DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER

November 4, 2014

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FROM: AFCEC/CIBE – Plattsburgh
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SUBJECT: Final Site Clousre Report for Land use control/institutional control site SS024
Fire Demonstration Area AOC
October 2014
Former Griffiss Air Force Base (AFB) Rome, New York
Contract Number FA8903-10-D-8595 / Delivery Order 0014

Accompanying this letter please find the "Final Site Clousre Report for Land use control/institutional control site SS024 Fire Demonstration Area AOC" in relation to work conducted at the Former Griffiss AFB in Rome, New York under the referenced Performance Based Remediation (PBR) contract.

This report has been prepared to present results from the June 2014 soil sampling event which was conducted based on a NYSDEC comment provided on May 8, 2014 for the Final Site Closure Report (March 2014).

We would appreciate review comments by December 5, 2014 so that project schedules and performance milestones can be maintained in accordance with this PBR Contract.

Should you have any questions or concerns please contact me at 518-563-2871.

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FINAL

SITE CLOSURE REPORT
LAND USE CONTROL/INSTITUTIONAL CONTROL SITE
SS024 FIRE DEMONSTRATION AREA AOC

FORMER GRIFFISS AIR FORCE BASE SITE
ROME, NEW YORK

Prepared for:

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Contract Number FA8903-10-D-8595/
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October 2014

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LIST OF ACRONYMS AND ABBREVIATIONS

ABS	Dermal Absorption Factor
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AOC	Area of Concern
ATc	Averaging Time Cancer
ATnc	Averaging Time Non-Cancer
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below Ground Surface
BW	Body Weight
CQCR	Chemical Quality Control Reports
CR	Carcinogenic Risk
DoD	Department of Defense
ED	Exposure Duration
EF	Exposure Frequency
ET	Exposure Time
FPM	FPM Remediations, Inc.
ft	Feet
HI	Hazard Index
IR	Ingestion Rate
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
KM	Kaplan-Meier
LUC/IC	Land Use Control/Institutional Control
M	Soil to Skin Adherence Factor
µg/L	microgram/liter
MS/MSD	Matrix spike/ matrix spike duplicates
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated biphenyl
PEF	Particulate Emission Factor
PID	photoionization detector

RfC	Reference Concentration Inhalation
RfDo	Reference Dose Oral
RfDd	Reference Dose Dermal
RI	Remedial Investigation
ROD	Record of Decision
SA	Exposed Skin Surface Area
SCO	Soil Cleanup Objective
SFd	Slope Factor Dermal
SFo	Slope Factor Oral
SVOC	Semi-Volatile Organic Compound
UCL	Upper Confidence Limit
UFP QAPP	Uniform Federal Policy Quality Assurance Project Plan
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This Final Site Closure Report has been prepared to present the June 2014 soil sampling results. This sampling event was conducted based on a New York State Department of Environmental Conservation (NYSDEC) comment provided on May 8, 2014 for the Draft Site Closure Report for Land use Control/Institutional Control Site SS024 Fire Demonstration Area (FDA) Area of Concern (AOC) (CAPE/FPM, March 2014). The comment is as follows:

- *The New York State Department of Environmental Conservation and the New York State Department of Health do not agree with the recommendation to remove the deed restriction. The pesticide dieldrin is still present on the site in exceedance of both NYSDEC groundwater SCOs and residential soil numbers (and they have not actually characterized the first 2 feet of soil specifically, all upper soil samples seem to have been collected from a 0-4' interval). Regardless of whether this pesticide comes from former activities at the AOC or because of base spraying, it is there.*

Based on the comment, eight additional soil samples were collected at the site to characterize pesticide contamination within the 0 to 2 feet (ft) below ground surface (bgs) interval on June 13, 2014. The ample locations are illustrated on the attached Figure. The results will be compared to Title 6 - New York Codes, Rules and Regulations (6-NYCRR) Part 375 Residential use Soil Cleanup Objectives (SCOs) and Protection of Groundwater SCOs [NYSDEC, December 2006]. The sample locations are illustrated on the attached Figure 1. Sample analysis results indicated that all metals concentrations were below their respective residential use SCOs (Table 1).

The 2013 and 2014 results show that one pesticide, dieldrin, exceeds of 6-NYCRR Part 375 Residential use SCOs and Protection of Groundwater SCOs in surface and subsurface soil. As a result, the 2013 Health Human Risk Assessment was updated to include the 2014 data. The results of the residential HHRA show that there are no unacceptable non-carcinogenic or carcinogenic risk from exposure to soil and groundwater for potential residential receptors. Therefore, it is requested that the site be closed and that New York State and USEPA grant permission to remove the remaining deed restrictions at the SS024 FDA AOC.

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1 INTRODUCTION

FPM Remediations, Inc. (FPM), in association with CAPE, Inc., under contract with the Air Force Civil Engineer Center (AFCEC), conducted site closure activities at the Land Use Control/Institutional Control (LUC/IC) Site SS024 FDA AOC, at the former Griffiss Air Force Base (AFB) in Rome, New York.

1.1 Purpose

This Site Closure Report has been prepared to present soil sampling results from May 2013, July 2013, and May 2014. Sampling was conducted at this site as a result of the Air Force's initiative to reduce its long-term environmental liabilities and life cycle costs through site closures. This site is subject to a deed restriction in the form of land use restrictions for non-residential use and groundwater use restrictions. An evaluation of the site, including soil sampling, was conducted to determine if residual soil contamination is at levels below the 6-NYCRR Part 375 Residential use SCOs [NYSDEC, December 2006] and to obtain site closure with unrestricted reuse at the site. The site closure activities were conducted in accordance with the Final Site Closure Plan for LUC/IC Sites (CAPE/FPM, March 2013). The Updated 2013 Uniform Federal Policy Quality Assurance Project Plan (UFP QAPP) for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, May 2013) and Health and Safety Plan for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, July 2012) were also adhered to.

2 RECORD OF DECISION

The record of decision (ROD) for the FDA AOC was signed by the Air Force and the United States Environmental Protection Agency (USEPA) in September 1999. Based on the previous investigations and environmental conditions at the site, the selected remedy for the FDA AOC is no further remedial action, with LUC/ICs for industrial land use and groundwater use restrictions. The ROD for the FDA (included in Appendix A), states that:

- The property will be industrial use unless permission is obtained from the USEPA, NYSDEC, and the New York State Department of Health (NYSDOH) and
- The owner or occupant of the property shall not extract, utilize, consume, or permit to be extracted, any water from the aquifer below the ground surface within the boundary of the property unless such owner or occupant obtains prior written approval from the NYSDOH.

