest published applicable regulatory values. The choices of DCGL values for the Site Scoping Survey are provided in Table 3 - .

Table 3 - Chosen DCGL Values for Former Wolff-Alport Chemical Company

	Alpha		Beta-Gamma	
	Total (dpm/100cm^2)	**Removable (dpm/100cm^2)**	**Total (dpm/100cm^2)**	**Removable (dpm/100cm^2)**
Chosen DCGL	***500 (Avg)***	***100***	***0.0125 mR/hr gamma***	***1,000***
Soil DCGL (thorium)	***5 pCi/g***	***N/A***	***N/A***	***N/A***

The DCGL for volumetric samples (soil) will be 5 pCi/g total thorium (above background), total thorium being estimated by summing the Ac-228 + Bi-214 concentrations as determined by gamma spectroscopy.

4.3 Regulatory Criteria for Non-Radiological Contaminants

In order to evaluate the subsurface soil and groundwater, laboratory analytical results and field measurements will be compared with the following DEC regulatory standards:

- *Spill Technology and Remediation Series (STARS) Memo #1 establishes statewide criteria for re-use of petroleum-contaminated soil, provides guidance for specific petroleum-related Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs), odors and other nuisance factors and provides Toxicity Characteristic Leaching Procedure (TCLP) Alternative Guidance Values (AGVs) for waste characterization purposes (1992);*

- *Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs), as per 6 NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives, represent the concentration of a contaminant in soil which, when achieved at a site will require no use restrictions on Section A for the protection of public health, groundwater and ecological resources due to the presence of contaminants in soil (2006);*

- *Technical and Administrative Guidance Memorandum #4046 (TAGM) Recommended Soil Cleanup Objectives (RSCOs) provide guidance for remedial actions at DEC Inactive Hazardous Waste and Spill sites, based on health-related concerns and available clean-up technologies (1994);*

- *Class GA Groundwater Standards and Guidance Values as per DEC Technical and Operational Guidance Series 1.1.1 (TOGS) (June 1998); and*

5.0 SURVEY DESIGN AND RATIONALE

5.1 Determine Impacted or Non-Impacted.

Areas that have no reasonable potential for residual contamination are classified as non-impacted areas. They have no radiological impact from site operations and typically are identified early in decommissioning. Areas with reasonable potential for residual contamination are classified as impacted areas.

There is limited information available relating to the storage and use locations for monazite sand and processed materials. The results of the gamma survey performed by the DOH and the Bureau of Environmental Science and Engineering indicate several areas of residual contamination. Because of the limited knowledge of the operations on-site, there are no areas excluded from the Scoping Survey, and the entire Site is considered potentially impacted. This Scoping Survey will provide a more detailed understanding of residual radioactivity on-site, and it is possible that several areas may be considered non-impacted for future evaluations and for remediation purposes.

The Phase II ESI will be performed concurrently with the radiological assessment activities that are proposed for the Site, but will focus on non-radioactive contaminants that may be present in the underlying soil and groundwater. Based on a review of historical Sanborn maps and other background information, 10 of the 30 proposed radiological locations will be selected for environmental screening and soil sampling in support of the Phase II ESI.

5.2 Survey Unit Breakdown

A *survey unit* is a physical area consisting of structure or land area of specified size and shape for which a separate decision will be made on whether or not the release criteria are exceeded there.

Impacted areas are further divided into three classifications:

- **Class 1 Areas**: These are areas that have, or had before remediation, a potential for radioactive contamination (based on the Site's operating history) or known contamination (based on previous radiation surveys) above the DCGL. Examples of Class 1 areas include site areas previously remediated, locations where leaks or spills are known to have occurred, former burial or disposal sites, waste storage sites, and areas with contaminants in discrete solid pieces of material and high specific activity.

- **Class 2 Areas**: These are areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL.

- **Class 3 Areas**: These are any impacted areas that are not expected to contain any residual radioactivity or are expected to contain levels of residual radioactivity at a small fraction of the DCGL based on site operating history and previous radiation surveys.

Table 4 (extracted from *MARSSIM*, chapter 4) shows the suggested areas for survey units.

Table 4 - Suggested areas for MARSSIM survey units.

Classification	*Suggested Area*
Class 1	
Structures	Up to 100 m^2 floor area
Land areas	Up to 2000 m^2
Class 2	
Structures	100 to 1000 m^2 floor area
Land areas	2000 to 10,000 m^2
Class 3	
Structures	No limit
Land areas	No limit

Based on the limited site history and survey information, the building areas closest to Cooper Avenue are considered Class 1, and the warehouse area closest to Moffat Street is considered to be a Class 2 area. The land area near the rail spur is considered to be a Class 1 area.

The Site was split up into survey units based on physical building construction and outside areas. The preliminary breakdown of the survey units is shown on Figure 3.

5.3 Survey Unit Naming Convention

The inside survey units are named A-1 through A-6. The outside survey units are named B-1, B-2, and B-3. Sewers are considered one survey unit (C-1). The preliminary survey units are shown on Figure 3, and the approximate surface areas associated with each unit are shown on Table 5. It is noted that the sewer locations are to be determined during the survey, and are therefore not shown on Figure 3.

Table 5 – List of Survey Units and Approximate Surface Areas

Survey Unit	Description	Survey Unit Class (prelim)	Approx. area (ft^2)	Approx. area (m^2)
A-1	Former Deli, 1125 Irving Ave.	1	3,000	279
A-2	Primo Storage Area, 1127 Irving Ave.	1	4,200	390
A-3	Primo Body Shop, 1127A Inving Ave.	1	5,100	474
A-4	LJ Ironworks, 1129 Irving Ave.	1	2,325	216
A-5	Losquadro Large West, 1129A Irving Ave.	1	4,900	455
A-6	Losquadro Large East, 1129B Irving Ave.	2	7,200	669
	Losquadro, 1133 Irving Ave.	2	1,600	149
	Total		**28,325**	**2,633**
Survey Unit	**Description of Outside Areas**		**Approx. area (ft^2)**	**Approx. area (m^2)**
B-1	Sidewalk & road along Cooper Ave.	1	6,500	604
	Parking area behind 1125/1127 Irving Ave.	1	3,375	314
	Parking next to rail spur by Cooper Ave.	1	2,000	186
B-2	Rail spur behind bldgs	1	15,500	1,441
B-3	Sidewalk & road along Irving Ave.	1	8,000	744
	Total		**35,375**	**3,288**
C-1	1 survey unit for all sewers	1		

5.4 Scope and Rationale for Radiological Surveys

The Site will be occupied during execution of the radiological surveys. As such, the surveys must take into account personnel, equipment, and materials in storage in survey areas. For outside areas, there are considerations for access to sidewalks, parking areas and active roadways.

As a Scoping Survey, this survey is intended to develop a clear picture of the extent of the residual contamination in order to develop the plan for remediation. This survey will be performed in stages in order to optimize the number of samples and surveyor time. For example, if a subsurface area is identified as contaminated, an estimated concentration will be determined based on exposure rate, sample analysis and/or downhole gamma surveys at a sufficient level of detail to determine the need for remediation and to support any dose evaluations for personnel working in affected facilities.

The first portion of this Scoping Survey will be to undertake radon-222 and radon-220 sampling to determine the potential exposure to personnel in the facilities on the Site. Then, the survey team will obtain a detailed gamma survey and create indoor and outdoor radiation contour maps.

The gamma survey is relatively non-intrusive and will assist in determining the best locations for surface and subsurface samples. Alpha radiation and contamination surveys will be taken at limited locations during this portion of the survey. If alpha contamination is determined to be above DOH limits based on this limited survey, then a full alpha survey will be implemented.

The second portion of this Scoping Survey will be to obtain surface samples and to determine the extent of subsurface contamination by a combination of samples and downhole gamma measurements. Survey Unit C-1 is the sewer system, and surveys will consist of gamma readings and sludge samples in accessible sewer piping to determine the extent and type of contamination.

This design philosophy will be executed in the field using the recommendations and parameters summarized in Table 6. All survey data will be recorded on designated survey area worksheets, in logbooks or via direct meter to computer interface.

5.5 Scope and Rationale for Phase II ESI

The objective of the Phase II ESI is to determine if there is subsurface contamination resulting from former Site operations. The Phase II ESI will be performed concurrently with the radiological survey activities that are proposed for the Site, but will focus on non-radioactive contaminants that may be present in the underlying soil and groundwater. The following sections provide descriptions of the Phase II ESI soil and groundwater sampling activities. The proposed samples are also included in Tables 6 and 7.

5.5.1 Soil Sampling and Analysis

Based on a review of historical Sanborn maps and other background information and following the initial radiological survey, 10 of the proposed 30 radiological locations will be selected for environmental screening and soil sampling. Locations will be biased to discharge points, staging areas and any other areas of potential environmental concern.

At the 10 proposed locations, soil cores will be recovered in acetate sleeves using a direct push drill rig to a depth of 10 feet bgs, the encountered water table, or top of bedrock, whichever is encountered first. Soil will be classified by a geologist using the Burmister system of soil classification. Up to 10 soil samples will be collected by a Berger geologist based on in-situ field observations and screening with a Photoionization detector equipped with a 10.2 electron-volt lamp (PID).

To obtain the most representative PID reading, the geologist will use a decontaminated stainless steel spoon or knife to make a longitudinal score deep enough to expose a porous surface the length of the core, or, make very small divots at six-inch intervals to expose a porous surface. Simultaneously, the geologist will place the probe of the PID immediately above the fresh soil surface being careful not to touch the sample, and move the probe slowly above the lateral scoring and record any peaks in the field book.

All soil samples will be analyzed for target compound list (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs, and target analyte list (TAL) metals (i.e., full TCL/TAL analysis). In addition, one (1) laboratory-blind QA/QC duplicate sample will be collected. All sample containers will be supplied by the laboratory and all samples will be sent to the laboratory with proper preservation and in accordance with chain-of-custody procedures.

A soil sample will be collected from the 2-foot interval exhibiting the highest PID and/or signs of contamination, including odor/staining, or from the interval bridging the water table. If no PID readings are detected and there are no obvious signs of contamination, the VOC component of the sample will be collected from the bottom of the boring (8-10 feet bgs) while the remaining sample is collected from the surface interval (0-2 feet bgs).

The soil component for VOC analysis shall be collected first to minimize volatilization and biodegradation. Once the VOC soil sampling is complete the remaining soil to be analyzed for non-VOC parameters such as SVOCs, pesticides, PCBs, metals or cyanide shall be homogenization over the 2-ft sample interval to create a representative sample.

Homogenization of the soil shall take place with a decontaminated stainless steel spoon and bowl. The mixing technique will depend on the physical characteristics of the soil including moisture content, particle size and distribution however; the goal is to achieve a consistent physical appearance over the entire soil sample. Prior to homogenization, twigs, roots, leaves, rocks and miscellaneous debris (glass, bricks, etc.) shall be removed from the sample using the decontaminated stainless steel spoon or spatula. Homogenization of the soil will include a series of mixing and quartering steps. The soil should be quartered (divided into 4) and moved to the sides of the bowl/tray/hole. Each quarter will then be mixed individually, and then rolled to the center of the bowl/tray/hole and mixed with the entire sample again. These steps of quartering the soil, mixing individually and then mixing the entire sample again should be repeated at least twice. Once a consistent physical appearance over the homogenized soil has been obtained, the soil should be transferred into the appropriate sample container using the decontaminated stainless steel spoon or spatula. Disposable gloves will be worn and changed between each location.

5.5.2 Groundwater Sampling and Analysis

In an effort to characterize the Site's groundwater quality, one (1) groundwater sample will be collected from a deep exploratory boring to an anticipated maximum depth of 50 feet bgs. Initially, a deep boring will be advanced using direct push technologies while removing soil cores. Soil will be classified by a geologist using the Burmister system of soil classification and screened using a PID as described above. If the water table is encountered, the driller will deploy the SP15 discrete groundwater sampler into the soil.

If the geologist feels a representative groundwater sample immediately below the water table cannot be obtained from the initial deep borehole, the hole will backfilled and a second deep borehole will be drilled using a bull-point to reach the depth above the water table, at which

point the driller will deploy the SP15 discrete groundwater sampler.

The groundwater sample will be collected manually via an inertial pump using Teflon® lined PVC tubing and a check-ball valve at the tip inserted down the sampler rods. The VOC portion of the sample will be collected either by a weighted bottom filling Teflon® lined small diameter bailer, or by removing the tubing from the drill rods while keeping a thumb over the top end of tubing then transferring the groundwater into the appropriate laboratory supplied VOC vials. All other sample parameters can be collected by manually purging the tubing with the check-ball valve.

The one (1) groundwater sample will be submitted for full TCL+30 and TAL metals analysis. In addition, a second sample will be submitted to the laboratory for laboratory filtration and analyzed for TAL metals analysis. For QA/QC, one trip blank sample will be sent with the groundwater sample for VOCs analysis.

Table 6 – Indoor Survey Units – List of Required Surveys and Samples

Survey and Sample Type	Survey Unit A-1	Survey Unit A-2	Survey Unit A-3	Survey Unit A-4	Survey Unit A-5	Survey Unit A-6	Notes
100% scan with NaI Detector	x	x	x	x	x	x	Surface scan of accessible areas. Inaccessible areas may be present due to equipment, material, and vehicle storage. If there is indication of contamination in inaccessible areas (elevated readings near boundaries of those areas), then make attempts to have the areas made accessible.
Fixed point measurement with NaI Detector (estimated no. of pts listed)	120	168	204	93	196	352	5' x 5' grid using NaI detector. Use fixed count of at a minimum of 10 seconds at near contact with floor surface and at 1 meter.
Alpha fixed point measurements (estimated number)	6	8	10	5	10	17	Use Ludlum 43-89 dual phosphor scintillator or equivalent, with a minimum of 30 seconds at near contact distance. Areas selected for alpha should be a combination of random locations and biased locations (areas of high gamma radiation level, and areas such as ledges, shelves, light fixtures)
Alpha smears (estimated number)	6	8	10	5	10	17	Use Ludlum 43-10-1 alpha-beta smear counter, with a minimum of a one minute count. Areas selected for alpha should be a combination of random locations and biased locations (areas of high gamma radiation level, and areas such as ledges, shelves, light fixtures)
Sub-surface Soil Samples - based on gamma survey results	2	2	4	2	2	0	Based on gamma survey results, drill an estimated 30 boreholes (actual amount to be determined based on survey results). Hole to be 20 feet or to refusal. For each hole, remove cores and place on the surface. For the entire borehole, perform downhole gamma logging over the entire length. Obtain one sample at the location of the highest downhole gamma reading. Send samples to the offsite laboratory, analyze samples via for gamma spectroscopy, with specific results required for Th-232. Obtain a contact and 1-meter gamma scintillation reading at these locations. Utilize approved procedures (attachments to this SAMP) for collection, sample handling, and maintaining custody control of samples. This table estimates 12 samples in inside areas and there are 18 locations estimated to be located outside of buildings.
Field duplicate of soil samples for 1/20 survey points.	N/A	N/A	N/A	N/A	N/A	N/A	For one sample during sub-surface sampling inside buildings, collect twice the volume for one sample, mix, split, then send as a duplicate to the laboratory. Analyze the same as for other samples.
Field blank for 1/20 samples.	N/A	N/A	N/A	N/A	N/A	N/A	One field blank during sub-surface sampling inside buildings, taken of soil from area known not to contain significant quantities of Th-232 - send to laboratory for analysis.
Phase II ESI Soil Samples	0	2	2	2	0	0	10 of the 30 total proposed radiological boreholes will be selected for environmental screening and soil sampling (6 indoors, 4 outdoors, locations TBD in field). Soil samples will be analyzed for TCL/TAL. One (1) laboratory-blind QA/QC duplicate sample will also be collected. From each boring, a soil sample will be collected from the 2-foot interval exhibiting the most evidence of contamination (PID readings, etc.), or from the interval bridging the water table (if encountered). If no obvious signs of contamination, collect VOC portion from the bottom of the boring and remaining portion from surface interval (0-2 feet bgs).
Embedded Pipe Measurements	**Survey Unit C-1**						Interior pipe contamination and surrounding soil contamination will be estimated by snaking a gamma logging detector into the sewer pipe to a distance of 20 feet or to refusal. At least 1 sludge sample will be collected. If significantly elevated count rates are found well into the pipe, additional cabling or use of a gamma spectrometer will be used to investigate the source of the readings.

Table 7 – Outdoor Survey Units – List of Required Surveys and Samples

Survey and Sample Type	Survey Unit B-1	Survey Unit B-2	Survey Unit B-3	Survey Unit C-1	Notes
100% scan with NaI Detector	x	x	x	N/A	Surface scan at near ground elevation for accessible areas. Inaccessible areas may be present due to equipment, material, and vehicle storage. If there is indication of contamination in inaccessible areas (elevated readings near boundaries of those areas), then make attempts to have the areas made accessible.
Fixed point measurement with NaI Detector	N/A	N/A	N/A	N/A	The method of survey outside will use a continuous recording of readings to a data logger with coordination to GPS coordinates. The radiation contour will be at least as sensitive as a 10' x 10' radiation contour.
Surface Soil Samples (0-6 inches)- Background Measurements	N/A	N/A	N/A	N/A	Obtain 5 surface samples in unimpacted areas. Unimpacted areas on the Site may be determined by selecting areas with gamma radiation indistinguishable from background. Obtain samples from the first 6 inches, and send for analysis of Th-232 and progeny using gamma spectoscopy. Obtain a contact and 1-meter gamma scintillation reading at these locations. Utilize approved procedures for collection, sample handling, and maintaining custody control of samples.
Surface Soil Samples (0-6 inches) (no. of samples)	2	16	2	N/A	Obtain surface samples in areas without concrete or blacktop covering. If practical, obtain 2 samples each from survey units B-1 and B-3. Obtain samples from the first 6 inches, and send for analysis of Th-232 and progeny using gamma spectoscopy. Obtain a contact and 1-meter gamma scintillation reading at these locations. Utilize approved procedures for collection, sample handling, and maintaining custody control of samples.
Field duplicate of soil samples for 1/20 survey points.	N/A	1	N/A	N/A	Collect twice the volume for one sample, mix, split, then send as a duplicate to the laboratory. Analyze the same as for other samples.
Laboratory Quality Control	N/A	N/A	N/A	N/A	Review the laboratory's Quality Control procedures and ensure that the laboratory performs at least one matrix spike test during analysis of the soil samples.
Sub-surface Soil Samples - background measurements	N/A	N/A	N/A	N/A	Determine 3 areas that are unimpacted. Unimpacted areas on the Site may be determined by selecting areas with gamma radiation indistinguishable from background and at a distance of at least 100 feet from known radioactive material use. Obtain samples from 0-2 feet, 8-10 feet, and at the location of the highest downhole gamma reading. Analyze sample for gamma spectroscopy, with specific results required for Th-232. Obtain a contact and 1-meter gamma scintillation reading at these locations. Utilize approved procedures for collection, sample handling, and maintaining custody control of samples.
Sub-surface gamma logging - background measurements	N/A	N/A	N/A		For a 10 foot deep borehole, perform downhole gamma logging over the entire 10 feet. Log results every 6 inches. Use a Ludlum 44-62 detector or equivalent.
Field duplicate of soil samples for 1/20 survey points.	N/A	N/A	N/A	N/A	For one sample during sub-surface background sampling, collect twice the volume for one sample, mix, split, then send as a duplicate to the laboratory. Analyze the same as for other samples.
Sub-surface Soil Samples - based on gamma survey results	4	10	4	N/A	Based on gamma survey results, drill an estimated 30 boreholes (actual amount to be determined based on survey results). For each hole, obtain one sample at the location of the highest downhole gamma reading. For a 10 foot deep borehole, perform downhole gamma logging over the entire 10 feet. Obtain samples from 0-2 feet, 8-10 feet, and at the location of the highest downhole gamma reading. Analyze sample for gamma spectroscopy, with specific results required for Th-232. Obtain a contact and 1-meter gamma scintillation reading at these locations. Utilize approved procedures for collection, sample handling, and maintaining custody control of samples. This table estimates 18 samples in outside areas and there are 12 locations estimated to be located within buildings.
Field blank for 1/20 samples.	N/A	N/A	N/A	N/A	During collection of sub-surface samples, obtain 1 field blank, taken of soil from area known not to contain significant quantities of Th-232 - send to lab for analysis.
Phase II ESI Soil Samples (Non-Radiological)	2	2	0	N/A	10 of the 30 total proposed radiological boreholes will be selected for environmental screening and soil sampling (6 indoors, 4 outdoors, locations TBD in field). Soil samples will be analyzed for TCL/TAL. One (1) laboratory-blind QA/QC duplicate sample will also be collected. From each boring, a soil sample will be collected from the 2-foot interval exhibiting the most evidence of contamination (PID readings, etc.), or from the interval bridging the water table (if encountered). If no obvious signs of contamination, collect VOC portion from the bottom of the boring and remaining portion from surface interval (0-2 feet bgs).
Phase II ESI Groundwater Samples	TBD			N/A	One (1) groundwater sample will be collected from a deep exploratory boring to an anticipated maximum depth of 50 feet bgs (location TBD). The one (1) sample will be submitted for full TCL+30 and TAL metals analysis (metals both unfiltered and filtered at the lab). For QA/QC, one trip blank sample will be sent with the groundwater sample for VOCs analysis.
Embedded Pipe Measurements	N/A	N/A	N/A	1	Interior pipe contamination and surrounding soil contamination will be estimated by snaking a gamma logging detector into the sewer pipe to a distance of 20 feet or to refusal. At least 1 sludge sample will be collected. If significantly elevated count rates are found well into the pipe, additional cabling or use of a gamma spectrometer will be used to investigate the source of the readings.

Note: The above quantities of measurements and samples are estimates which are subject to change based on results of field readings and site conditions

6.0 RADIOLOGICAL SURVEY INSTRUMENTATION AND METHODS

6.1 Field Instruments

The purpose of this section is to describe direct radiation measurement and sample collection and analysis techniques that will be implemented during the Scoping Survey of the Site. Characteristics of each are provided in **Table 8** .

Table 8 - Types of Instruments Planned for Use

Detector / Instrument	Detector Type	Active Area (cm^2)	Radiation Sensitivity & Uses
Ludlum 44-9	Geiger-Mueller	15	Beta-gamma scans for contamination (e.g., drilling equipment)
Gamma Scintillation* (Ludlum 44-10 or 44-62 or Ludlum 19)	Exposure Rate Meter	N/A	Gamma Exposure Rates
Ludlum 43-89	Dual Phosphor Scintillator	100	Alpha / beta surface scans and fixed-point measurements
Ludlum 43-10-1	Dual Phosphor Scintillator	N/A	Alpha / beta wipe test counter for removable contamination
Durridge Rad-7 Radon Monitor	Alpha spectrometer	N/A	Real-time survey for radon and thoron

* For Gamma Scintillation Detectors: surface and one meter readings will be taken with a Ludlum 44-10 or equivalent (2” x 2” NaI), and for downhole gamma, in order to minimize hole size and waste creation, Ludlum 44-62 NaI probe or equivalent will be used (1/2” diameter x 1” NaI).

6.1.1 Alpha Beta Sample Counter

Analyses of wipe tests and air samples may be performed on-site or off-site using a Ludlum Model 2929 dual phosphor alpha-beta counter. This instrument is used with a 1-minute counting time which provides a minimum detectable activity (MDA) of approximately 60 dpm/sample.

6.1.2 100 cm^2 Alpha-Beta Dual Phosphor Scintillator

A Ludlum Model 43-89 dual phosphor scintillation probe is used to assess alpha-beta contamination and exposure rates on surfaces. The probe may be used with Ludlum Models 2350, 2221, or 2360 scaler-ratemeters set with the proper operating voltage and discriminator settings for measurement of alpha or beta radiations as appropriate.

6.1.3 GM Pancake Probe

Ludlum Model 44-9 Geiger-Mueller probes is used to assess gross alpha-beta-gamma count rates on small surfaces for which the larger 100 cm^2 probes are not manageable. They are used for general health physics purposes such as hand and foot monitoring (frisking) and equipment scanning for release from controlled areas.

6.1.4 Gamma Scintillation Detector

A Ludlum Model 44-2 1"x1" NaI Scintillation Probe (or Ludlum Model 44-10 2” x 2” Probe, or Ludlum 19 Micro-R Meter) is used to assess ambient gamma-ray fields from residual thorium activity. The probe may be used with a Ludlum Model 12 ratemeter, and is calibrated to gamma exposure rate using a cesium-137 field within 1 year prior to date of use. Gamma exposure rate measurements are collected during scans and at fixed survey points at contact (1 cm) and at a distance of 1 meter from the floor. The probe can also be used to scan pipes to determine if internal thorium is present.

All of these instruments will be calibrated within 1 year of use by standards traceable to the National Institute of Standards and Technology. The operation of the instruments will be checked during the project by performing standard and background measurements daily. Results of efficiency and background checks will be maintained in a log book.

6.1.5 Rad-7 Electronic Radon Monitor

The Rad-7 has a sniffer with a small tube “snout” to search for radon and thoron entry points. It has a nominal 1 liter per minute air flow and uses electrostatic collection of alpha emitters with spectral analysis. The monitor can be used as a continuous radon/thoron gas monitor or as a sniffer.

6.2 Building Survey Background Measurements

Determination of background values is of the utmost importance in building decommissioning projects. Since ‘net’ residual contamination values, or the difference between a sample count rate and background, are used to assert whether a particular SU satisfies the criteria for unrestricted release, application of accurate and applicable background values is necessary. In this light, background measurements must be made in non-impacted building areas. Alternatively, background may be determined in a nearby building with similar construction. Contact and 1 meter background readings with the gamma scintillator must be determined and this value should be subtracted from actual measurements to enable a direct comparison with a DCGL value. In order to account for instrument response to ambient background, which can change from location to location, instrument background measurements will be performed on each material encountered.

6.3 Gamma Scan Surveys

Scans for gamma contamination will be performed within all areas with a 2-inch by 2-inch (2x2) NaI detector in gross count rate mode for surface and 1 meter readings. The intent of these surveys is to identify areas with potential thorium contamination.

6.3.1 Scan Minimum Detectable Concentrations

The methodology used in NUREG-1507 was used in determining minimum detectable scan sensitivity. A discussion of the calculation of scanning minimum detectable concentration (MDC) and the scanning minimum detectable count rate (MDCR) is provided in Appendix A. Cs-137 was used to determine scan MDC, as it has a moderate gamma energy which is in the range of many of the thorium chain gamma energies. Therefore, determining MDC for Cs-137 is appropriate.

6.4 Smear Sample Collection and Analysis

Selected building surfaces will have smear samples collected to assess the presence of removable alpha contamination. The amount of removable radioactive material per 100 cm^2 of surface area will be determined by wiping that area with a dry filter, applying moderate pressure, and preparing them for counting. The presence of removable alpha-emitting nuclides will be determined using a dual scintillator detector. If necessary the smear samples can be sent to an off-site laboratory for further alpha / beta Liquid Scintillation Counting spectrometric analysis.

6.5 Soil Sample Analysis

Soil samples and other volumetric samples (e.g., sludge) will be analyzed for total thorium, estimated by summing the Ac-228 + Bi-214 concentrations. The MDC is calculated as shown in Appendix B.

7.0 SURVEY QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Activities associated with this Sampling and Analysis Plan shall be performed in accordance with written procedures and/or protocols in order to ensure consistent, repeatable results. Daily quality control checks will be performed on all in-use instruments, and all radiological measurement instrumentation will be calibrated and relatable to the National Institute of Standards and Technology (NIST). Instrument performance will be tracked daily using control charts with performance criteria established at the beginning of the survey effort.

7.1 Quality Assurance/Quality Control Samples (QA/QC)

QA/QC samples will be analyzed in the same manner as the field samples. The applicable types of QC samples for this project are described below.

7.1.1 Field Duplicates

A field duplicate is a second sample for a particular analysis collected simultaneously at a sampling location, using the same sampling apparatus and identical sampling containers. The purpose of the duplicate sample is to check the contract analytical laboratory reproducibility of the analytical data. The soil sample should be taken at twice the normal volume and manually blended before preparing the duplicate sample to minimize the potential for varying radioactivity content. Field duplicate samples will be collected at a rate of five percent, or one per every 20 environmental samples collected. A minimum of one duplicate sample will be sent with each batch of at least 10 samples. The results will be subject to the precision evaluation described in Section 7.2.1, with an RPD acceptance value of 30%.

7.1.2 Field Blanks

A field blank is a sample of non-radioactive soil collected from an area known not to contain significant quantities of the radionuclides of concern. The purpose of the field blank is to check for cross-contamination during transit and sample processing. Field blank samples will be collected at a rate of five percent, or one per every 20 environmental samples collected. A minimum of one blank sample will be sent with each batch of at least 10 samples. The results of the field blanks will be qualitatively evaluated to determine if there are problems with cross-contamination or other issues relating to false positive results.

7.2 Quality Assurance Objectives for Measurement

The quality assurance (QA) objectives for measurement, the means by which quality will be measured and documented, will be achieved through measuring the following quality indicators.

7.2.1 Precision

Precision is a measure of the agreement between a set of replicate sample results. It is assessed by comparing the results of duplicate sample analyses including matrix spikes and matrix spike

duplicates, laboratory control samples and laboratory control sample duplicates, laboratory duplicates, and field duplicate with the results of the original sample. Precision is generally expressed in terms of relative percent difference (*RPD*),

$$RPD = \frac{|X_1 - X_2|}{\frac{1}{2}(X_1 + X_2)} \times 100\%$$

where X_1 and X_2 are the duplicate results.

7.2.2 Accuracy

Accuracy is defined as the nearness of a measurement to its true value. Accuracy measures a method's average or systematic error. Laboratory accuracy is assessed by spiking samples with known standards and calculating the percent recovery. Three types of recoveries are measured: matrix spikes; laboratory control spikes; and, blind quality control spikes. Laboratory accuracy will be evaluated during validation of the data. Accuracy is reported in terms of percent recovery,

$$\%\ \text{recovery} = \frac{|R - U|}{S} \times 100\%$$

where S is the actual concentration of spike added, U is the measured concentration in the unspiked aliquot, and R is the measured concentration in the spiked aliquot.

7.2.3 Representativeness

Representativeness expresses the degree to which the sampling data represent the characteristics that are being measured. Field planning meetings, technical system audits, and oversight will offer opportunities to check that field procedures are being correctly implemented, thus helping to ensure the representativeness of the field data collected.

7.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Sample data will be comparable with other measurement data for similar samples and sample conditions. Data comparability will be maintained by using consistent standardized methods and units of measurement.

7.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from the field investigation compared with the total amount of data that was collected. A minimum goal of 90 percent completeness for chemical and radiological data is acceptable for data quality requirements.

8.0 REFERENCES

(NRC, 1997) NUREG-1507, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, U.S. Nuclear Regulatory Commission, December 1997.

(NRC, 2000) NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), U.S. Nuclear Regulatory Commission, August 2000.

(NRC, 2003) NUREG-1757, Consolidated NMSS Decommissioning Guidance, Rev. 1, U.S. Nuclear Regulatory Commission, September 2003.

(NRC 2003b) Title 10, Code of Federal Regulations, Part 20, Paragraph 1402 of 10CFR20, "Radiological Criteria for Unrestricted Use."