3 SITE BACKGROUND

The FDA is located north of Buildings 101 and 100, between Taxiways 17 and Apron 3 in Parcel A1A. Surface water run-off discharges into the Mohawk River. The FDA was used from 1974 to 1992 for fire demonstrations. From 1974 to 1987, fuels and other flammable materials were ignited on bare ground and from 1987 to its closure in 1992 fuels were ignited in a metal trough.

3.1 Remedial Investigation

Groundwater sampling and a soil gas survey were performed in 1994 during the remedial investigation (RI) [Law, December 1996]. Volatile organic compound (VOC) concentrations met applicable standards or guidance values in all of the soil gas samples. One grab groundwater sample was collected and analyzed for VOCs, dioxin, pesticides and polychlorinated biphenyls (PCBs). One pesticide, alpha-BHC exceeded the previous NYS groundwater standard of "Not Detected" (0.002 J microgram/liter [µg/L]). When compared to current NYS groundwater standards, this pesticide is not an exceedance. The current NYS groundwater standard for alpha-BHC is 0.01 µg/L (NYSDEC, June 1998). Groundwater was encountered at 18 to 19 feet (ft) below ground surface (bgs).

Four soil borings were used at the FDA AOC to collect 32 subsurface screening samples and 18 confirmatory samples in late 1994 and early 1995 during the RI. These locations, FDASB-1, -2, -3 and -4, are illustrated on Figure 1. Samples from each boring were collected from 0 to 16 ft bgs. and analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, PCBs, dioxins, metals, cyanide, and petroleum hydrocarbons. Soil exceedances of applicable RI criteria were limited to 2 SVOCs, 1 pesticide, and 5 metals. In addition, results showed that contaminant concentrations decreased with depth from approximately 8 to 16 ft bgs with the highest concentrations between 0 and 10 ft bgs. The exceedances are summarized in Table 1.

A risk assessment was also conducted during the RI for human health and ecological evaluation. For human health, the exposure pathways included incidental ingestion of soil, inhalation of fugitive dusts, dermal contact with soil, and ingestion and dermal contact with on-base groundwater. The land use scenario was considered industrial/commercial occupational receptors. Based on the findings of the HHRA, there was no unacceptable non-carcinogenic and carcinogenic risk for the identified receptors and pathways. For terrestrial ecological receptors, the calculated hazard quotient was below the target level and risk was not considered significant. Therefore, no further action was recommended (Law, December 1996).

3.2 Monitoring Well Decommissioning

The monitoring well at the site (FDAMW-1) was decommissioned with NYSDEC and USEPA approval in 2005. The well decommissioning report is provided in Appendix B.

4 2013 AND 2014 SOIL INVESTIGATION

Site closure activities conducted at the SS024 FDA AOC included a soil investigation to determine if residual soil contamination meets the 6-NYCRR Part 375 Residential use and Protection of Groundwater SCOs. The site was historically used for fire demonstrations (at ground surface) and the results from previous investigations showed that only SVOCs, pesticides, and metals concentrations were detected above 6-NYCRR Part 375 Residential use SCOs. Therefore, samples were collected at 21 soil borings from 0 to 4 ft bgs, 4 to 8 ft bgs, and 8 to 12 ft bgs and analyzed for SVOCs, pesticides, and metals. The soil borings were completed on May 7, 2013 and July 29, 2013 at four areas via direct push (4-ft Macro-core®) and are illustrated in Figure 1. Based on comments obtained from the NYSDEC, additional soil samples

were collected from 0 to 2 ft bgs on June 13, 2014 and analyzed for pesticides. The 2014 sampling event was comprised of 8 locations which are illustrated in Figure 2.

2013 FDA AOC Soil Investigation, Sampling Area 1:

Sampling Area 1 was previously identified as the SS024 FDA AOC. The 2013 soil investigation at this area included the collection of 18 soil samples from 6 soil borings (FDASCS-1, -2, -3, -4, -5, and -6) via direct push method. Samples were collected on May 7, 2013. The sampling area 1 locations are illustrated on Figure 1.

2013 FDA AOC Soil Investigation, Sampling Area 2:

Upon further review of the historical location of the site activities, it was concluded that activities were conducted approximately 150 feet east of the previously identified site. Therefore, additional sampling was conducted to evaluate the soils in this area on July 29, 2013. The 2013 soil investigation at this area included the collection of 15 soil samples from 5 soil borings (FDASCS-15, -16, -17, -18, and -19) via direct push method. The 2013 locations for sampling area 2 are illustrated on Figure 1.

2013 Site Background Study, Sampling Area 3:

Due to the location of the site within the airport, additional COCs not associated with the FDA AOC may be present as a result of the airport activities. Therefore, a background study of the area surrounding the FDA AOC was conducted to identify COCs not associated with FDA AOC site activities.

The site background study included the collection of 24 soil samples from 8 soil boring locations (FDASCS-7, -8, -9, -10, -11, -12, -13, and -14) located outside the FDA AOC site boundary via direct push method. Samples were collected on May 7, 2013. The site background study locations are illustrated on Figure 1.

2013 Additional borings for Site Background Study, Sampling Area 4:

Two additional soil borings (FDASCS-20 and -21) were installed on July 29, 2013 as part of the site background study to evaluate pesticide contamination. The additional 2013 locations for site background study are illustrated on Figure 1.

2014 FDA AOC Soil Investigation, Surface Soil Sampling:

The 2014 sampling event was conducted on June 13, 2014 to collect surface soil samples at the site using a hand auger. Surface soil samples were collected to completely establish the potential exposure pathways from both the SS024 FDA AOC and the background study area that exhibited previous exceedances of dieldrin. Samples were collected at 8 additional borings from 0 to 2 ft bgs. Four surface soil samples were collected from 4 soil borings (FDASCS-22, -23, -24 and -25) within the site boundary. Four additional surface soil samples were collected from 4 soil borings (FDASCS-26, -27, -28 and -29) that were positioned around the previous sample

locations with dieldrin exceedances of residential use SCOs (FDASCS-10, -11 and -12). The samples were analyzed for pesticides using USEPA Method SW8081B. The additional boring locations are illustrated on Figure 2.