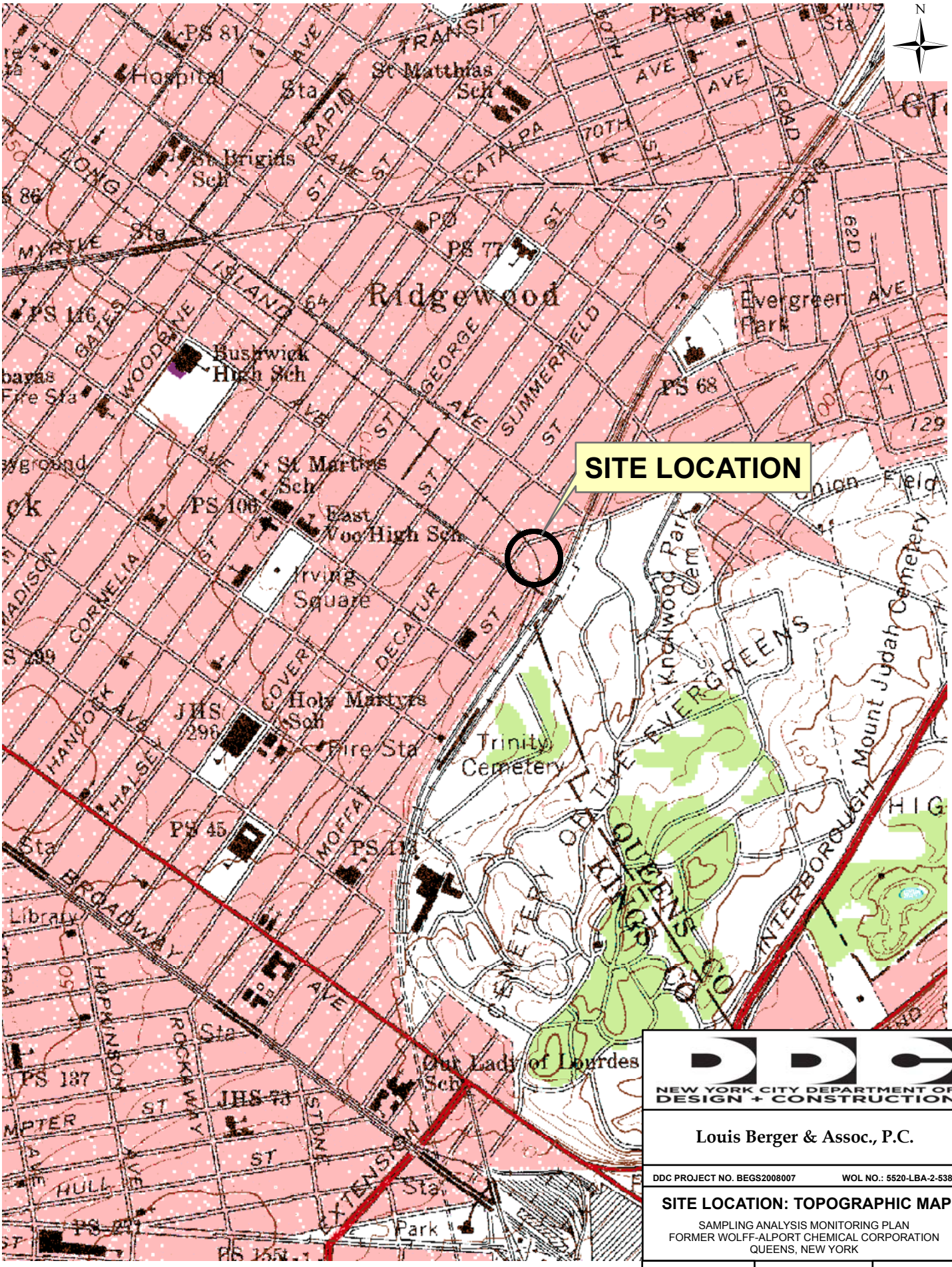
(NYSDEC 2002) Draft DER 10 Technical Guidance for Site Investigation and Remediation, New York State Department of Environmental Conservation, December 2002.

(NYCDOH 2002) New York City Health Code §175.03, "Standards for the Protection Against Radiation" 2002.

(WGGM 2002) Master Final Status Survey Plan - Welsbach/GGM Contamination Site, Camden, NJ, USACE, 2002.

FIGURES

Figure 1 Site Location/Topographic Map
Figure 2 Site Plan
Figure 3 Preliminary Survey Unit Map



Source: USGS Quadrangle, Brooklyn, New York

NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

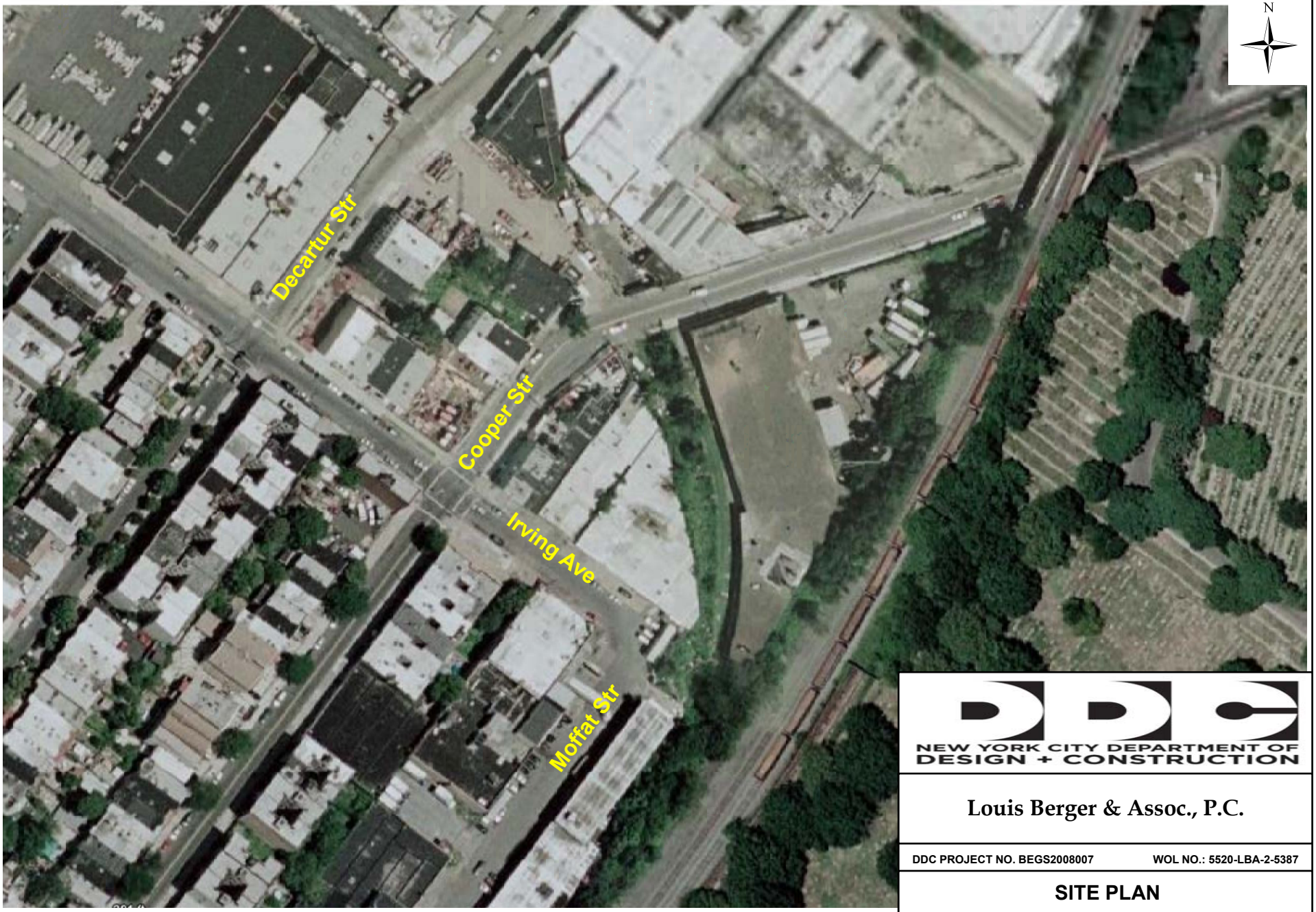
Louis Berger & Assoc., P.C.

DDC PROJECT NO. BEGS2008007 WOL NO.: 5520-LBA-2-5387

SITE LOCATION: TOPOGRAPHIC MAP

SAMPLING ANALYSIS MONITORING PLAN
FORMER WOLFF-ALPORT CHEMICAL CORPORATION
QUEENS, NEW YORK

SCALE: 1"=1000'	DATE: 10/2/2008	FIGURE: 1



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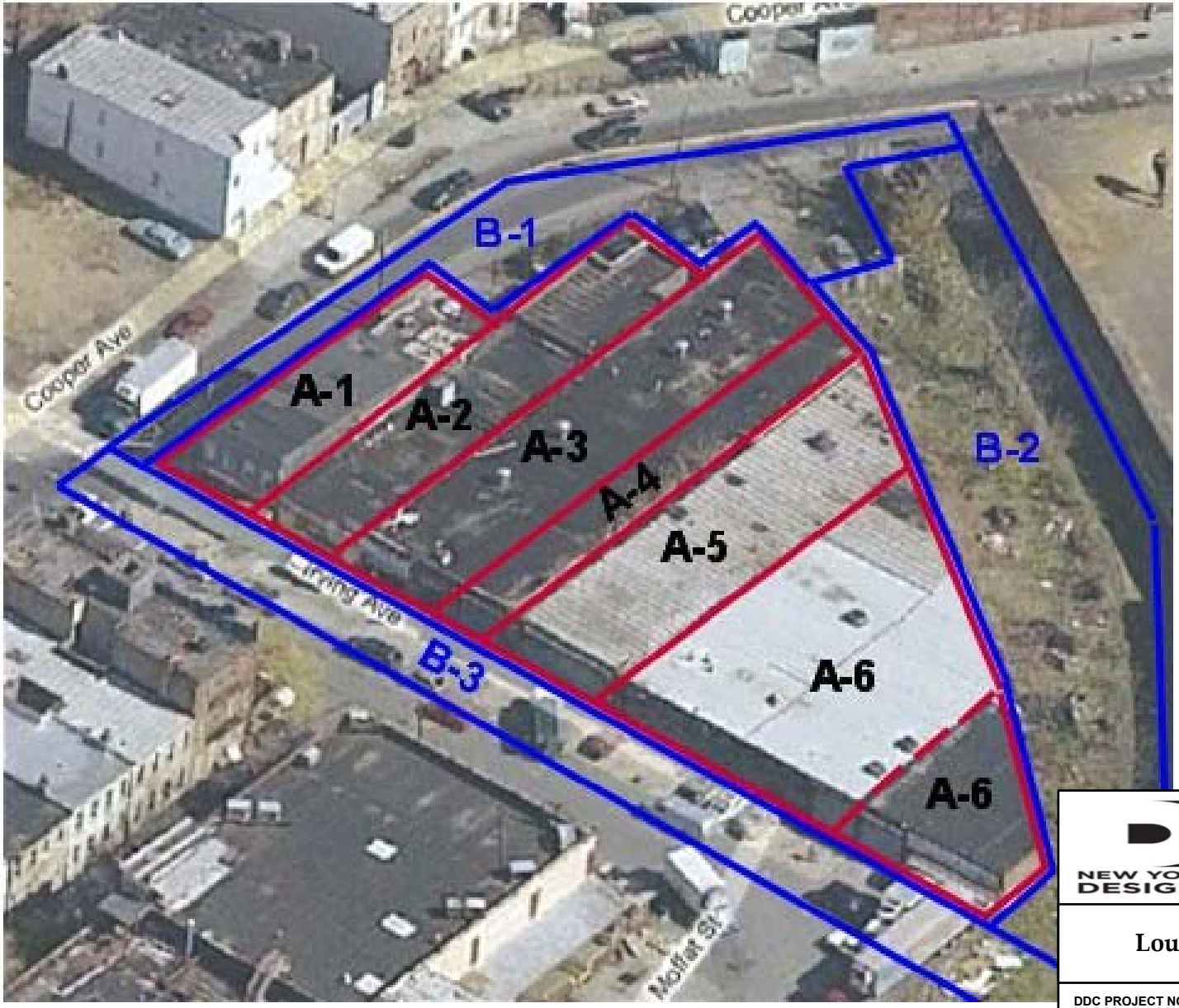
DDC PROJECT NO. BEGS2008007 WOL NO.: 5520-LBA-2-5387

SITE PLAN

SAMPLING ANALYSIS MONITORING PLAN
FORMER WOLFF-ALPORT CHEMICAL CORPORATION
QUEENS, NEW YORK

DATE: 10/2/2008 FIGURE: 2



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PRELIMINARY SURVEY UNIT MAP

SAMPLING ANALYSIS MONITORING PLAN
FORMER WOLFF-ALPORT CHEMICAL CORPORATION
QUEENS, NEW YORK

DATE: 10/2/2008 FIGURE: 3

APPENDIX A
MINIMUM DETECTABLE CONCENTRATIONS – SURVEY INSTRUMENTS

Appendix A
Minimum Detectable Concentrations – Survey Instruments

1.0 Introduction

The minimum detectable concentration of a scan survey (scan MDC) depends on the intrinsic characteristics of the detector (efficiency, window area, etc.), the nature (type and energy of emissions) and relative distribution of the potential contamination (point versus distributed source and depth of contamination), the scan rate and other characteristics of the surveyor. Some factors that may affect the surveyor's performance include the costs associated with various outcomes—e.g., cost of missed contamination versus cost of incorrectly identifying areas as being contaminated —and the surveyor's *a priori* expectation of the likelihood of contamination present. For example, if the surveyor believes that the potential for contamination is very low, as in an unaffected area, a relatively large signal may be required for the surveyor to conclude that contamination is present.

A discussion of the calculation of scanning minimum detectable concentration (MDC) and the scanning minimum detectable count rate (MDCR) is provided in the MARSSIM (EPA 2000). More detail on signal detection theory and instrument response is provided in NUREG-1507, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions (NRC 1997), from which the following discussion is drawn.

1.1 Minimum Detectable Count Rate and Surveyor Efficiency

The framework for determining the scan sensitivity is based on the premise that there are two stages of scanning. That is, surveyors do not make decisions on the basis of a single indication, rather, upon noting an increased number of counts, they pause briefly and then decide whether to move on or take further measurements. Thus, scanning consists of two components: continuous monitoring and stationary sampling. In the first component, characterized by continuous movement of the probe, the surveyor has only a brief "look" at potential sources, determined by the scan speed. The surveyor's willingness to decide that a signal is present at this stage is likely to be liberal, in that the surveyor should respond positively on scant evidence, since the only "cost" of a false positive is a little time. The second component occurs only after a positive response was made at the first stage. This response is marked by the surveyor interrupting his scanning and holding the probe stationary for a period of time, while comparing the instrument output signal during that time to the background counting rate. Owing to the longer observation interval, sensitivity is relatively high. For this decision, the criterion should be more strict, since the cost of a "yes" decision is to spend considerably more time taking a static measurement or a sample.

Since scanning can be divided into two stages, it is necessary to consider the survey's scan sensitivity for each of the stages. Typically, the minimum detectable count rate (MDCR) associated with the first scanning stage will be greater due to the brief observation intervals of continuous monitoring—provided that the length of the pause during the second stage is

significantly longer. Typically, observation intervals during the first stage are on the order of 1 or 2 seconds, while the second stage pause may be several seconds long. The greater value of MDCR from each of the scan stages is used to determine the scan sensitivity for the surveyor.

The minimum detectable number of net source counts in the interval is denoted by S_i. Therefore, for an ideal observer, the number of source counts required for a specified level of performance can be arrived at by multiplying the square root of the number of background counts by the detectability value associated with the desired performance (as reflected in d') as shown in [Equation 6-8, MARSSIM]:

$$S_i = d' \, (b_i)^{1/2}$$

where the value of d' is selected from MARSSIM Table 6.5 based on the required true positive and false positive rates and b_i is the number of background counts in the interval.

The minimum detectable source count rate (MDCR), in cpm, detectable during the observation interval i, in seconds, by an "ideal" surveyor may be calculated by [Equation 6-9, MARSSIM]:

$$MDCR = S_i \times (60 / i)$$

For the case of real surveyors who are not equivalent to the "ideal" construct, MARSSIM recommends assuming an efficiency value at the lower end of the observed range of 0.75 – 0.50 (i.e., p = 0.5) when making MDCR estimates. Thus, the required number of net source counts for the surveyor, $MDCR_{surveyor}$, is determined by dividing the MDCR by the square root of p.

Consider the calculation of the MDCR for the case of 2 inch by 2 inch NaI(Tl) scintillation detector used for a walkover scan. The actual detectors and actual background count rates will be used, but as an example of the methodology, the following is shown:

EXAMPLE:

Background count rate is conducted in several areas and averaged to be 7166 cpm.

The desired level of performance, 95% correct detections and 60% false positive rate during initial scanning, results in a d' of 1.38 [Table 6-5, MARSSIM]. The scan rate of 0.5m/s at an observation interval of 1 to 2 seconds, results in a diameter of about 60 cm for the area of activity observed. The $MDCR_{surveyor}$ may be calculated assuming a surveyor's efficiency (p) of 0.5 as follows (example shown for the bare NaI detector):

- b_i = (7166 cpm) × (1 sec) × (1 min/60 sec) = 119 counts
- MDCR = $(1.38) \times (119)^{1/2} / (1 \text{ sec}) \times (60 \text{ sec}/1 \text{ min})$ = 905 cpm
- $MDCR_{surveyor} = 905 / (0.5)^{1/2}$ = 1,280 cpm net above background

- $MDCR_{surveyor}$ (gross) = 1,280 + 7,166 = 8,466 cpm gross

The minimum number of source counts required to support a given level of performance for the final detection decision (second scan stage) can be estimated using the same method. As explained earlier, the performance goal at this stage will be more demanding. The required rate of true positives remains high (e.g., 95%), but fewer false positives (e.g., 20%) can be tolerated, such that d' (from Table 6.5) is now 2.48. For this second stage of the scan survey, the surveyor typically stops the probe over a suspect location for about 4 seconds before making a decision,

- bi = (7166 cpm) × (4 sec) × (1 min/60 sec) = 478 counts
- MDCR = (2.48) × (478) 1/2 / (4 sec) × (60 sec/1 min) = 813 cpm
- MDCRsurveyor = 813 / (0.5) 1/2 = 1,150 cpm net above background
- MDCRsurveyor (gross) = 1,150 + 7,166 = 8,316 cpm gross

For the 2x2 NaI probe, the greater of the calculated $MDCR_{surveyor}$ values is 1,280 cpm above background. This would then be the value chosen for the $MDCR_{surveyor}$ when using the 2x2 NaI probe.