Prior to sample collection, soils were screened in the field for visual and olfactory characteristics. A photoionization detector (PID) was not used for field screening since VOCs are not a COC at the site. Once the field screening was complete, the primary samples were collected. In addition to the primary samples, duplicate samples were collected at a rate of 10% and analyzed to assess sampling precision. Matrix spike/ matrix spike duplicates (MS/MSD) were also collected at a rate of 5%. Following sample collection, all direct push tooling was properly decontaminated before moving to another location.

The field screening results and completed field sampling forms are attached in the daily chemical quality control reports (CQCRs) in Appendix C. All sample collection and handling was conducted in accordance with the 2013 Updated Final Quality Assurance Project Plan for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, May 2013). The following sections describe the four sampling areas and provide the soil sampling results from the initial and additional events.

4.1 Sampling Results

Sampling results are tabulated in Table 2. The validated data are attached in Appendix D and the raw lab data are provided in Appendix E.

4.1.1 2013 Subsurface Sampling Results

Metals:
All metals concentrations met their respective 6-NYCRR Part 375 Residential use SCOs.

SVOCs:
All SVOCs except for benzo(b)fluoranthene met their respective 6-NYCRR Part 375 Residential use SCOs. Benzo(b)fluoranthene was reported at boring FDASCS-4 in the 4 to 8 ft bgs sample interval with a concentration of 1,200 J µg/kg, which marginally exceeds the 6-NYCRR Part 375 Residential use SCO for benzo(b)fluoranthene of 1,000 µg/kg. The benzo(b)fluoranthene detection did not exceed the 6-NYCRR Part 375 Protection of Groundwater SCO of 1,700 µg/kg. The J data qualifier indicates that the analyte was positively identified above method detection limit; however the concentration is below the reporting limit.

Pesticides:
All pesticides except for dieldrin met their respective 6-NYCRR Part 375 Residential use SCOs and Protection of Groundwater SCOs. Dieldrin was detected above the 6-NYCRR Part 375 Residential use SCO of 39 µg/kg at three locations and six intervals and above the 6-NYCRR Part 375 Protection of Groundwater SCO of 100 µg/kg at two locations and four intervals. The exceedances are detailed below.

- FDASCS-10

- 4 to 8 ft bgs sampling interval with a concentration of 63 µg/kg.

- FDASCS-11
  - 0 to 4 ft bgs sampling interval with a concentration of 330 µg/kg.
  - 4 to 8 ft bgs sampling interval with a concentration of 47 µg/kg.

- FDASCS-12
  - 0 to 4 ft bgs sampling interval with a concentration of 440 µg/kg.
  - 4 to 8 ft bgs sampling interval with a concentration of 480 µg/kg.
  - 8 to 12 ft bgs sampling interval with a concentration of 140 µg/kg.

All SVOC and pesticide detections met the 6-NYCRR Part 375 industrial and commercial use SCOs.

4.1.2 2014 Surface Soil Sampling Results

Pesticides:
All pesticides except for dieldrin met their respective 6-NYCRR Part 375 Residential use SCOs and Protection of Groundwater SCOs. Dieldrin was detected above the 6-NYCRR Part 375 Residential use SCO of 39 µg/kg at five locations and above the 6-NYCRR Part 375 Protection of Groundwater SCO of 100 µg/kg at three locations. The exceedances are detailed below.

- FDASCS-23
  - 41 µg/kg.

- FDASCS-25
  - 180 µg/kg.

- FDASCS-26
  - 510 µg/kg.

- FDASCS-28
  - 110 µg/kg.

- FDASCS-29
  - 97 µg/kg.

All pesticide detections met the 6-NYCRR Part 375 industrial and commercial use SCOs.

4.2 Analysis and Discussion

One pesticide, dieldrin, exceeded 6-NYCRR Part 375 SCOs in the 2013 and 2014 Site Investigation. The dieldrin exceedance is assumed not to be associated with the site, but attributed to former Air Force pesticide application. Dieldrin was used as an insecticide before being banned in 1987 by the USEPA. There were three subsurface and five surface locations with dieldrin exceedances above the 6-NYCRR Part 375 Residential use SCO and two

subsurface and three surface locations with dieldrin exceedances above the 6-NYCRR Part 375 Protection of Groundwater SCO. The highest dieldrin concentration occurred at surface soil location FDASCS-26. In addition, all of the dieldrin concentrations showed an overall decrease with depth in the subsurface sampling locations. Only location FDASCS-12 had an exceedance of 6-NYCRR Part 375 Protection of Groundwater SCO at the deepest soil sample interval of 8 to 12 ft bgs. However, this exceedance was in the same order of magnitude as the SCO. Additionally, this interval is approximately 5 to 6 ft above the groundwater table.

5 HUMAN HEALTH RISK ASSESSMENT

A HHRA was previously conducted for the RI to evaluate potential health risks using an industrial/commercial land use scenario for the site. The RI HHRA results indicated acceptable risks for the identified receptors and pathways (Law, December 1996). A supplemental HHRA was conducted as part of the 2013 and 2014 site closure activities. This HHRA addressed future residential land use scenario only and used the most recent soil data.

Risk assessment as defined in the CERCLA process consists of data evaluation, exposure assessment, toxicity assessment, and risk characterization (USEPA, December 1989). An uncertainty analysis was also completed as part of this risk assessment. The HHRA has been organized as follows:

- Data Evaluation – Ensures that the data are appropriate for use in the HHRA and to identify chemicals of potential concern (COPCs). Chemicals identified as COPCs are the focus of the following components of the risk assessment.
- Exposure Assessment – Identifies potential pathways by which exposure could occur, characterizes the potentially exposed populations (i.e. future residential use) and estimates the magnitude, frequency, and duration of exposures. Results of the assessment are combined with toxicity information to characterize potential risks.
- Toxicity Assessment – Identifies the types of adverse health effects associated with the exposure to the COPCs, lists the available toxicity factors (i.e., reference dose values [RfDs]), and summarizes the relationship between magnitude of exposure and occurrence of adverse health effects.
- Risk Characterization – Integrates the results of the data evaluation, exposure assessment, and toxicity assessment into quantitative expressions of risk.
- Uncertainty Analysis – Provides an evaluation of the uncertainties that enter the risk assessment at each step of the process in order for regulators, stakeholders, and risk managers to put the risks in proper context.

These components are described briefly in the following sections. Tables prepared in accordance with USEPAs *RAGS, Volume 1, Human Health Evaluation Manual, Part D* were used to screen for COPCs, and to calculate estimated exposures and health risks associated with the COPCs. The tables are summarized in the following sections and presented at the end of the document.

5.1 Data Evaluation

The data used in the HHRA consisted of the following:

- Soil samples were collected from the FDA AOC at 29 locations and four sampling depths (0 to 2 ft bgs, 0 to 4 ft bgs, 4 to 8 ft bgs and 8 to 12 ft bgs). Samples were analyzed by a Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

Chemical analyses were performed in accordance with USEPA methods for SVOCs (SW8270D), pesticides (SW8081B) and metals (SW6010C). For the 0 to 2 ft bgs interval, USEPA method pesticides (SW8081B) was the only analysis performed. The analytical results were evaluated to assess data usability and laboratory compliance with the analytical methods. The analytical data were reviewed, validated, and evaluated using the criteria specified in the UFP QAPP (FPM, May 2013). The data validation reports are located in Appendix E. All "J" qualified detections (estimated values) were considered as detected concentrations for this HHRA. All undetected results, at the limit of detection (indicated with a "U" qualifier) were retained in the HHRA dataset.

The data evaluation included the calculation of statistics for each dataset evaluated in the HHRA. Basic statistics included frequency of detection, range of positive detections, arithmetic mean, and the most appropriate 95% upper confidence limit (UCL) of the mean. Statistics depended on the data distribution and the skewness, as predicted by USEPA Technical Support Center ProUCL Version 5.0 (USEPA, September 2013a) [results are located in Appendix G]. These statistics were also used in the determination of the exposure point concentration (EPC) selected in the exposure assessment.

5.1.1 Chemicals of Potential Concern

The purpose of the screening process is to eliminate chemicals for which no further risk evaluation is needed. COPCs for the HHRA are limited to those chemicals that exceed a selection criterion. For this risk assessment, SCOs and background screening values were used to reduce the number of chemicals and exposure routes considered. The background screening values used to eliminate COPC were collected from the statewide rural surface soil survey conducted by NYSDOH and NYSDEC (August 2005) and were not based on the site background study area which identified pesticide contamination. The premise of this screening step is that risk is typically dominated by a few chemicals and that, although several may actually be detected, the concentration of these chemicals do not contribute to the total risk.

Environmental sampling results were compared to the SCOs and background screening values. The SCO levels represent a risk level of 1×10^{-6} for carcinogenic effects (i.e., a one-in-one-million excess chance of developing cancer over a lifetime) and a Hazard Index (HI) of 1.0 for non-carcinogenic effects (i.e., adverse non-carcinogenic health effects are not anticipated at or below this exposure concentration). If screening levels exist for a chemical for both carcinogenic and non-carcinogenic effects, the lower of the two values is used as the COPC selection criteria.

Chemicals that were not detected at concentrations exceeding the SCOs and background screening values were not retained as COPCs. Table 3 provides the summary of COPCs for the HHRA. The only detected analyte that is considered a COPC is dieldrin.

SVOCs were not retained for the HHRA. Only one minor benzo(b)fluoranthene exceedance (1,200 J mg/kg vs. the standard of 1,000 mg/kg) was reported for 1 of 63 samples. This minor exceedance at this low frequency is considered a natural variation in concentrations and not indicative of widespread site related contamination. Therefore, no SVOCs were retained for the HHRA.

5.2 Exposure Assessment

The exposure assessment defines and evaluates the current and potential future exposures experienced by receptor populations. More specifically, an exposure assessment identifies the pathways by which humans are potentially exposed to COPCs, the magnitude of the potential human exposure, and the frequency and duration of exposure. This process involves several steps:

- Characterization of the exposure setting in terms of physical characteristics and the populations that may potentially be exposed to site-related chemicals.
- Identification of potential exposure pathways and receptors.
- Quantification of exposure for each receptor in terms of the amount of chemical that is ingested, inhaled, or absorbed through the skin from all potentially complete exposure pathways.

5.2.1 Characterization of Exposure Setting

The FDA AOC is an open grassy area, north of Building 101 and 100, located within the Griffiss International Airport. The airport has fencing and controls to restrict access. The FDA was used from 1974 through 1992 for demonstrations on how to extinguish aircraft fuel fires. Currently the site is maintained as an open field. Future use of the FDA AOC is anticipated to be consistent with current air field use. However, hypothetical residential development is evaluated.

Human receptors are identified based on hypothetical future land uses and include potential residents. The current land use scenario of industrial/commercial occupational use was adequately assessed during the RI HHRA (Law, December 1996).

5.2.2 Contaminants Pathway Analysis

Exposure describes ways that receptors come into contact with a source. Environmental contaminants, such as pesticides, often undergo various processes (i.e., migration) such that media other than the source area can become contaminated. Therefore, all potentially contaminated media (exposure media) were considered at the site.

Vertical soil profiling results indicated that the pesticide contamination appears to exist in surface and subsurface soils. The appropriate human receptors to soil exposure were selected for the FDA AOC. Human receptors considered for the evaluation included potential residents. A contaminants pathway analysis for the FDA AOC is provided in Figure 3. The primary complete exposure pathway for human receptors is ingestion, dermal contact or inhalation during intrusive activities. For the inhalation pathway, dieldrin is likely to be stuck to particles or dust.

No pathway currently exists for drinking water, since all drinking water is supplied by municipal utilities from off-site. In addition, no pathway exists for subsurface soil to groundwater via infiltration due to the results of the RI conducted in 1994 and due to the results of the soil sampling conducted in 2013. The one RI grab groundwater sample did not have any pesticide exceedances of current NYS Groundwater Standards and 2013 dieldrin concentrations in soil decreased with depth. Also, dieldrin is not very water soluble and is rarely leached in deeper soil layers and groundwater. The pathway between surface water/sediment runoff is considered incomplete since the site is covered with grass providing sufficient erosion control. The bioaccumulation pathway through vegetation, domestic animals and game/fish/prey to potential residents is considered complete. However, the ecological risk assessment conducted during the RI showed that there are no bioaccumulation risks to terrestrial receptors. In addition, there is no surface water at the site to support aquatic receptors.

5.2.3 Quantification of Exposure

Data statistics were used during dieldrin exposure point concentration (EPC) determination. Data statistics were derived from the USEPA Technical Support Center ProUCL Version 5.0 (USEPA, September 2013a) [results are located in Appendix G]. The most appropriate 95% UCL of the mean was retained as the EPC. This calculated EPC provides a reasonable maximum exposure scenario as an upper bound estimate of risks to individuals in the population. Data statistics were calculated for all soil samples collected from 29 locations at the FDA AOC. The EPC was calculated for each range of depths, including 0 to 2 ft bgs, 0 to 4 ft bgs, 4 to 8 ft bgs and 8 to 12 ft bgs.