In summary, for this listed EXAMPLE, the MDCs for the different scanning techniques are as follows:

- Scan – 2x2 NaI detector 1.4 pCi/g
- Stop (4 sec) – 2x2 NaI detector 1.2 pCi/g

When actual background readings are obtained, the MDC will be calculated using the above methodology.

SITE SPECIFIC HEALTH & SAFETY PLAN

FORMER WOLFF-ALPORT CHEMICAL CORPORATION-SITE INVESTIGATION

1127-1129 IRVING AVENUE

QUEENS, NEW YORK

Prepared for:

City of New York Department of Design and Construction

Bureau of Environmental and Geotechnical Services

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ACRONYMS AND ABBREVIATIONS

cm^2 square centimeters

cpm counts per minute

$DCGL_w$ Derived Concentration Guideline Level (average)

$DCGL_{EMC}$ Derived Concentration Guideline Level (elevated measurement comparison)

DDC New York City Department of Design and Construction

DEC New York State Department of Environmental Conservation

DOH New York City Department of Health and Mental Hygiene

dpm disintegrations per minute

DQO Data Quality Objective

EPA U.S. Environmental Protection Agency

FSS Final Status Survey

g gram

hr hour

HSA Historical Site Assessment

HVAC Heating Ventilation and Air Conditioning

LBGR Lower Bound of the Grey Region

LSC liquid scintillation counter

m^2 square meters

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

MDC Minimum Detectable Concentration

MSKCC Memorial Sloan-Kettering Cancer Center

µ micro

m milli

mrem millirem

NIST National Institute of Standards and Technology

NRC U.S. Nuclear Regulatory Commission

QA Quality Assurance

QC Quality Control

RAM radioactive materials

ROC Radionuclide of Concern

R Roentgen

SOR Sum of the Ratios

SU survey unit

WP Scoping Survey Work Plan

1.0 INTRODUCTION

Louis Berger Associates, PC (LBA) is under contract to the New York City Department of Design and Construction (DDC) to perform an initial site assessment at the former Wolff Alport Chemical Corporation (FWACC) Site in Queens, NY. Studies conducted to date indicate that the site is contaminated with radioactive materials associated with monazite ore processing. The purpose of the proposed investigation is to determine the extent of radioactive contamination on the property.

This Site Health and Safety Plan (HASP) has been developed to address overall health and safety requirements for LBA employees and subcontractors on site in compliance with OSHA 29 CFR 1910.120. The HASP has been adapted from the Welsbach/GGM Superfund Site HASP which is a thorium-contaminated site in Camden, NJ. Investigations at the FWACC Site will closely resemble those at the Welsbach site because the type and location of contamination and the buildings and urban environment are very similar.

This HASP describes in detail the requirements and procedures for employee protection for the various investigation activities at the Site. Additional scope requests, when not adequately covered by the provisions of this Plan, will be addressed in Task Addenda and will become part of this Plan.

This HASP outlines safety, health, and emergency response procedures for preventing accidents and protecting personnel from injury and occupational illness during all activities described herein. Included in this HASP are the assignment of responsibilities, personnel protection minimum requirements, safe work practices, and emergency response procedures. This document is based upon available historical information and the assessment of potential physical and chemical hazards associated with the site and activities related to the planned associated activities. A copy of this HASP will be available at the Site, in the keeping of the Project Safety Officer (PSO), during site activities. Compliance with this HASP is required of all project personnel and visitors.

2.0 REGULATORY REQUIREMENTS AND GUIDELINES

The procedures outlined in this HASP comply with the Occupational Safety and Health Administration (OSHA) requirements contained in 29 CFR 1910. The procedures are also consistent with the guidance contained in Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (prepared jointly by the USEPA, National Institute for Occupational Safety and Health (NIOSH), OSHA, and the U.S. Coast Guard (USCG)). Radiation exposure precautions comply with the requirements set forth in NYC Health Code Article 175.

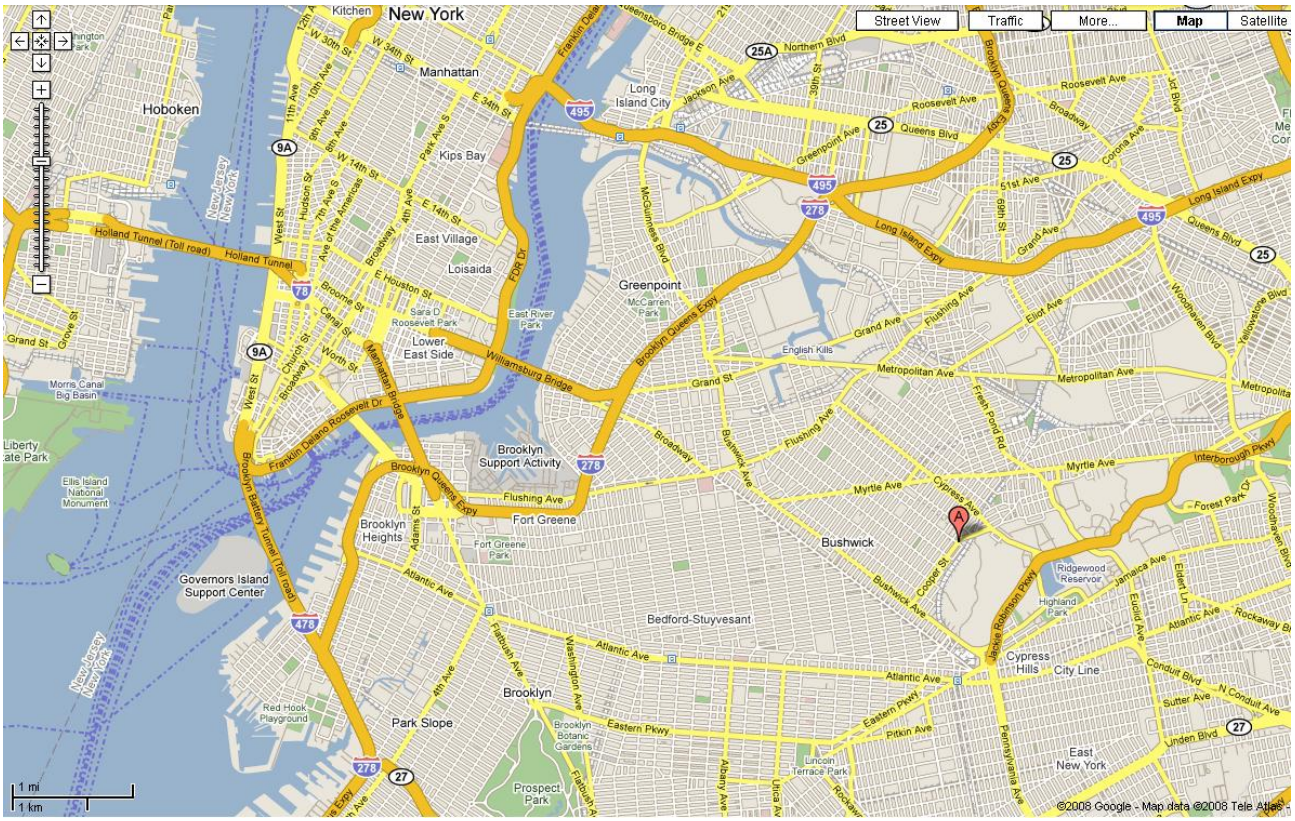
3.0 SITE BACKGROUND AND SETTING

3.1 Site Location

The FWACC site is located at 1127 Irving Avenue in the borough of Queens in an urban, light industrial area bordering with residential areas to the north and west. Immediately east of the former site is warehouse building space. Immediately west is a former deli/grocery that was heavily damaged by a fire in 2007. The rail line behind the site is heavily overgrown and contains a significant amount of illegally dumped trash. The Cemetery of the Evergreens borders the site to the south and east on the opposite side of the rail line. Figure 3-1 shows an aerial view of the triangular-shaped property, bordered by Irving Ave., Cooper Ave., and the abandoned rail spur/empty lot behind the buildings.

Figure 3-1 – Aerial Photo of Former Wolff-Alport Site – 2008

(http://maps.live.com)


Street View
Traffic
More...
Map
Satellite
New York
Manhattan
Hoboken
Long Island City
Kips Bay
East Village
Loisaida
Greenpoint
Lower East Side
Brooklyn Support Activity
Fort Greene
Brooklyn Heights
Bushwick
Governors Island Support Center
Bedford-Stuyvesant
Brooklyn
Park Slope
Prospect Park
Cypress Hills
City Line
East New York
Ridgewood Reservoir
Highland Park
Liberty State Park
Ellis Island National Monument
Red Hook Playground
Brooklyn Botanic Gardens
Lincoln Terrace Park
Morris Canal Big Basin
Holland Tunnel (Toll road)
Williamsburg Bridge
Manhattan Bridge
Brooklyn Battery Tunnel (Toll road)
Franklin Delano Roosevelt Dr
Brooklyn Queens Expy
Long Island Expy
Northern Blvd
Roosevelt Ave
Queens Blvd
Greenpoint Ave
Grand Ave
Flushing Ave
Metropolitan Ave
Myrtle Ave
Atlantic Ave
Eastern Pkwy
Pitkin Ave
Jackie Robinson Pkwy
Interborough Pkwy
Forest Park Dr
Woodhaven Blvd
Rockaway Blvd
Conduit Blvd
Linden Blvd
Pennsylvania Ave
Albany Ave
Nostrand Ave
Franklin Ave
Fulton St
Washington Ave
Adams St
Bushwick Ave
Cypress Ave
Cooper St
Jamaica Ave
Eldert Ln
Euclid Ave
Sutter Ave
N Conduit Ave
Broadway
Grand St
Canal St
Worth St
Church St
Broome St
E Houston St
West St
Hudson St
Greenwich St
Grove St
Varick St
Lafayette St
Bowery
Avenue of the Americas
7th Ave S
6th Ave
8th Ave
10th Ave
11th Ave
Park Ave S
4th Ave
Broadway
McGuinness Blvd
Vernon Blvd
Jackson Ave
Greenpoint Ave
Queens Blvd
Roosevelt Ave
Broadway
Corona Ave
Woodhaven Blvd
Yellowstone Blvd
Eliot Ave
Fresh Pond Rd
English Kills
Flushing Ave
Myrtle Ave
Cypress Ave
Bushwick Ave
Cooper St
Jamaica Ave
Eldert Ln
Euclid Ave
Atlantic Ave
Rockaway Blvd
Conduit Blvd
Sutter Ave
N Conduit Ave
Linden Blvd
Eastern Pkwy
Pitkin Ave
Pennsylvania Ave
Albany Ave
Nostrand Ave
Franklin Ave
Fulton St
Washington Ave
Adams St
Fresh Pond Rd
Eliot Ave
Woodhaven Blvd
Yellowstone Blvd
Metropolitan Ave
Grand Ave
Grand St
Flushing Ave
Myrtle Ave
Interborough Pkwy
Forest Park Dr
Jackie Robinson Pkwy
Atlantic Ave
Eastern Pkwy
Pitkin Ave
Linden Blvd
Pennsylvania Ave
Albany Ave
Nostrand Ave
Franklin Ave
Fulton St
Washington Ave
Adams St
Bushwick Ave
Cypress Ave
Cooper St
Jamaica Ave
Eldert Ln
Euclid Ave
Sutter Ave
N Conduit Ave
Linden Blvd
Rockaway Blvd
Conduit

According to federal records, Wolff-Alport operated at this location from approximately 1920 to about 1954. About 1940, the company began importing Monazite sand from the Belgian Congo through the rail spur located in back of the property. Monazite sand is rich in thorium and rare earth elements, and the company extracted these rare earth elements and sold them to various commercial entities. Initially, the thorium (and presumably other radioactive decay products) was considered a waste product and disposed into the sewer. Wolff-Alport was ordered to halt sewer disposal in the fall of 1947 by the AEC. In order to minimize the waste volume, Wolff-Alport began concentrating the thorium as a precipitate and then sold the sludge to the AEC.

Wolff-Alport terminated operations at the site in approximately 1954. Land use records after 1954 are limited. In 1988, the site was occupied by Lynda Knitwear. In late 2000, the site was used by the current rental occupants, Primo Auto Body.

3.3 Current Land/Building Use

The building which housed the former Wolff-A1port operations appears to have been subdivided (access ways between the portions were sealed) at a later date. Most of the areas investigated during this field effort are used for storage or materials with limited/short term entry by individuals. The one exception is in the main working area of Primo Auto Body, (1127A Irving Avenue) where individuals spend their entire working day in the building while completing various auto repairs and body work.

3.4 Proposed Work

The investigation activities currently proposed at the Site are described in the Sampling, Analysis and Monitoring Plan (SAMP). These activities include indoor and outdoor surface exposure rate scans, short-term (real time) and long-term (3-month) radon, thoron measurements, alpha/beta counts with a dual alpha/beta detector, downhole gamma logging, surface and subsurface soil sampling, and collection of geotechnical and chemical soil samples.

A tracked excavator may be used on the old rail siding to push back tall weeds and trash which now limit access to the outdoor, potentially contaminated area. A pickup truck-mounted geoprobe will be used to collect sub-surface samples.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITY

4.1 Project Safety Personnel and Contractors

Project health and safety personnel are listed below.

Project Manager

Name:	Rhine Almonacy
Work Telephone:	212-612-7951
Mobile:	973-418-1267

Corporate Health and Safety Manager

Name:	Brian Murphy
Work Telephone:	212-612-7900
Mobile:	484-788-9673

Project Safety Officer (PSO)

Name:	Joshua Cupriks
Work Telephone:	212-612-7954
Mobile:	646-772-2261

Project Health Physicist

Name:	Dennis Quinn
Work Telephone:	845-223-1960
Mobile	845-891-5761

Laboratory Analysis

CoPhysics Corporation
1 Commercial Dr.
Florida, NY
Attn: Theodore Rahon
office: 845-783-4402
mobile: 914-260-1293

Drilling

Zebra Environmental Corp.
30 N. Prospect Ave.
Lynbrook, NY 11563
516-596-6300

4.2 Responsibilities of Safety Personnel

Project Manager – is primarily responsible for the development and implementation of the investigation and for the health and safety of personnel assigned to the field investigation. The Project Manager has the final responsibility for the quality of work performed under the contract and will be the primary point of contact with the client agency.

Corporate Health and Safety Manager – The Corporate Health and Safety Manager (CHSM) is responsible for development and implementation of health and safety program and the overall implementation of this HASP. The CHSM functions as a liaison with governmental Agencies on health and safety issues. The CHSM conducts or directs periodic audits for successful implementation of the site safety and health plans. The CHSM has reviewed this revised HASP and finds it acceptable.

Project Safety Officer - The Project Safety Officer (PSO) is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include monitoring the day to day compliance of site work to the requirements in this HASP, having the ability and authority to make needed changes or additions to the plan and providing technical assistance to the Project Manager on problems relating to work site safety.

The PSO will assist the Certified Health Physicist (CHP) in interpreting and documenting health and safety related data relevant to work activities at the site. As site data are obtained and evaluated, the PSO may modify this HASP with the approval of the CHSM. The levels of personnel protection outlined in this plan may be upgraded or downgraded based on such information; the levels of personal protection outlined in this plan cannot be downgraded without the approval of the CHSM. The PSO or designee will also conduct regular, documented, on-site briefings pertaining to health and safety requirements of the project. The PSO will be present on a full-time basis whenever there are three or more persons working simultaneously or whenever the CHSM and the PM deem it necessary.

The PSO is responsible for the development and set-up of emergency procedures and personal decontamination procedures. The PSO or designee will complete a daily diary of activities with health and safety relevance. If unsafe work conditions are determined, the PSO is authorized to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the CHSM.