For the primary exposure pathway of ingestion and the contaminant dieldrin, the calculated EPC at the 0 to 2 ft bgs depth is the 95% Kaplan-Meier (KM) (t) UCL of the mean at 233.5 µg/kg . The EPC at the 0 to 4 ft bgs depth is the 99% KM (Chebyshev) UCL of the mean at 298.7 µg/kg. The EPC at the 4 to 8 ft bgs depth is the 95% KM (BCA) UCL of the mean at 73.12 µg/kg. The EPC at the 8 to 12 ft bgs depth is the 95% KM (t) UCL of the mean at 20.62 µg/kg. For the primary exposure pathway of dermal, the EPC for the ingestion pathway was multiplied by the dermal absorption factor (ABS). The ABS for dieldrin is 10% as referenced from the USEPA Technical Guidance Manual on Assessing Dermal Exposure from Soil (USEPA, September 2013b). Lastly, for the primary exposure pathway of inhalation, the EPC for the ingestion pathway was divided by the particulate emissions factor (PEF). The PEF is 1.36 x 10^9 m^3/kg as referenced from the Wind Erosion Model (Cowherd, 1985).

All HHRA assumptions for frequency and duration of exposure are located in Table 4 and are referenced from the Exposure Factors Handbook: 2011 Edition (USEPA, September 2011).

5.3 Toxicity Assessment

Toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse health effects, and weighs the quality of available toxicological evidence. Acute exposure to high dieldrin concentrations can cause seizures and convulsions and even death. Prolonged exposure to lower levels has induced headaches, dizziness, irritability, vomiting, and muscle spasms. The USEPA has determined that dieldrin is a probable human carcinogen (ATSDR, September 2002). In addition, dieldrin was used as an insecticide before being banned in 1987 by the USEPA.

Reference toxicity values were obtained from the Integrated Risk Information System (IRIS) database (USEPA, updated monthly). Values in this database have been derived by expert toxicologists at USEPA and most values have undergone thorough review and validation both within and outside USEPA. Table 5 lists the toxicity values for dieldrin. The toxicity value for reference concentration inhalation (RfC) was not available through the IRIS database. Therefore, a tiered approach was used to reference other databases for peer reviewed toxicity values including the USEPA, California EPA, Agency for Toxic Substances and Disease Registry (ATSDR) and USEPA's Health Effects Assessment Summary Table. None of these databases provided an RfC.

5.4 Risk Characterization

Risk characterization combines the results of the previous elements of the risk assessment to evaluate the potential health risks associated with exposure to COPCs. The risk characterization is then used as an integral component in remedial decision making and selection of potential remedies or actions. Table 6 references the HHRA Equations and Models used for the risk characterization (USEPA, December 2002, July 2004, January 2009), Table 7 through 9 apply the HHRA Equations and Models based on identified pathways and receptors and Table 10 summarizes the cancer risks and non-cancer hazard indices.

5.4.1 Non-carcinogenic Health Effects Characterization

The USEPA benchmark level for evaluating non-carcinogenic effects is a HI of 1.0. A HI of 1.0 or less indicates that exposure to potential contaminants is not expected to result in adverse non-carcinogenic health effects.

The cumulative HI for potential residents, including adult residents and child residents, exposed to soil at a depth of 0 to 2 ft bgs at the FDA AOC is 0.085 (Table 10). This cumulative HI is below the benchmark value of 1.0. Of the three potential exposure pathways, the greatest potential non-carcinogenic hazard (0.066) is from the incidental ingestion of soil (Table 10).

The cumulative HI for potential residents, including adult residents and child residents, exposed to soil at a depth of 0 to 4 ft bgs at the FDA AOC is 0.11 (Table 10). This cumulative HI is below the benchmark value of 1.0. Of the three potential exposure pathways, the greatest potential non-carcinogenic hazard (0.085) is from the incidental ingestion of soil (Table 10).

The cumulative HI for potential residents, including adult residents and child residents, exposed to soil at a depth of 4 to 8 ft bgs is 0.027 (Table 10). This cumulative HI is below the benchmark value of 1.0. Of the three potential exposure pathways, the greatest potential non-carcinogenic hazard (0.021) is from the incidental ingestion of soil (Table 10).

The cumulative HI for potential residents, including adult residents and child residents, exposed to soil at a depth of 8 to 12 ft bgs is 0.0075 (Table 10). This cumulative HI is below the benchmark value of 1.0. Of the three potential exposure pathways, the greatest potential non-carcinogenic hazard (0.0058) is from the incidental ingestion of soil (Table 10).

5.4.2 Carcinogenic Risk

The USEPA defines the target risk range for exposure to carcinogenic compounds as an excess upper bound lifetime risk within the range 1×10^{-4} to 10^{-6}. This translates to one excess cancer in a population of ten thousand to one excess cancer in a population of one million.

The cumulative carcinogenic risk (CR) associated with exposure by potential residents, including adult residents and child residents, to soil at a depth of 0 to 2 ft bgs at the FDA AOC is 8.3×10^{-6} (Table 10), which is within USEPA's target risk range. The pathway-specific risks for potential residents from incidental soil ingestion, dermal contact and inhalation of fugitive dust were 6.3×10^{-6}, 2.0×10^{-6} and 1.6×10^{-16}, respectively (Table 10). The inhalation of fugitive dust is negligible compared to the other two pathways.

The cumulative CR associated with exposure by potential residents, including adult residents and child residents, to soil at a depth of 0 to 4 ft bgs at the FDA AOC is 1.1×10^{-5} (Table 10), which is within USEPA's target risk range. The pathway-specific risks for potential residents from incidental soil ingestion, dermal contact and inhalation of fugitive dust were 8.0×10^{-6}, 2.6×10^{-6} and 2.1×10^{-16}, respectively (Table 10). The inhalation of fugitive dust is negligible compared to the other two pathways.

The cumulative CR associated with exposure by potential residents, including adult residents and child residents, to soil at a depth of 4 to 8 ft bgs is 2.6×10^{-6} (Table 10), which is within USEPA's target risk range. The pathway-specific risks for potential residents from incidental soil ingestion, dermal contact and inhalation of fugitive dust were 2.0×10^{-6}, 6.3×10^{-7} and 5.1×10^{-17}, respectively (Table 10). The inhalation of fugitive dust is negligible compared to the other two pathways.