Project Health Physicist - The Project Health Physicist is responsible for the implementation of the radiation protection strategies detailed in the health and safety plan. As part of his responsibilities, he will confirm that all field personnel receive proper training and guidance on radiological health and safety issues.

Other Field Personnel – all field personnel are required to become thoroughly familiar with this HASP, follow the health and safety procedures and guidelines outlined in this

HASP, and use protective equipment properly to protect themselves and their fellow workers from injury and to prevent damage to material, equipment, and facilities. Field personnel will contribute any suggestions and assist in discovering or correcting unsafe working conditions.

Subcontractor Management - Subcontractors will designate one or more safety and health coordinators, one of whom will be assigned to the site during any site activities involving the subcontractor. The safety and health coordinator will develop a HASP addendum addressing the hazards associated with that subcontractor's project tasks and act as a liaison between the PSO and the subcontractor.

Subcontractor Personnel – The field investigations will be conducted according to the requirements of this HASP and applicable regulations. Subcontractors whose work will be performed on-site, or who otherwise could be exposed to health and safety hazards, will be advised of known hazards through distribution of site information obtained by LBA. As employers, each subcontractor is responsible for the health and safety of their employees. All subcontractors are responsible for:

- Providing personal protective equipment (PPE) for their employees subject to the requirements of this HASP and PSO review
- Providing documentation to the PSO that their employees have been trained in accordance with the requirements of this HASP
- Providing documentation to the PSO that their employees have received medical clearances as required by the HASP
- Providing periodic documentation to the PSO that their employees are in compliance with the provisions of this HASP

Subcontractors will also provide documentation to the PSO that their employees have received a daily briefing covering their assignment, required PPE, special or unusual conditions and lessons learned. Subcontractor personnel will contribute any suggestions and assist in discovering or correcting unsafe working conditions. The site PSO will document the subcontractor's compliance with the requirements of the HASP, and inspect the subcontractor's PPE to verify that it is fit for duty.

5.0 HEALTH AND SAFETY ANALYSIS

5.1 Project Tasks

The field activities being conducted as part of the scope of work for this project are outlined below and described in detail in the SAMP.

- Indoor and outdoor surface exposure rate scans
- Radon/thoron gas measurement

- Long-term (3-month) radon/thoron gas measurements.
- Surface alpha/beta activity measurements
- Downhole gamma logging
- Surface and subsurface soil sampling

5.2 Safety and Hazard Analysis

The anticipated safety and health hazards associated with the project tasks are listed in the following section. There are no extraordinary hazards. Standard health and safety protocols for environmental field work will be sufficient to protect employees and the public during the project. Radiation hazards on the site are minor for occupational exposure. Radiation safety aspects of the project are discussed in Section 9.

5.3 General Hazards

Anticipated physical/biological hazards include:

- Heat stress (high ambient temperature)
- Cold (Hypothermia)
- Noise
- Slip, Trip and Fall
- Equipment Operation
- Electrical
- Utility avoidance (overhead and underground)
- Vehicular Traffic
- Falling objects
- Biological hazards
- Radiation hazards
- Excavation/trenching/shoring
- Ergonomic hazards
- Structural/collapse potential

5.3.1 Heat Stress

Exposure monitoring for heat stress is described in Section 7.

5.3.2 Cold Stress

Exposure monitoring for cold stress is described in Section 7.

5.3.3 Noise

OSHA requires the use of hearing protection by all employees when noise levels exceed an average of 85 decibels in an 8-hour day. This limit may be exceeded on or near heavy equipment. A noise dosimeter operating in the dBA mode, may be used to determine if levels near heavy equipment are less than or greater than 85 dB. However, monitoring is usually not necessary because site workers will wear hearing protection near heavy equipment as standard practice regardless of the noise levels.

5.3.4 Slip, Trip and Fall Hazards

Ground irregularities due to topography or protruding materials (*e.g.*, nails in boards, broken glass) may pose a fall, slip or trip hazard to workers. Leather shoes with puncture proof inserts will be worn by personnel to protect against sharp objects which may be protruding from the surface or when using heavy equipment. There are potential hazards from the presence of wet areas, puddles, oil and grease, debris, loose or sandy soils, or other obstructions that may be within the passageways or walkways. Field personnel will be briefed by the PSO each morning on the location and type of obvious hazards in the work areas. Site workers are to take care in areas where ground irregularities or protruding objects exist and may not be observed due to vegetation.

5.3.5 Equipment Operation

To prevent entrainment in moving machinery, personnel will maintain a safe distance from heavy machinery. The PSO or designee will remind all site workers each morning about the hazards of moving equipment. .

5.3.6 Electrical

Electrical storms (thunderstorms) may pose an electrocution hazard. During thunderstorms, all heavy equipment will be shut down, drilling activities will be terminated and all personnel on-site will take refuge in buildings.

All electrical equipment, power tools, and extension lighting used on this site will be low voltage or protected by ground fault circuit interrupters (GFCIs).

5.3.7 Utility Avoidance (overhead and underground)

Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. The location of underground utilities and tanks will be determined prior to excavation or drilling. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the drilling contractor. The drilling subcontractor shall visually inspect or use remote sensing devices (*i.e.*, electrical resistivity, ground penetrating radar, magnetometer, or metal detector) in areas where public utility companies may not have sufficient information on buried utilities

5.3.8 Vehicular Traffic

Vehicular traffic will pose a hazard during the surface exposure rate scans of public streets and, if required, shallow subsurface soil sampling and downhole gamma logging in public streets. If necessary, the local police department will be contacted prior to street scanning activities, in order to make arrangements to close streets to all but local traffic. Traffic cones will be set across all street intersections to restrict the flow of traffic into the areas being scanned. In addition, warning signs (*e.g.*, Work Ahead) will be posted at all street intersections. All personnel will wear bright-colored, reflective traffic safety vests while performing street scanning activities.

5.3.9 Falling Objects

If there is a danger of falling objects on a property, the entire area inside the exclusion zone will be a hard hat area. Depending on the height of the drilling equipment, hard hats may also be specified within 50 feet of drilling operations.

5.3.10 Biological Hazards

Persons working on the Site should be aware of the presence of biological hazards including snakes, poisonous plants and poisonous insects. Non-poisonous snakes may be present at the Site, but it highly unlikely that poisonous snakes will be present. If a snake is discovered, the PSO should be immediately informed of the snake's location, size and type, if known. In most cases, only a brief interruption of work will be necessary to allow the snake to vacate the work area on its own.

Poison ivy is a climbing plant with ternate leaves (arranged in threes), with white berries. Poison oak is similar to poison ivy, but its leaves appear oak-like in form. The leaves of these poisonous plants produce irritating oil causing an intensely itching skin rash and characteristic bullous lesions. These plants are to be avoided.

Working in tall grass, especially in or at the edge of wooded areas, increases the potential for ticks to bite workers. Ticks can be particularly numerous in the spring and fall. Ticks are vectors of many different diseases including rocky mountain spotted fever, Q fever, tularemia, Colorado tick fever and lyme disease. Ticks attach to the skin and intravenously feed on blood, creating an opportunity for disease transmission. Covering exposed areas of the body and the use of insect repellent containing N,N-Diethyl-m-

toluamide (DEET) help prevent tick bites. Periodically during the workday, employees should inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold
- Do not twist the tick as you pull and do not squeeze its body. That may actually inject bacteria into your skin
- Thoroughly wash your hands and the bite areas with soap and water. Then apply an antiseptic to the bite area
- Save the tick in a small container with the date, the body location of the bite and where you think the tick came from
- Notify the PSO of any tick bites as soon as possible
- An accident report should be filed within 24-hours of a tick bite that occurs while working

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States. Ticks transmit other diseases similar to Lyme disease, which present similar symptoms and long-term consequences. All personnel sustaining a tick bite should consult a physician.

5.3.11 Radiation hazards

If the potential exists for radiation or contamination above 10 times the general public release levels levels shown in Table 10-1, personnel will be trained in accordance with the CoPhysics Corporation Radiation Safety Manual and Level C PPE will be utilized. The Health Physicist will be notified whenever levels exceed those in Table 10-1.

5.3.12 Excavation/trenching/shoring

During excavation and trenching operations where the potential for engulfment exists, personnel will be trained in Construction Safety and Confined Space Entry in accordance with OSHA regulations. Excavations will not be entered unless approval is granted by the CHSM.

5.3.13 Ergonomic hazards

When the potential exists for repetitive stress injuries, poor posturing, or other ergonomic hazards, employees will exercise extreme caution. Repeated tasks may be divided among several workers or performed at different times to prevent injuries such as carpal tunnel

syndrome. Proper lifting techniques will be utilized at all times. Mechanical devices, and/or additional personnel will be utilized as needed to prevent the lifting of weights in excess of abilities.

5.4 Social Conditions

Field personnel are to be knowledgeable of the general conditions currently existing within the study area. Discussions with local law enforcement officials and other personnel indicate that drug use and other illegal activities have occurred sporadically within certain areas of the site. Personnel should be cognizant of their surroundings at all times while in the field. Actions required of all personnel include conducting field activities with at least two field team members, finishing all field activities during daylight hours, and limiting the public visibility of field personnel while activities are being conducted. In addition, all field personnel will be required to carry a cellular phone and have identification badges identifying themselves as company personnel.

Before entering any property, workers must ensure that a property entry approval letter has been obtained by the NYC DOHMH.

5.5 Health and Safety Orientation Training

Site personnel involved with the investigation activities are required to have completed the 40-hour hazardous materials health and safety training as specified in 29 CFR 1910.120. This training, designed to orient personnel potentially exposed to hazardous substances, health hazards, or safety hazards, includes the following:

- Safety and health risk / job hazard analysis
- Use of PPE and requirements of 29CFR1920.132
- Work practices by which the employee can minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards
- Procedures for environmental monitoring, site control and decontamination
- Emergency response plans
- Introductory Radiological Worker Training

All personnel will also have proof of attendance at an annual 8-hour Health and Safety refresher course if their 40-hour course was completed more than a year prior to the start of field activities. A copy of all current training certificates will be kept in the PSO office.

A radiation orientation will also be presented to all field personnel before any work begins, and all field teams will be provided with a daily work order that will include a checklist, including utility clearance and known conditions on the property. Standard Safety work permits, to be used for this investigation, are presented in the Appendix.

5.6 Specialized Training

All field personnel are to be knowledgeable in the particular hazards that may be encountered during this project and be familiar with safe operating procedures. This will be accomplished through the review of this HASP, specialized training prior to the commencement of the field work, an audit of field activities and safety meetings during the program, as discussed below. Forms for the documentation of site-specific training are contained in Appendix B.

5.6.1 Pre-Investigation Health and Safety Briefing

Personnel involved with the project will attend a site-specific health and safety briefing prior to initiation of the field activities. The topics to be discussed will include:

- Characteristics and potential hazards of contaminants known to be present at the site
- Personal protective clothing: function, donning/doffing, frisking
- Personal hygiene
- Environmental monitoring
- Decontamination procedures
- Respirators: selection, use, care
- Site control and work zone designations
- General safety concepts
- Emergency recognition and prevention
- Heat stress
- Signs and symptoms of over exposure to site specific chemical hazards
- Hazard communication
- Emergency response plan
- Site contingency plans
- Excavation safety
- Ergonomic hazards including proper lifting techniques
- Recognition of structural defects during work in basements

5.6.2 Morning Safety Meetings

The PSO or designee shall conduct morning safety and health briefings on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat stress, or the interpretation of newly available environmental monitoring data are examples of topics that might be covered during these briefings. An outline report of meetings giving the date, time, attendees, subjects discussed, and instructor shall be maintained. Visitors will be properly oriented to existing site conditions, planned activities, levels of personal protection, and other procedures outlined in this HASP.

6.0 HAZARD COMMUNICATION

Hazard communication requirements specified herein meet the requirements of 29 CFR 1910.1200, and field activities shall be implemented in accordance with this program, as described below.

Material Safety Data Sheets (MSDSs) for hazardous chemicals introduced to the site by personnel and subcontractors will be present at the site, for review by all on-site personnel. Labels on containers used by personnel are as originally received (not to be defaced) and are to contain the following information: (1) the identity of the hazardous chemical(s); (2) the appropriate hazard warnings; and (3) the name and address of the chemical manufacturer. If an employee transfers chemicals from a labeled container to a portable container, a label that contains those three items must be affixed to it. If the portable container is intended only for that employee's immediate use (during the same work shift), the product name only shall be clearly marked on the container. The employee will be responsible to properly empty, clean or dispose of the portable container immediately after use.

The PSO shall make a reasonable effort to obtain the appropriate hazard communication information for hazardous chemicals introduced by other employers that are working independently of the design investigations, including:

- Precautionary measures other employers need to take to protect their employees from harmful exposure to hazardous chemicals under normal operating conditions and in foreseeable emergencies
- Explanation of that firm's labeling system
- The name and location of each hazardous chemical, and location of MSDSs

As part of the site-specific health and safety orientation conducted by the PSO, a review of this Hazard Communication Program will be included to inform employees of hazardous chemicals to which they may be exposed during field activities. Subcontractors will also attend the hazard communication training session. If the chemical hazard changes or a new chemical hazard is introduced into the area after work begins, additional training will be provided by the PSO.

Site-specific hazard communication training for hazardous chemicals introduced to the site will include:

- Properties and hazard (chemical, physical, toxicological) of each hazardous chemical
- Health hazards, including signs and symptoms of exposure and any medical condition known to be aggravated by exposure
- Measures employees can take to protect themselves, including: appropriate work practices or methods for proper use and handling, procedures for emergency response, and the proper use and maintenance of PPE, as required
- Work procedures for employees to follow to protect themselves when cleaning hazardous chemical spills and leaks
- Use of the container labeling system and the MSDSs including: where MSDSs are located, how to read and interpret the information on both labels and MSDSs, and how employees may obtain additional hazard communication information

Site-specific hazard communications training will also cover hazardous chemicals introduced by other contractors and shall emphasize:

- Information about the hazardous chemicals to which employees may be exposed
- An explanation of the labeling system other contractors are using
- Information about the precautionary measures employees need to take to protect themselves during normal operating conditions and in emergencies
- Location of MSDSs for hazardous chemicals brought to the site by other contractors

The PSO shall document the training, including the agenda and list of attendees. This subsection of the HASP, and the hazard communication training conducted as described above, shall be the mechanism for informing other employers planning to be on-site of hazardous chemicals introduced to the site by field activities.

7.0 MEDICAL SURVEILLANCE AND EXPOSURE MONITORING

7.1 Medical Surveillance

Personnel who may have potential exposure to hazardous materials will have an initial employment, an annual, and a termination examination. If personnel potentially need to wear a respirator, the physical shall include medical approval to wear respirators, and fit-tested in accordance with OSHA requirements. Subcontractors are also required to meet medical surveillance requirements for this project.

Purpose - The purposes of the medical evaluation are to: 1) determine fitness for duty on hazardous waste sites; and 2) establish baseline data for future reference. Such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination, and an evaluation of the ability to work while wearing protective equipment. The medical examination must include an OSHA-type evaluation of the workers' ability to use respiratory protective equipment.

Supplemental Examinations - Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stress.

7.2 Heat Stress Monitoring

Whenever feasible, the level of protection established for workers will be based upon quantitative determinations of the radiological and chemical agents and physical stresses present in the work environment. It is proposed that work will be conducted during the summer months; therefore, heat exposure is an issue of concern.

Heat stress is probably one of the most common and potentially serious illnesses at hazardous waste sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning, and age. The effects of heat stress can range from mild symptoms, such as fatigue, irritability, and decreased mobility, to death. The body's response to heat stress includes the following:

- Heat Rash: A result of continuous exposure to heat and humidity, heat rash decreases the body's ability to tolerate heat
- Heat Cramps: A result of profuse perspiration with inadequate fluid intake and chemical replacement, heat cramps are signaled by muscle spasms and pain in the abdomen and the extremities
- Heat Exhaustion: A result of increased stress on various organs. The signs of heat exhaustion include shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude
- Heat Stroke: The most severe form of heat stress, heat stroke must be relieved immediately to prevent severe injury or death. The signs of heat stroke are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma. The body must be cooled and medical attention sought immediately

7.3 Heat Stress Control Measures

Measures to prevent heat stress include regular work breaks during field activity, regular fluid replenishment, and the availability of shelter (*e.g.*, shaded area). All personnel will be made aware of the symptoms of heat stress. Should one or more symptoms be detected, the affected worker will be assisted to seek shade, drink plenty of fluids, and seek medical attention, if required.