The cumulative CR associated with exposure by potential residents, including adult residents and child residents, to soil at a depth of 8 to 12 ft bgs is 7.3×10^{-7} (Table 10), which is below USEPA's target risk range. The pathway-specific risks for potential residents from incidental soil ingestion, dermal contact and inhalation of fugitive dust were 5.6×10^{-7}, 1.8×10^{-7} and 1.4×10^{-17}, respectively (Table 10). The inhalation of fugitive dust is negligible compared to the other two pathways.

5.5 Uncertainty Analysis

This section presents a brief summary of uncertainties inherent to risk assessments and includes a discussion of how they may affect the quantitative risk estimates and conclusions of the risk analysis. This HHRA was performed in accordance with current USEPA guidance; however, there are varying degrees of uncertainty associated with the HHRA.

Once the risk assessment is completed, the results must be reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading.

Uncertainty in the selection of COPCs is related to the current status of the predictive databases, the grouping of samples, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route/scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose-response relationships and the weight-of-evidence used for determining the carcinogenicity of COPCs. Uncertainty in the risk characterization includes the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

In general, assumptions, which are often based (in part) on safety factors, are made so that the final calculated risks are overestimated.

5.5.1 Uncertainty Associated with Data Evaluation

The following issues may contribute to uncertainty in COPC selection:

- Data collection and evaluation;
- The existing database; and
- The screening levels used.

5.5.1.1 Data Collection and Evaluation

The analytical data used in this HHRA was soils data from investigation areas at the FDA AOC. These data are subject to uncertainty associated with sampling and analyses and subsequent evaluation.

In this HHRA, it was assumed that samples collected were representative of the area to which various populations may be exposed. The systematic characterization of the investigation areas focused on supplying the data needed to support the risk assessment and remediation decision making process. However, the collected samples may not be completely representative due to biases in sampling and to random variability of samples. Soils are not homogeneously distributed in the environment. While random variability of the media sampled could result in either an over- or under-estimation of site-related chemical concentrations, and thus, site risks, the use of biased data is more likely to over-estimate than under-estimate risks because conscious

decisions were made during the planning stages to sample areas of significant interest instead of utilizing a random sampling methodology.

5.5.1.2 Existing Databases

Samples were analyzed using Air Force-approved procedures and were subject to data validation procedures to assure that data were suitable for use in decision making. However, sample analyses are subject to uncertainties with precision and accuracy of analytical methods which are generally random. While these sources of error are typically of low magnitude compared to other sources of uncertainty, they may contribute to an over- or under-estimation of risks. Given that data validation efforts were performed on the data used to support this HHRA in accordance with Air Force and USEPA approved documents, it can be concluded that the data used in this risk assessment is of acceptable quality.

Of the qualified data, many were either "U" qualified, indicating the analyte was undetected at the limit of detection, or "J" qualified, indicating that the analyte was positively identified, but the quantitation is an estimation. All chemical data used in this HHRA were reviewed by a qualified chemist and were found to be of acceptable quality for use in this risk assessment; as such, both "J" and "U" qualified data were used. While there is some uncertainty as to whether these values over- or under-estimate actual concentrations, it is unlikely that any of these reported values greatly exceeded the actual values.

Analytes that were undetected at the limit of detection ("U" qualified) in all samples, and chemicals that were only detected at concentrations below their respective SCOs, were not retained as COPCs. While it is unlikely that major contaminants have been excluded on this basis, exclusion of these undetected chemicals or chemicals with elevated reporting limits could result in an underestimation of risk.

5.5.1.3 Chemicals of Potential Concern Screening Levels

The use of risk-based screening values should ensure that the significant contributors to risk from a site are not eliminated but are retained for risk evaluation. COPC screening values were based on conservative land use scenarios (e.g., residential).

In addition, the toxicity values used in the derivation of project action levels are subject to change, as additional information (e.g., from scientific research) becomes available; these periodic changes in toxicity values may cause the project action levels to change as well.

5.5.2 Uncertainty Associated with Exposure Assessment

Uncertainty in the exposure assessment arises because of the methods used to calculate EPCs and the selection of exposure parameters.

5.5.2.1 Exposure Parameters

Selected exposure parameters are generally designed to be conservative so that no actual exposed population will receive greater exposures than those estimated. Exposure parameters were used to encompass the upper and best estimate levels of reasonable maximum exposures. All pathways that could reasonably be completed under the land use scenarios were evaluated quantitatively for their potential to be associated with adverse health effects. There is a high degree of certainty that total exposures are not underestimated for any actual exposed population.

To demonstrate risks associated with residential land use, hypothetical future residents (adult and child) were considered in this HHRA to conservatively evaluate the site. The exposure scenario was developed to describe plausible frequency and duration of exposures for a future resident adult and child.

5.5.3 Uncertainty Associated with Toxicity Assessment

In general, the available scientific information is insufficient to provide a thorough understanding of all the potential toxic properties of chemicals to which humans may be exposed. Consequently, varying degrees of uncertainty surround the assessment of adverse health effects in the exposed populations. Sources of uncertainty related directly to toxicity data include:

- Use of dose-response data from experiments on homogeneous sensitive animal populations to predict effects in heterogeneous human populations with a wide range of sensitivities.
- Extrapolation of data from high dose animal studies to low dose human exposures; acute or sub-chronic toxicity studies to chronic exposure scenarios; and one exposure route to another (e.g., from ingestion to dermal absorption).
- Use of single-chemical test data that do not account for multiple exposures or synergistic and antagonistic responses.
- Toxicity values (reference doses and slope factors) are predicted values and have incorporated factors to provide a margin of safety for even the most sensitive subpopulations and likely over-estimate potential risks for all receptors evaluated in this risk assessment.

Based on the above, a high degree of uncertainty may be associated with the toxicity values used in this risk assessment. In an attempt to minimize the consequences of uncertainty, USEPA typically relies on a conservative approach in determining toxicity values. The current USEPA toxicity values used in this risk assessment are likely to over-estimate the potential risk and hazard. Specifically, the RfC was unavailable for dieldrin and the non-carcinogenic risk to the inhalation pathway could not be quantified. This may result in underestimation of the overall risk. However, it may be assumed that the inhalation pathway is negligible compared to the other two pathways. For the inhalation pathway, dieldrin is likely to be stuck to particles or dust. Therefore, to determine the EPC for inhalation, the PEF is applied to the soil concentration, decreasing the soil concentration by 9 orders of magnitude.

5.5.4 Uncertainty in Risk Characterization

Uncertainties associated with risk characterization include the assumption of chemical additively and the basis that the contamination level is consistent over the lifetime of exposure. These uncertainties are inherent in any inferential risk assessment. USEPA-promulgated inputs to the quantitative risk assessment and toxicological indices are calculated to be protective of the human receptor and to err conservatively, so as not to underestimate the potential human health risks.

6 CONCLUSIONS

The FDA AOC site closure activities included the collection of 63 soil samples from 21 soil boring locations for metals, pesticides, and SVOC analysis and 8 soils samples from 8 soil boring locations for pesticides analysis only. All metals and SVOC concentrations met their respective 6-NYCRR Part 375 Residential use SCOs and 6-NYCRR Part 375 Protection of Groundwater SCOs except for one minor benzo(b)fluoranthene exceedance. The benzo(b)fluoranthene detection was below the 6-NYCRR Part 375 Protection of Groundwater SCOs. In addition, all detected concentrations showed an overall decrease with depth which correlates with the source of area contamination being at ground surface. All pesticides except dieldrin met their respective 6-NYCRR Part 375 Residential use SCOs and NYCRR Part 375 Protection of Groundwater SCOs. A total of eleven dieldrin detections were above the 6-NYCRR Part 375 Residential use SCOs and a total of seven dieldrin detections were above the 6-NYCRR Part 375 Protection of Groundwater SCOs. All of the dieldrin concentrations showed an overall decrease with depth and only location FDASCS-12 had an exceedance of 6-NYCRR Part 375 Protection of Groundwater SCO at the deepest soil sample interval of 8 to 12 ft bgs, however this exceedance was in the same order of magnitude as the SCO. The dieldrin exceedance is assumed not to be associated with the site, but attributed to former Air Force pesticide application. Dieldrin was used as an insecticide before being banned in 1987 by the USEPA.

An HHRA was conducted to evaluate potential adverse health effects due to these exceedances. Under hypothetical future residential land use, residential receptors (adult and child) were considered. The exposure pathways evaluated included incidental ingestion of soil, dermal contact with soil, and inhalation of fugitive dusts. The cumulative HI for residents exposed to subsurface soils was less than 1.0, indicating that exposure to potential contaminants is not expected to result in adverse non-carcinogenic health effects. The cumulative CR for residents exposed to subsurface soils was within USEPA's target risk range.

7 RECOMMENDATIONS

The results of the site closure activities conducted at the FDA AOC show exceedances for only one pesticide, dieldrin, of 6-NYCRR Part 375 Residential use SCOs and Protection of Groundwater SCOs in surface and subsurface soil. It is assumed that this COC is associated with previous pesticide use at the former Griffiss AFB and not with previous FDA AOC site activities. Based on the results of the previous RI (Law, December 1996), the 2013 and 2014 soil sampling results, and the results of this residential HHRA, there appear to be no

unacceptable non-carcinogenic and carcinogenic risk from exposure to soil and groundwater for potential residential receptors. Therefore, it is requested that the site be closed and that New York State and USEPA grant permission to remove the remaining deed restrictions at the SS024 FDA AOC.

8 REFERENCES

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Tables

Table 1
Compounds Exceeding Guidance Values
in RI Subsurface Soil Samples

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion (used for RI)	Frequency of Detection Above NYCRR Part 375 Residential use Soil Cleanup Objectives	Locations above NYCRR Part 375 Residential use Soil Cleanup Objectives	NYCRR Part 375 Residential use Soil Cleanup Objectives
SVOCs (µg/kg)						
benzo(a)pyrene	64 J - 450 J	3/16	61[a]	0/16	NA	1,000
phenol	39 J - 360	3/16	30[a]	0/16	NA	100,000
Pesticides (µg/kg)						
dieldrin	0.36 J - 324	4/16	40[b]	4/16	FDASB-1 and -3	39
Metals (mg/kg)						
arsenic	2 J - 10.2	7/16	4.9[c]	0/16	NA	16
beryllium	0.112 J - 0.86	1/16	0.65[c]	0/16	NA	14
total chromium	10.9 - 90.9	4/16	22.6[c]	4/16	FDASB-1 and -4	22/36*
copper	16.9 - 67.2	2/16	43[c]	0/16	NA	270
silver	0.05 J - 1.43 J	2/16	1.1[c]	0/16	NA	36

Notes:

a - NYS soil cleanup objective

b - proposed RCRA corrective action levels

c - background screening concentrations

* - hexavalent chromium - 22 mg/kg and trivalent chromium - 36 mg/kg

J - Estimated concentration

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-1			FDASCS-2		
Sample ID			**FDASCS0104AA**	**FDASCS0108AA**	**FDASCS0112AA**	**FDASCS0204AA**	**FDASCS0208AA**	**FDASCS0212AA**
Date of Collection			**5/7/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**
Sample Depth (ft bgs)			**0-4**	**4-8**	**8-12**	**0-4**	**4-8**	**8-12**
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	U	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	U	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	U	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	U	U	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	U	U	U	U
chrysene	1,000	1,000	U	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	U	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	U	U	U	U	U
phenanthrene	100,000	1,000,000	28 J	U	U	U	U	U
pyrene	100,000	1,000,000	29 J	U	U	18 J	15 J	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	UJ
delta BHC	100,000	250	U	U	U	U	U	UJ
gamma BHC (Lindane)	29	100	U	U	U	U	U	UJ
alpha-Chlordane	91	2,900	U	U	U	U	U	UJ
gamma-Chlordane	NA	NA	U	U	U	U	U	UJ
p,p'-DDD	2,600	14,000	U	U	U	U	U	UJ
p,p'-DDE	1,800	17,000	U	U	U	U	U	UJ
p,p'-DDT	1,700	136,000	U	U	U	U	U	UJ
aldrin	19	190	U	U	U	U	U	UJ
dieldrin	39	100	U	U	U	14	26	UJ
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	UJ
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	UJ