Several screening techniques can be used to detect early warning signs of heat stress. The following method, based on body temperature measurements, is simple and straightforward and may be conducted by the PSO. Body temperature may be measured with a digital-readout clinical ear thermometer with disposable tips.

Body temperature may be measured for three minutes with an ear thermometer at the end of each work period and before drinking. Temperature at the end of the work period should not exceed 99.6°F. If the temperature does exceed 99.6°F, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the temperature exceeds 99.6°F at the beginning of the next rest period, however, the following work cycle should be further shortened by 33%. Temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6°F. No worker may be permitted to continue wearing semi-permeable or impermeable garments when his/her temperature exceeds 100.6°F.

7.4 Cold Stress Monitoring

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at 18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in the Table, below.

Table 7-1 Wind Chill Temperature Chart

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds >40 mph have little additional effect.)	Little Danger: Maximum danger of false sense of security.				Increasing Danger: Danger from freezing of exposed flesh within one minute.			Great Danger: Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

Note: This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents).

Frostbite is the generic term for a local injury resulting from cold. Several degrees of tissue damage are associated with frostbite. Frostbite of the extremities can be categorized into:

- Frost Nip or Incipient Frostbite: characterized by sudden blanching or whitening of skin
- Superficial Frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient
- Deep Frostbite: tissues are cold, pale, and solid; extremely serious injury
- Systemic hypothermia: caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages:

    1. Shivering
    2. Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F
    3. Unconsciousness, glassy stare, slow pulse, and slow respiratory rate

4. Freezing of the extremities

5. Death

Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first-aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

7.5 Cold Stress Control Measures

To prevent cold stress illnesses, follow the safety precautions listed below.

- Protective gloves are typically worn during field activities. These gloves offer some thermal protection
- For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F
- At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia
- If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must verify that their clothing is not wet due to perspiration. If wet, field personnel must change into dry clothes prior to entering the cold area
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve
- Field personnel handling evaporative liquid (*e.g.*, gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling

In addition, the following safe work practices should be employed to prevent cold stress.

- All field personnel will be provided with adequate cold weather gear including insulated coveralls, gloves or mittens, and cold weather boots. Warming facilities or equipment will be provided (*e.g.*, heated car) and utilized by field personnel as needed. Personnel working on the river will

- wear a USCG-approved survival suit. If extremely cold or severe weather conditions are forecast, work activities should be postponed

- Direct contact between bare skin and cold surfaces (less than 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material

- For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed

- Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing

- Work should be arranged in such a way that sitting or standing still for long periods is minimized

- During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects

The PSO shall be vigilant in order to identify hypothermia in its earliest stage, thus preventing a potential hazard to the worker. The most important sign of hypothermia is a change in behavior; this is often subtle and typically best recognized by a co-worker or the PSO. Physical and behavioral symptoms of hypothermia include:

- Pain in the extremities

- Decrease in usual work efficiency

- Forgetfulness and a decreased level of communication

- Decline in manual dexterity

- Poor motor skills or repetitive behavior

- Poor judgment

- Lack of concern for physical needs

- Cold, pale skin appearance, shivering, and goosebumps
- Maximum severe shivering develops when the body temperature drops to 95° F. This must be taken as a sign of danger to workers and exposure to cold should be immediately terminated

Mild hypothermia is treated by re-warming the affected person by:

- Moving to a protected area
- Removing wet or damp clothing and changing into dry clothing
- Drinking warm fluids
- Wrapping in dry blankets

More severe cases of hypothermia require prompt intervention by medical personnel in addition to the above activities.

Mild cases of frostbite (*i.e.*, the affected area can still be sensed as painful) may be treated in the field by re-warming. More serious cases of frostbite should be treated at a medical facility since attempting to thaw the frozen are may cause severe damage. A victim of serious frostbite will be protected from the environment and protected from further heat loss, but the skin should not be rubbed or thawed with warm water or dry heat.

7.6 Radiation Exposure Monitoring

Procedures for radiation exposure monitoring are specified in Section 9 (Radiation or Hazardous Material Monitoring) of this HASP.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 General Protection Levels

Personnel must wear protective equipment when work activities involve known or suspected radiological or chemical atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Respirators can protect the lungs, the gastrointestinal tract and the eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with chemicals that are destructive to the skin or can adsorb to the skin or be absorbed through the skin into the bloodstream. Good personal hygiene limits or prevents the ingestion of materials.

Equipment designed to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

- Level A: Should be selected when the highest level of respiratory, skin and eye protection is needed. It is not anticipated that use of Level A protection will be required at the Site
- Level B: Should be selected when the highest level of respiratory protection is needed, but a level of skin protection lower than Level A is required. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies. It is not anticipated that use of Level B protection will be required at the Site
- Level C: Should be selected when the types of airborne contaminants are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. Level C requires the use of a full-face air-purifying respirator equipped with an organic vapor, dust, fumes and mists combination cartridge
- Level D/Modified Level D: Level D should be selected only when there are no respiratory or skin hazards suspected or known to exist at the site. Modified Level D PPE is selected when no respiratory hazards are suspected or known to exist which are associated with exposure to elevated levels of hazardous substances or radionuclides, yet the potential for dermal hazards, including contact with contaminated soils, splashes or immersion, exists. If the potential for splashes or immersion exists, coated-type chemical resistant coveralls (such as Saranex) and hard hats with face shields could be selected. If the only dermal hazards which existed were related to soil sampling, a non-coated semipermeable-type coverall (such as Tyvek) could be selected, thereby avoiding the heat stress hazards associated with an impermeable coverall. When nuisance dust concentrations below 5 mg/m^3 have been identified, the employee may wear, at their own discretion, N95 Particulate disposable respirators, such as 3M 8271, 3M 8511, Moldex N95, or AOSafety N95 respirators.

The level of protection selected is based primarily on:

- Types and measured concentrations of the contaminants in the ambient atmosphere and their associated toxicity
- Potential or measured exposure to substances in air, splashes of liquids or other indirect contact with material due to the task being performed

In situations where the types of contaminants, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards may be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components outlined in the following subsection are based on the widely used USEPA Levels of Protection.

In general:

- All protective headgear shall meet the requirements of the American National Standards Institute (ANSI) Z89.1, Class A or ANSI Z89.2, Class B
- Personnel will be provided with eye and face protective equipment when machines or operations present potential eye or face injury from physical, chemical or radiological agents. Eye and face protective equipment shall meet the requirements in ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection
- Persons requiring corrective lenses in eyeglasses, when required by this regulation to wear eye protection, will be protected by one of the following:
  - Eyeglasses whose protective lenses provide optical correction
  - Goggles that can be worn over corrective lenses without disturbing the adjustment of the spectacles; or goggles that incorporate corrective lenses mounted behind the protective lenses
- If excessive noise levels are encountered, particularly around heavy equipment operation, noise protection shall be provided as appropriate
- Persons handling rough, sharp-edged, abrasive materials or whose work subjects the hand to lacerations, punctures, burns, or bruises will use general-purpose outer hand protection in addition to the chemical resistant inner and outer gloves, as required
- Employees will wear clothing suitable for the weather and work conditions. The minimum will be a shirt, long trousers, and protective work shoes or boots. Canvas tennis or deck shoes are not acceptable
- Protective footwear will be worn by all persons who are engaged in the work.
- PPE will be inspected regularly and maintained in serviceable and sanitary condition and before being reissued to another person or returned to storage, will be cleaned, disinfected, inspected, and repaired

8.2 Site Specific Level of Protection

Based upon current information regarding the contaminants present at the Site and a hazard evaluation of the various tasks to be completed, the required levels of personal protection are:

- non-intrusive radiation or chemical measurements - Level D
- intrusive sampling via drilling or direct employee contact with contaminated soil - modified Level D or Level C at the discretion of the PSO based on *in situ* radiation and chemical measurements

These levels of protection require the following equipment:

<u>Level C Personal Protection</u>

Equipment Requirements for Level C are as follows:

- Air-purifying respirator, full-face, equipped, with chemical cartridges that are NIOSH approved for organic vapors, acid gases, dusts, fumes, mists and radionuclides
- Chemical-resistant clothing (disposable, hooded chemical-resistant coveralls
- Coveralls (optional)
- Long cotton underwear (optional)
- Nitrile gloves
- Chemical-resistant gloves over nitrile gloves, optional
- Chemical-resistant steed toed safety boots
- Chemical-resistant outer boot covers
- Hard hat
- Hearing protection, if noise levels exceed 85 dBA

<u>Modified Level D</u>

Equipment Requirements for Modified Level D are as follows:

- Semi-permeable disposable coveralls, such as Tyvek
- Long cotton underwear (optional)
- Outer gloves weather dependent, chemical-resistant (optional)
- Inner gloves (Nitrile), chemical-resistant

- Chemical resistant safety boots
- Outer boot covers (Latex), chemical-resistant (optional)
- Safety glasses or chemical splash goggles (optional)
- Hard hat (face shield optional for liquid sampling or decontamination activities)
- Hearing protection
- Particulate respirator with exhalation valve (*i.e.*, dust mask) (optional, only for use if nuisance dust levels are detected)

Level D

Equipment Requirements for Level D are as follows:

- Coveralls or suitable work uniform (*e.g.*, Blue Jeans & T-Shirt)
- Gloves (optional)
- Boots/shoes with steel toe, leather or chemical-resistant uppers
- Safety glasses or chemical splash goggles (optional)
- Hard hat (face shield optional)
- Hearing protection

The PSO may increase the level of protection based on the general reasons below:

- Known or suspected presence of dermal hazards
- Occurrence or likely occurrence of gas or vapor emission
- Change in work task that will increase contact or potential contact with hazardous materials
- Request of the individual performing the task

Conversely, the PSO may decrease the level of protection based on the following reasons:

- New information indicating that the situation is less hazardous than was originally thought
- Change in site conditions that decreases the hazard
- Change in work task that will reduce contact with hazardous materials

8.3 Inspection of PPE

Before use of protective clothing, all personnel shall determine that the clothing material is correct for the specified task at hand. The clothing is to be visually inspected for

imperfect seams, non-uniform coatings, tears and malfunctioning closures. It is to be held up to the light to check for pinholes. It is to be flexed to observe for cracks or other signs of shelf deterioration. If the product has been used previously, it should be inspected inside and out for signs of chemical deterioration, such as discoloration, swelling and stiffness. During work, the clothing should be periodically inspected for evidence of chemical deterioration, closure failure, tears, punctures and seam discontinuities.

Before using gloves, check for pinhole leaks. Prior to use, air-purifying respirators should be checked for positive and negative fit. Before and after each use, they should be inspected to be sure that they are adequately clean. Respirator components should be checked for pliability, and for signs of deterioration or distortion. Cartridges should be examined to ensure that they are the proper type for the intended use, that the expiration date has not passed and that they have not been previously used or opened. Face shields and lenses should be checked for cracks, crazing and fogginess. Equipment that is found to be defective must be replaced immediately.

9.0 RADIATION AND HAZARDOUS MATERIAL MONITORING

9.1 General Monitoring

Emergency response actions and PPE selection will be based on monitoring results. The following monitoring instruments will be used, at the discretion of the PSO, during performance of the investigation activities at the Site to make quantitative determinations of contaminant concentrations in the breathing zone of personnel, especially those with the likelihood of greatest exposure:

- MiniRAE photoionization detector (PID)
- Oxygen/combustible gas indicator (CGI)
- Miniram Dust Monitor
- Gamma radiation scintillation (sodium iodide) detector

Prior to the start of work, an initial monitoring survey will be conducted to establish background conditions. During site activities, the monitoring instruments will be operated during intrusive sampling activities. If contaminant levels in the area exceed those specified in Table 9-1, the prescribed PPE will be used or the area will be evacuated.

Contaminant concentrations detected, instrument type and calibration data will be recorded in field notebooks or field laptop computers. All instrumentation will be calibrated before use; periodic calibration checks will be made by the PSO or designee and documented in the field laptop over the duration of the work activities.

All instrumentation will be maintained in accordance with the manufacturer's specifications. All monitoring instruments will be protected from surface contamination during use to minimize the need for decontamination.

Refer to Section 10 for a description of the monitoring equipment that will be utilized for personal and equipment decontamination.

9.2 Minirae Photoionization Detector

A MiniRAE PID will be used to monitor the breathing zone of field personnel to assess the presence of volatile organic vapors in accordance with Table 9-1.

9.3 Oxygen Combustible Gas Indicator (CGI)

A CGI will be used to monitor for the presence of explosive atmospheres and oxygen concentrations in areas such as pits, depressions, excavations, on-site buildings, gamma logging boreholes, *etc.*, where flammable gases might collect. Each instrument will be set to alarm when the atmosphere being tested has reached a concentration equal to 10% of the LEL of methane and/or oxygen less than 19% or higher than 23.5%.

9.4 Miniram

A Miniram Model PDM-3 will be used to obtain real-time particulate dust measurements. An action level of 0.3 mg/m^3 sustained for at least 10 minutes will be used to determine if respiratory protection should be adopted for hazardous substances or radionuclides during intrusive work activities. An action level of 2.5 mg/m^3 sustained for at least 10 minutes will be used to determine if particulate respiratory protection should be adopted for nuisance dust during non-intrusive activities. An action level of 5 mg/m^3 sustained for at least 10 minutes will be used to determine if respiratory protection should be adopted for a hazardous level of dust during non-intrusive activities. Action levels for particulate monitoring are presented on Table 9-1.

9.5 Radiation Dosimetry

Personnel external whole body doses may be monitored with thermoluminescent dosimeters (TLDs) or film badges if potential doses may exceed 300 mrem in a calendar quarter as determined by the PSO. These will be collected quarterly and the dosimetry results will be disclosed; results will be included in the employee’s medical surveillance record.

9.6 Action Levels For Work Area Monitoring

Action levels for air monitoring results are listed in Table 9-1. The PID action levels in Table 9-1 apply to persistent readings (greater than 15 minutes) above background concentrations. The PID action levels are based on USEPA's rationale for relating total

atmospheric vapor/gas concentrations to the selection of the level of personal protection as provided in the USEPA Standard Operating Safety Guides.

The action level of 0.3 mg/m^3 for the Miniram Model PDM-3 was derived with the RESRAD computer code and must be sustained for 15 minutes before implementing respiratory protection. (RESRAD is a computer program used to calculate radiation dose in a wide variety of exposure scenarios.)

Table 9-1 - Action Levels for Work Area Monitoring

Monitoring Instrument	Contaminant Concentration	Level of Respiratory Protection/Protective Clothing or Prescribed Action
Any radiation exposure rate meter	Background to 500 µR/h	-Continue monitoring
	500 µR/h to 2 mR/h	-Continue monitoring -Notify Certified Health Physicist
	Greater than 2 mR/h	-Cease all activities and withdraw from work area - Notify Certified Health Physicist
MiniRAE PID (volatile organics)	0 ppm to background	- Use Level D protective equipment - Continue monitoring
	Background to 5 ppm above background sustained for at least 15 minutes.	- Use Level C protective equipment* - Continue monitoring
	Greater than 5 ppm above background sustained for at least 15 minutes.	- Cease all activities and withdraw from work area - See Emergency Response Procedures
Miniram Model PDM-3 (real-time particulate dust)	Greater than 0.3 mg/m^3 sustained for at least 10 minutes.	- Upgrade to full-face respiratory protection - Implement proper engineering controls
Oxygen Combustible Gas Indicator (CGI)	Greater than 10% of the Lower Explosive Limit (LEL) for methane	-Cease all activities and withdraw from work area until adequately ventilated
	Oxygen less than 19% or higher than 23.5%	-Cease all activities and withdraw from work area until oxygen levels stabilize

*If personnel do not have the specified protective equipment and appropriate certifications, they must withdraw from the work area in accordance with the Emergency Response Procedures.

10.0 SITE CONTROL MEASURES

10.1 General

A daily log containing the names of personnel, site entry and exit times, and their levels of personal protection shall be maintained. Site security may involve the use of security guards to protect equipment and field personnel during field activities, if deemed necessary.

10.2 Work Zones

In order to control the potential spread of contamination from chemical or radiological areas and to prevent injury to field personnel and the public, work zones will be classified according to three categories as outlined below:

- Exclusion Zone(s)/Hazardous Work Areas. For this site, the Exclusion Zone will be all parts of the site not designated as Support or Contaminant Reduction Zones. During sample collection outside the Exclusion Zone, a five-foot radius circle around the sampling point will be the designated work area. A plastic drop cloth will be used to eliminate contact between potential contaminated ground surface and clean sampling equipment and containers. The level of personal protective equipment required in the Exclusion Zone shall be in accordance with the specified requirements as a minimum or as determined by the PSO after monitoring and on-site inspection. No eating, drinking or smoking will be allowed in this zone. No personnel will be allowed in the Exclusion Zone without the proper PPE, medical authorization, and training certification. The appropriate authorities shall be contacted prior to the commencement of the field activities. Actions required of all personnel include conducting field activities with at least two field team members, finishing all field activities during daylight hours, and limiting the public visibility of field personnel while activities are being conducted. In addition, each field team will be required to carry two-way radios and have access to a cellular phone
- Contamination Reduction (Buffer) Station. The Contamination Reduction Zone (CRZ) or station will be used for the general entry and egress station to and from the Exclusion Zone. This area will be the area designated for the decontamination of personnel, clothing, and equipment prior to entering the Support Zone, and for the physical segregation of the Support and Exclusion Zones. The level of PPE required in this area shall be in accordance with the specified requirements as a minimum or as determined by the PSO after monitoring and on-site inspection. No eating, drinking or smoking will be allowed in this area. Appropriate safety and emergency equipment, such as the first aid equipment, fire extinguishers, and portable eye wash stations, will be maintained in this zone.

- Support (Safe or Clean) Zone(s). This zone will be established by the Project Health Physicist, PSO or designee. The Support Zone is defined as the area outside the zone of significant contamination. The Support Zone shall be protected from work site contamination. Eating and drinking will be allowed only in this Zone

The function of the Support Zone is to provide:

- An entry area for personnel, material and equipment to the CRZ and Exclusion Zone
- An exit area for decontaminated personnel, materials and equipment from the CRZ
- An area for location of Support Area facilities
- A storage area for clean safety and work equipment

The specific location of work zone boundaries shall be determined jointly by the Site Field Manager, the PSO or designee and the Subcontractor prior to field mobilization. Decontamination of personnel will be performed as outlined in Section 10 before entering the Support Zone. Access of non-essential personnel to the Exclusion Zone and CRZ will be strictly controlled. Only personnel who are essential to the completion of the field investigation will be allowed access to work areas, if they are wearing the prescribed level of protection.

10.3 Standard Operating Procedures for Safety

The Site contains a range of physical and radiological hazards that must be understood by all field personnel assigned to work on this site. At a minimum, the safe work practices to be followed at the site shall include:

- The number of personnel and equipment on the site shall be minimized, consistent with effective site operations
- With the following exceptions, on-site personnel shall use the buddy system (*i.e.*, within earshot or visual contact with other workers). The buddy system is optional under the following conditions:
- Non-intrusive work on publicly accessible properties (*e.g.*, parks) or residential properties (*e.g.*, going to a property to produce a design sketch, switching out E-Perms) located in Areas 2 through 6. The person conducting the work must have a cell phone
- Oversight of subcontractor work on properties located in Areas 2 through 6 when subcontractor employees are present. The person conducting the work must have a cell phone

- Two individuals are required to be present on site at all times, regardless of the type of work being conducted. The person conducting the work has the right to request that the buddy system be used at any time. All field personnel will be required to carry two-way radios or cellular phones.
- Because of potential safety issues associated with abandoned and/or uninhabited buildings, site workers must stay within their designated work areas. No one should enter restricted access areas without authorization of the PSO
- Site activities will be performed to minimize dust production and soil disturbance.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, the need for decontamination and cross contamination
- All work areas shall be lighted to not less than five foot candles. Because some work will be conducted outdoors, portable lighting may be required to support work in the dawn or dusk hours
- Eating, drinking, chewing gum or tobacco, smoking, or any practice, which increases the probability of hand-to-mouth transfer of contaminated material, is strictly prohibited in the work area outside the designated clean zone
- All clothing and bare skin that may have come into contact with radioactive contamination will be "frisked" with a GM pancake detector prior to leaving a contaminated area.
- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the contractor or subcontractor occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities
- Any respiratory protective equipment and clothing must be worn by personnel as outlined in this HASP. Excessive facial hair (*i.e.*, beards, long mustaches or sideburns), that interferes with the satisfactory respirator-to-face seal is prohibited
- When it is necessary for a visitor to observe the fieldwork, that person will be issued appropriate PPE, briefed on potential hazards, safety practices, decontamination procedures and site communications. All site visitors must supply respiratory equipment and proof of training/fit testing to the PSO or designee
- All employees have the obligation to correct or report unsafe work conditions
- Prior to shield removal activities, field personnel shall review structural data which may include a statement prepared and signed by a Professional

- Engineer which states that the shield removal operation will not impact the structural integrity of the building

10.4 Decontamination Procedures

10.4.1 Decontamination of Personnel

The degree of decontamination required is a function of both a particular activity and the physical environment within which it takes place. Decontamination procedures are described below. The Project Health Physicist, PSO or designee will monitor these procedures. All on-site activities will be carried out in such a manner as to minimize excessive contamination of personnel, protective equipment, tools and machinery.

Decontamination will take place in the area designated as the CRZ. Personnel egress to and from these zones will be limited. This will minimize the potential spread of contaminated material to clean areas. A potentially contaminated person shall not exit the site by any means other than through the CRZ accept in emergencies. Upon leaving the site for lunch break or at the end of each work shift, personnel will be required to remove all contaminated protective clothing/equipment. Upon completion of remediation activities, at each time of break, or at the end of each work shift, the work crew will proceed toward the designated decontamination area. All potentially contaminated equipment (e.g., shovels, tools) will remain in the Exclusion Zone until the end of the field activity.

A GM pancake detector Model 44-9 will be used for equipment and personnel frisking. The GM detector can detect beta, gamma, and alpha radiations and thus is not as susceptible to material self-absorption as is an alpha-only detector such as ZnS(Ag). While the release limits are shown in Table 10-1, in practice, any reading above background would initiate decontamination of the equipment or person.

Table 10.1 - Surface Contamination Limits

	Alpha		Beta/Gamma	
Agency / Reference	Total (dpm/100cm^2)	Removable (dpm/100cm^2)	Total (dpm/100cm^2)	Removable (dpm/100cm^2)
NYCDOH §175.03 - Release of Materials or Facilities	2,500 (Max) 500 (Avg)[1]	100	0.2 mR/hr[2]	1,000

Notes: 1. Averaged over 1 m^2
2. Measured at 1 cm from the surface

Each individual leaving the site will be frisked while standing on the plastic sheet using a GM pancake detector coupled to a suitable scaler/ratemeter, such as a Ludlum Model 3, for residual radioactive contamination. If elevated measurements are observed, a piece of clear tape will be applied to the elevated area, removed, and the area will be re-frisked. Personnel will have a backup set of clothing or coveralls in case the clothing being worn cannot be decontaminated with tape. If clear tape does not remove residual contamination from the skin, the affected area will be washed gently with warm water using a mild (non-abrasive) cleaner, dried and re-frisked. If after several washings, the skin remains contaminated the affected area will be covered with a piece of plastic, duct taped, and placed under a lamp to induce sweating. The affected area will again be washed gently with warm water using a mild (non-abrasive) cleaner. If clear tape does not remove residual contamination from an item of clothing, that item will be removed and bagged for proper disposal.

For decontamination at properties that also had a prior industrial/commercial use the following procedure will be used, if warranted. Prior to removal, boot covers or boots, aprons and outer gloves will be washed in large tubs with a soap and water solution (e.g. Alconox), rinsed with fresh water, and removed. Absorbent pigs will be used to contain spilled and splashed water. A bristle brush will be used to remove gross soil contamination. A pump sprayer will be utilized for each rinse station. Wash and rinse waters will be contained in storage containers. Unsoiled or decontaminated disposable protective equipment will be disposed as described in Section 10.5.

10.4.2 Decontamination of Field Equipment

When equipment must be removed from the Exclusion Zone, decontamination procedures shall be performed in the CRZ similar to the personnel decontamination described above. Each piece of equipment leaving the site will be frisked using a GM pancake detector. Acceptable surface contamination levels for field equipment are presented in Table 10-1**.** However, in practice, no detectable surface contamination would be permitted to remain on equipment or persons leaving the site.

If elevated measurements are observed, a piece of clear tape will be applied to the affected area of the item, removed, and the area will be re-frisked. If after several attempts residual radioactivity remains on an item, that item will be bagged and returned to the field office for decontamination. At properties with a past industrial/commercial use, the equipment will be wiped and brushed using soapy water, rinsed using fresh water, and then dried with a disposable paper towel. Personnel will be protected by Level C PPE whenever measurements exceeding 10 times the release levels must be decontaminated.

10.4.3 Decontamination of Heavy Equipment

If subcontractors need to decontaminate heavy equipment, the subcontractor will design, install, and operate a heavy equipment decontamination pad in the CRZ consisting of at least the following equipment:

- A decontamination pad 10% larger in area than the largest piece of heavy equipment that will be used on the site
- Decontamination water collection system
- High pressure washing equipment to remove potentially contaminated soils

After a piece of heavy equipment has been decontaminated, the equipment will be scanned for residual radiological contamination in accordance with the acceptable surface contamination levels presented in Table 10-1. Areas that exceed those levels will be re-washed until the surface contamination levels are achieved.

10.4.4 Decontamination for Medical Emergencies

In the event of a minor, non-life-threatening injury, personnel should follow the decontamination procedures as outlined above, and then administer first aid.

In the event of a major injury or other serious medical concern, immediate first aid is to be administered in lieu of further decontamination efforts unless the environmental conditions would be considered "Immediately Dangerous to Life or Health," in which case all personnel shall evacuate the site.

10.5 Disposal Procedures

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, (*e.g.*, clothing, gloves) will be bagged or drummed as necessary and segregated for disposal by the contractor. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory requirements. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

11.0 EMERGENCY RESPONSE PLAN

11.1 Emergency Planning

The PSO or designee shall implement this emergency response plan whenever conditions at the site warrant such action. The PSO will be responsible for assuring the evacuation, emergency treatment, and emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate staff.

The PSO or designee will inform the local fire department about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants.

11.2 Emergency Equipment

Emergency equipment will be readily accessible and distinctly marked. All prime and subcontractor personnel will be familiar with the location and trained in the use of emergency equipment. Emergency equipment that will be available on-site includes:

Fire Extinguishers

- The PSO shall ensure that personnel and subcontractors have access to fire extinguishers
- At least one Class AB dry chemical fire extinguishers will be located at each active work area.
- Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary
- Immediately after each use, fire extinguishers will be either recharged or replaced
- Fire extinguishers will be carried in the field vehicles, distinctly marked, and readily accessible

First Aid Kits

- First Aid Kits will conform to Red Cross and the requirements of 29 CFR 1910.151
- First Aid Kits shall consist of a weatherproof container with individually sealed packages for each type of item
- First Aid Kits will be fully equipped before being sent to the site, will be checked weekly by the PSO or designee, and expended items will be immediately replaced
- First Aid Kits will be carried in the field vehicles, distinctly marked, and readily accessible

Eye Wash

Emergency eyewash capability shall be provided to all field personnel. In an eye injury emergency, the eye will be immediately flushed with large amounts of water for a minimum of 15 minutes while lifting the lower and upper lids. Professional medical attention should be sought immediately. Emergency eye wash containers will be distinctly marked and located in areas known to all field personnel. The emergency eyewash will meet the minimum requirements of ANSI Z358.1-1990.

11.3 Personnel Roles, Lines of Authority and Communications

The PSO is the primary authority for directing operations at the site under emergency conditions. All communications both on-and off-site will be directed through the PSO.

Section 4, Project Organization and Responsibility, outlines the roles and responsibilities of safety personnel for the project.

Telephones, walkie-talkies, and hand signals will be used for communications at the site, as detailed below:

- Telephones: There will be a telephone in the field office (if present) for use during emergency situations. All field-sampling crews will carry mobile phones. Working order of the phone shall be verified before site operations begin
- Walkie-Talkies: Hand held units shall be utilized as much as possible by field teams for communication between remote work areas
- Hand Signals: To be employed by field teams along with utilizing the buddy system. These signals are also very important when working with heavy equipment. The entire field team will know all hand signals before operations commence. Hand signals will be discussed during site-specific training prior to field work
  - Hand gripping throat = out of air, can't breathe
  - Grip "buddy's" wrist or both hands around waist = leave area immediately
  - Hands on top of head = need assistance
  - Thumbs up = OK, I am all right, I understand
  - Thumbs down = no, negative
  - Arms waving upright = send backup support

11.4 Emergency Recognition and Prevention

As part of the initial site-specific health and safety briefing, the PSO and HP will address emergency recognition and prevention. Topics will include hazard recognition regarding tasks to be performed in addition to hazards associated with site contaminants. Other topics relating to emergency recognition and prevention are mentioned in other chapters of the HASP.

11.5 Adverse Weather Conditions

In the event of adverse weather conditions, the Site Field Manager and PSO or designee will determine if work can continue without sacrificing the health and safety of site workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress
- Inclement weather-related working conditions
- Limited visibility
- Potential for electrical storms

11.6 Emergency Medical Treatment First Aid

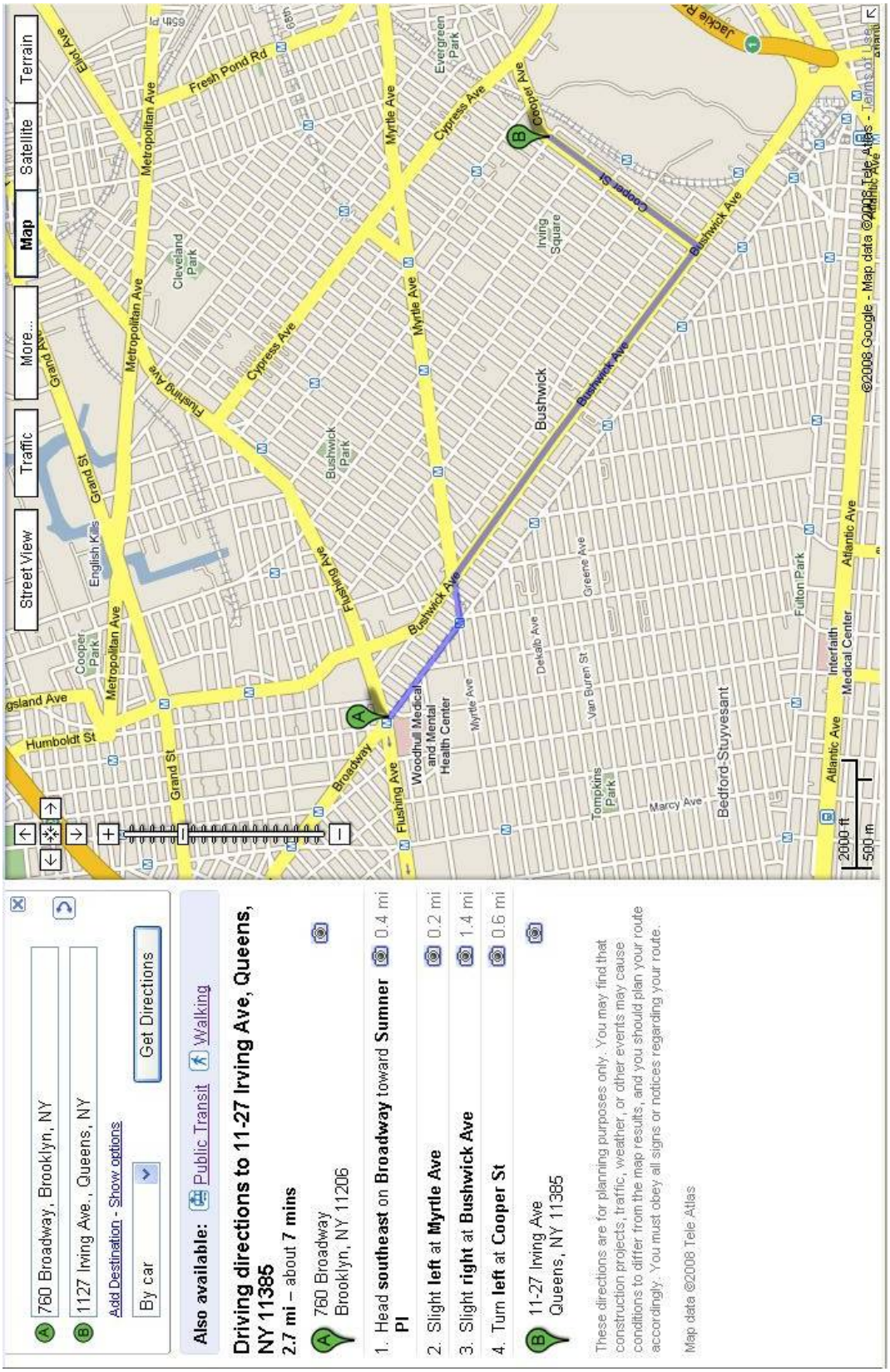
In the event of personal injury, emergency first aid will be applied on site as deemed necessary. Decontaminate as appropriate and transport the individual to the nearest medical center if needed. Appropriate medical data sheets will be provided by the PSO to the medical facility.

If any personnel have been directly exposed to chemicals or contaminants of concern, follow the procedures outlined below:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eye wash stations will be provided on site. If necessary, transport to the nearest medical facility
- Inhalation: Move to fresh air and, if necessary, transport to the nearest medical facility
- Ingestion: Decontaminate and transport to the nearest medical facility

In the event of a serious medical emergency, victims shall be treated at the nearest hospital (see Figure 11-1). The Emergency Room Supervisor will be contacted in the case of a serious medical emergency for determination of the appropriate mode of transportation (*i.e.*, by personal vehicle, ambulance, or ambulance after on-site treatment by paramedics). The hospital will be contacted and briefed on the situation, the potential hazards, and the substances involved. Written directions and map of the route to the hospital shall be posted at the site during field activities.

Figure 11-1 - Hospital Route (Woodhull Medical Center)



11.7 Emergency Numbers

Pertinent emergency telephone numbers shall be posted on site at all times in case of emergency (typically in the field vehicle or office).

11.8 Evacuation Procedures / Safe Distances

Evacuation procedures will occur at three levels: (1) withdrawal upwind from immediate work area (100 feet or more upwind), (2) site evacuation, and (3) evacuation of surrounding area. Anticipated conditions that require these responses are described in the following subsections. If site evacuation is required, all field team members will be notified by cellular phone.

Withdrawal Upwind

Withdrawing upwind (100 feet or more) will be required when (1) ambient air conditions contain greater contaminant concentrations than guidelines allow for the type of respiratory protection being worn (the work crew may return after donning greater respiratory protection and/or assessing the situation as transient and past); (2) a breach in protective clothing or minor accident occurs (the work crew may return when the tear or other malfunction is repaired and first aid or decontamination has been administered); or (3) the respirator malfunctions requiring replacement.

The work crew will observe general wind directions while on-site. Upon observing conditions that warrant moving away from the work site, the crew will relocate upwind a distance of approximately 100 feet or farther, as indicated by the site monitoring instruments. Donning SCBA and a safety harness and line, the PSO and a member of the crew may return to the work area to determine whether the conditions that were noted were transient or persistent. If persistent, an alarm should be raised to notify on-site personnel of the situation and the need to leave the site. An attempt should be made to decrease emissions only if greater respiratory protection is donned. The HSM, Project Manager, and the USACE PM will be notified of conditions. When access to the site is restricted and escape is thereby hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

Site Evacuation

Evacuation of the site will be required when (1) ambient air conditions contain explosive and persistent levels of combustible gas, excessive levels of toxic gases, or excessive dust; (2) a fire or major collapse occurs; or (3) explosion is imminent or has occurred.

After determining that site evacuation is warranted, the work crew will proceed upwind of the work site and notify the PSO of site conditions. If the decontamination area is upwind and more than 500 feet from the work site, the crew will pass quickly through decontamination to remove contaminated outer suits. If the hazard is toxic gas, respirators will be retained. The crew will proceed to the field office to assess the situation, where the respirators may be removed (if instrumentation indicates an acceptable condition). As more facts are determined from the field crew, they will be relayed to the appropriate agencies. The advisability and type of further response action will be coordinated and implemented by the PSO.

The evacuation route and an upwind gathering point will be determined by the PSO or designee each day and communicated to all field personnel prior to beginning work. Any modifications to the evacuation route or gathering point will be discussed at the morning safety meetings.

Surrounding Area Evacuation

The area surrounding the site will be evacuated when persistent, unsuppressible toxic or explosive vapors from borings (*e.g.*, pressure release from punctured drum) are released, or air quality monitored at several points downwind assesses danger to the surrounding area.

When the PSO or designee determines that conditions warrant evacuation of downwind residences and commercial operations, the local agencies will be notified and assistance requested. Designated on-site personnel will initiate evacuation of the immediate off-site area without delay.

11.9 Site Security and Control

A daily log containing the names of personnel, including site entry and exit times, and their levels of personnel protection shall be maintained by the PSO or designee. Site security may involve the use of security guards to protect equipment or field personnel during investigation activities.

Work areas will be well marked with barriers and caution tape so that accidental entry into these areas can be avoided. In order to control the potential spread of contaminants, and to keep visitors from entering potentially hazardous areas, the three-work zone approach will be utilized. Section 10.2, Work Zones, details the three-work zone approach.

11.10 Fire or Explosion

Temporary evacuation of the site will occur if LEL values are above 10% in the work zone. Notify local fire and police departments and other appropriate emergency response groups if an actual fire or explosion has taken place.

11.11 Spill Containment Plan

The goal of spill containment is to avoid spilling potentially hazardous liquids or solids at any time, especially during transfer, transport or disposal of these materials. In the unlikely event that a spill occurs, the field personnel will make a reasonable effort to contain the spill. If a significant release has occurred, the National Response Center should then be contacted. This group will alert National or Regional Response Teams as necessary. Following these emergency calls, the reporting individual should then notify the Project Manager, the HSM and the USACE PM. Cleanup will be conducted in accordance with applicable federal and state requirements including 29 CFR 1910.120(j).

The following specific steps will be taken to avoid spill control/containment if needed:

- Drums and containers will be labeled indicating their contents
- Drums will be inspected prior to moving to ensure their integrity
- The amount of drum movement will be minimized to the extent practical
- Appropriate PPE (Level C) will be used when cleaning up spills

If liquids are spilled, they will be contained with absorbents and later placed in drums. Spilled soils or liquids spilled on soils will be placed in drums for future disposal. In the case of a radiological spill, the affected area(s) will be cordoned off, limiting access to members of the public. The material will then be collected by individuals in modified Level D PPE and placed in suitable containers (such as 55-gallon drums). The area(s) will then be scanned for compliance with the surface action levels shown in the USNRC Regulatory Guide 8.23.

If an Immediately Dangerous to Life or Health (IDLH) atmosphere does not exist and adequate PPE is being used, prevent the spread of contamination whenever possible. The Project Manager and the PSO will be notified. Other appropriate emergency response groups and management will be notified as necessary by the PSO. The Project Manager, PSO or designee will also determine whether an evacuation of the immediate areas is necessary and will announce that decision. If possible, personnel should leave the area through the CRZ. If this is not possible, personnel should leave via the shortest route possible.

11.12 Emergency Response Evaluation

Before normal site activities are resumed, personnel will be fully prepared and equipped to handle another similar emergency. The Project Manager and the Site Safety Manager will be responsible for restocking emergency supplies, replacing or repairing damaged equipment, and ensuring that the Exclusion, Contaminant Reduction and Support Zones

have been redefined. The Project Manager will notify appropriate government agencies as required.

The Project Manager is responsible for initiating an investigation and documenting the incident. This investigation will be designed to develop information about the institutional, organizational, technical, and operational root causes of the accident or injury. Documentation will include:

- A chronological history of the incident
- Facts about the incident and when they became available
- Title and names of involved personnel
- Decisions made, orders given, to whom, by whom and when
- Actions taken, who did what, when, where and how
- Environmental measurements
- Potential exposures of site personnel
- History of all injuries or illnesses during or as a result of the incident

As soon as practical but before site work resumes, a meeting will be held to review and revise all aspects of the HASP according to new site conditions, cleanup or other additional tasks required as a result of the incident, and lessons learned from the emergency response. This meeting will be attended by the Project Manager, the Task Leader, the PSO, representatives of partner firms whose operations or tasks were or could be impacted by the incident, and by representatives of any and all contractors whose operations or tasks were or could be impacted by the incident. The CHSM will be available on a consultative basis during this meeting. Meeting minutes will be developed in sufficient detail to document issues discussed and action items assigned.

The purpose of the meeting will be to:

1. Review the incident and unsafe conditions and/or act which resulted in the incident

2. Determine if and how these conditions or acts were preventable

3. Replace, or correct procedures which failed to result in desirable responses or activities

4. Determine if the incident has changed the site profile and where and what that impact might be

The result of the meeting will be:

1. The generation of a series of action items which must be satisfactorily completed prior to the re-initiation of the site activities
2. Developing, if required, appropriate changes to the HASP
3. Retraining site personnel in the changes to the HASP
4. Communicating the results of the evaluation to the CHSM

12.0 RECORDKEEPING

Recordkeeping will include Medical Training Records, Site Safety and Health Plans and Incident Reports. In addition, records of meetings on health and safety matters will be maintained by the CHSM.

12.1 Medical Surveillance Report

The employer or the employer's medical center will maintain the original medical monitoring record. 29 CFR 1910.1020 requires retention of medical records to termination of employment plus 30 years. The employer shall maintain a copy of the employee's Disclosure Agreement and Physician's Statement.

12.2 Employee Training Records

Health and safety training records are maintained to document qualifications and capabilities of personnel and to demonstrate compliance with company training requirements. Each site-specific training session will be documented by a training report. The PSO will prepare the report and include the date of training, location, a list of attendees and a description of the material covered. The original report will be filed with the CHSM. Copies of CPR/first aid training certificates will be retained. Respirator fit test records will also be maintained.

12.3 Site Health and Safety Plan (HASP)

This HASP will be completed and in-place prior to each work assignment involving field activities. The HASP will be signed and approved by the CHSM and Project Manager. The original of each completed HASP will be placed in the Project File. A copy will accompany the field team and be readily available at the work site under the control of the PSO or designee. Copies of the HASP will be available to all employees when site-specific training is provided.

In addition to the HASP, the following documents may also be prepared, as necessary, depending on site conditions and circumstances:

- Site Health and Safety Meeting Reports - will be documented in the field laptop that becomes part of the permanent project file. Telephone conversation records on health and safety decisions will be retained
- Site Health and Safety Follow-up Report - will be completed by the Site Manager after completing work covered by the HASP. This report is an internal document only and will be maintained by the CHSM
- Health and Safety Audits - The CHSM or his/her designee will periodically audit field activities to determine compliance with the HASP

12.4 Incident Reports

Any work or site-related occurrence that either results in or has the potential to result in the need for medical treatment must be reported to the Project Manager and CHSM within 24 hours, regardless of the severity. Details of the incidents are to be documented in the Incident Reports as soon as possible and no later than 6 days after the incident. Reporting of the incident by the Project Manager to regulatory agencies shall be performed per applicable regulations.

APPENDIX A1 - SAFETY WORK PERMIT

Page 1 of 2

Project:			Starting Date:	
Site:			Project.Manager	
			Project.Safety Officer	
			Project HP	
			:	
Client:			RegulatoryAgncy	
			Contact:	
Tel.;			Tel.:	

SCOPE OF WORK:

SAFETY SPECIFICATIONS	
Protective Clothing:	
Dosimetry Required:	Radiation Badge SRD Bioassay
If Bioassay, List Nuclides, Frequency	
Contamination Control Measures:	
Decontamination Field Release Limits:	
Types of Field Measurements & Samples To Be Collected	
Other Notes:	
PSO Approval (Sign):	Date:

APPENDIX A2 - SAFETY WORK PERMIT - ON SITE SAFETY CHECKLIST

Project:			Starting Date:	

PERSONNEL:							
	NAME		JOB DESCRIPTION	Physical	Training	Respirator Fit Test	Pre-Op. Bioassay
1							
2							
3							
4							
5							
6							
7							
8							

FINAL SAFETY CHECKLIST:	X	NOTES:
Personnel Logged-in		
Site-Specific Training		
PPE Issued		
Contamination Control Set Up		
Instrumentation Ready		
Client Rep. Contacted		
Regulatory Contacted		

On-site Supervisor Signature:	Date:

APPENDIX B - SITE SAFETY TRAINING AND ACKNOWLEDGMENT FORM

Project: _____

Name: _____

Date: _____

CERTIFICATION: The above named person has been trained regarding radiological, safety and hazardous materials work
at the above named site(s) per NYS Code Rule 38 and 10CFR19.

Instructors: _____

_____

I, (print)_____, have been instructed in the work to be performed, the purpose of the operation, the nature of the radioactive materials to be handled, and the precautions to be taken to protect myself from those materials (including protective clothing, time, distance, shielding, and radiation monitoring). I have no objection to the performance of work with radioactive or hazardous materials.

Trainee: _____

APPENDIX C - FIELD PROJECT - DAILY SAFETY CHECKLIST

Project: _____ Date: _____ Page: ____ of _____

PERSONNEL:								
NAME	WORK PERFORMED	SRD START/END	TIME IN	TIME OUT	SURVEY RESULTS	TIME IN	TIME OUT	SURVEY RESULTS
		/						
		/						
		/						
		/						
		/						
		/						
		/						

SAFETY BRIEFING:

INSTRUMENTATION CHECK:						
	INSTRUMENT	CAL. DATE	SOURCE	ACTIVITY	DIST.(cm)	READING
1						
2						
3						
4						

OTHER NOTES:	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Supervisor: _____

APPENDIX I

DEVIATIONS BETWEEN SAMP AND FINAL RADIOLOGICAL SCOPING SURVEY REPORT

Deviations between SAMP and Final Radiological Scoping Survey Report

No.	SAMP Section	Deviation	Response
1	3.4.2	Sewer line not snaked using a gamma probe, but manhole surveys were taken, and samples collected.	The original plan to snake sewer lines was changed based on suggestions from the EPA and because there was no main accessible drain from the facility to the sewer line. Instead, manholes were surveyed with a NaI scintillation probe, and samples were taken where solid sample material was available. Since the drop-out of material from the FWACC site would be expected to occur in manholes, this was considered to be a reasonable alternative. The extent of manhole evaluation somewhat exceeded the original estimate, and there was not impact on the results and conclusions of the survey.
2	3.4.2	The completion of the Scoping Survey and report were originally scheduled within 6 months after commencement of onsite work.	Due to the difficulties in obtaining access agreements and the relocation of materials into the yard area (crane parts), the onsite work was spread out over an extended period of time, so that the 6 month schedule was not met.
3	5.5.2	Groundwater sample not collected due to hydrology and topography limitations.	Since the Site elevation is approximately 75-65 feet above means sea level (amsl), groundwater is expected to be approximately 60 to 50 ft below ground surface (bgs). Monitoring wells were installed in two of the borings completed by the City of New York in 1980; however, each of the wells was reported to be dry at depths of 28.3 and 37.0 feet bgs. During LBA's Phase II ESI, a well was observed on the south corner of the intersection of Cooper Avenue and Irving Avenue; this was assumed to be one of the two monitoring wells installed in 1980. The well was gauged by Berger and found to be dry at a depth of 35.0 feet bgs. Berger also attempted to obtain a groundwater sample from boring B-1D during the Phase II ESI at 27 feet bgs (stopped due to refusal); however, no groundwater was encountered.
4	6.1.5	Real Time Radon-Thoron was not performed using a "sniffer".	Real-time radon-thoron sniffing with a wand-type suction nozzle was planned in the SAMP to investigate possible contaminated equipment such as embedded piping, tanks, or enclosures remaining from the FWACC. However, no such items were presently found in the buildings. Instead, wide dispersion of contamination beneath floor slabs was found to be present. Therefore, long-term radon/thoron detectors were used to assess personnel exposure instead of the sniffing technique for equipment assessment. There is no impact on the results and conclusions of this survey.

Deviations between SAMP and Final Radiological Scoping Survey Report

5	Table 6	Background soil samples were not obtained at/near the site.	Background soil sampling was planned in the SAMP to be performed somewhere in the vicinity at a property known not to have been affected by the FWACC. Given that uncertainty (if a nearby property had been affected) and the other difficulties encountered in getting permission for property access, we decided to forego the background sampling and utilize the additional time and materials for actual site measurements which had been significantly delayed due to access difficulties. Because this survey was not a final status survey, comparison of site results with background was not essential. Furthermore, the range of thorium background concentrations in northeastern soil is well known (0.5 - 1.0 pCi/g) from work at Brookhaven National Laboratory and the Welsbach and US Radium Superfund sites. There is no impact on the results and conclusions of this survey.
6	Figure 5-1 and Table 4	An additional Survey Area was added	The shops named Primo Flat Fix, Mini Shop and K & M Auto Repair were found to be physically separated and different than the other nearby survey areas therefore they were incorporated into an additional area A-7.