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-3			FDASCS-4		
Sample ID			FDASCS0304AA	FDASCS0308AA	FDASCS0312AA	FDASCS0404AA	FDASCS0408AA	FDASCS0412AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	120 J ♦	U
acenaphthylene	100,000	107,000	U	U	U	U	100 J ♦	U
anthracene	100,000	1,000,000	U	U	U	U	410 ♦	U
benzo(a)anthracene	1,000	1,000	U	U	U	U	820 ♦	U
benzo(a)pyrene	1,000	22,000	U	U	U	U	650 ♦	U
benzo(b)fluoranthene	1,000	1,700	41 J ♦	U	U	U	**1200 J ♦**	U
benzo(g,h,i)perylene	1,000	1,000,000	28 J ♦	U	U	U	300 J ♦	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	U	U	U	U
chrysene	1,000	1,000	U	U	U	U	830 ♦	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	110 J ♦	U
dibenzofuran	NA	NA	U	U	U	U	240 J ♦	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	U	U	U	2000 ♦	U
fluorene	100,000	386,000	U	U	U	U	490 ♦	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	U	U	U	380 ♦	U
phenanthrene	100,000	1,000,000	34 J ♦	U	U	U	2100 ♦	U
pyrene	100,000	1,000,000	26 J ♦	U	U	17 J	1400 ♦	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	UJ	UJ	UJ
delta BHC	100,000	250	U	U	U	UJ	UJ	UJ
gamma BHC (Lindane)	29	100	U	U	U	UJ	UJ	UJ
alpha-Chlordane	91	2,900	U	U	U	UJ	U	UJ
gamma-Chlordane	NA	NA	U	U	U	UJ	U	UJ
p,p'-DDD	2,600	14,000	U	U	U	UJ	U	UJ
p,p'-DDE	1,800	17,000	U	U	U	UJ	U	UJ
p,p'-DDT	1,700	136,000	U	U	U	UJ	U	UJ
aldrin	19	190	U	U	U	UJ	U	UJ
dieldrin	39	100	U	U	U	UJ	U	UJ
endosulfan sulfate	4,800	1,000,000	U	U	U	U	0.38 J ♦	U
endrin	2200	60	U	U	U	UJ	UJ	UJ
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	UJ	U	UJ

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-5			FDASCS-6		
Sample ID			FDASCS0504AA	FDASCS0508AA	FDASCS0512AA	FDASCS0604AA	FDASCS0608AA	FDASCS0612AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	36 J	12 J	13 J	73 J	U
acenaphthylene	100,000	107,000	U	35 J	U	U	48 J	U
anthracene	100,000	1,000,000	U	110 J	24 J	32 J	160 J	U
benzo(a)anthracene	1,000	1,000	U	260 J	26 J ♦	74 J	350 J	U
benzo(a)pyrene	1,000	22,000	U	210 J	36 J	61 J	290 J	U
benzo(b)fluoranthene	1,000	1,700	U	400 J	35 J ♦	92 J	560 J	U
benzo(g,h,i)perylene	1,000	1,000,000	U	100 J	20 J	21 J	150 J	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	U	U	U	U
chrysene	1,000	1,000	U	280 J	49 J	80 J	380	U
dibenz(a,h)anthracene	330	1,000,000	U	33 J	U	U	U	U
dibenzofuran	NA	NA	U	60 J	22 J	27 J	140 J	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	640	59 J ♦	180 J	840	U
fluorene	100,000	386,000	U	140 J	47 J	50 J	260 J	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	130 J	U	38 J	180 J	U
phenanthrene	100,000	1,000,000	20 J	620	55 J ♦	180 J	860	19 J
pyrene	100,000	1,000,000	25 J	460 J	44 J ♦	130 J	620	16 J
Pesticides (µg/kg)								
beta BHC	72	90	UJ	UJ	U	U	U	UJ
delta BHC	100,000	250	UJ	UJ	U	U	U	UJ
gamma BHC (Lindane)	29	100	UJ	UJ	U	U	U	UJ
alpha-Chlordane	91	2,900	UJ	UJ	U	U	U	UJ
gamma-Chlordane	NA	NA	UJ	UJ	U	U	U	UJ
p,p'-DDD	2,600	14,000	UJ	UJ	U	U	U	UJ
p,p'-DDE	1,800	17,000	UJ	UJ	U	U	U	UJ
p,p'-DDT	1,700	136,000	UJ	UJ	U	U	U	UJ
aldrin	19	190	UJ	UJ	U	U	U	UJ
dieldrin	39	100	UJ	UJ	U	U	U	UJ
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	UJ	UJ	U	U	U	UJ
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	UJ	UJ	U	U	U	UJ

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-7			FDASCS-8		
Sample ID			FDASCS0704AA	FDASCS0708AA	FDASCS0712AA	FDASCS0804AA	FDASCS0808AA	FDASCS0812AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	27 J	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	34 J	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	58 J	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	34 J	U	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	84 J	U	U	U
chrysene	1,000	1,000	40 J	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	U	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	54 J	U	U	U	U	U
phenanthrene	100,000	1,000,000	U	U	U	U	U	U
pyrene	100,000	1,000,000	30 J	U	14 J	U	U	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	U	U	U	U	0.94 J	U
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-9			FDASCS-10		
Sample ID			FDASCS0904AA	FDASCS0908AA	FDASCS0912AA	FDASCS1004AA	FDASCS1008AA	FDASCS1012AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	11 J	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	U	53 J	U	29 J	U	U
benzo(a)pyrene	1,000	22,000	U	43 J	U	22 J	U	U
benzo(b)fluoranthene	1,000	1,700	U	68 J	U	34 J	U	U
benzo(g,h,i)perylene	1,000	1,000,000	U	26 J	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	89 J	98 J	81 J	U
chrysene	1,000	1,000	U	56 J	U	30 J	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	110 J	U	47 J	U	U
fluorene	100,000	386,000	U	23 J	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	120 J	U	110 J	U	U
phenanthrene	100,000	1,000,000	U	86 J	28 J	34 J	U	U
pyrene	100,000	1,000,000	28 J	92 J	23 J	40 J	U	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	0.53 J	U	U	63	4.7	11
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
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♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-11			FDASCS-12		
Sample ID			FDASCS1104AA	FDASCS1108AA	FDASCS1112AA	FDASCS1204AA	FDASCS1208AA	FDASCS1212AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	24 J	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	54 J	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	210 J	U	U	U	27 J	U
benzo(a)pyrene	1,000	22,000	220 J	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	360	U	U	U	40 J	U
benzo(g,h,i)perylene	1,000	1,000,000	170 J	U	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	150 J	89 J	U	U	87 J	U
chrysene	1,000	1,000	270 J	U	U	U	30 J	U
dibenz(a,h)anthracene	330	1,000,000	81 J	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	430	U	U	U	44 J	U
fluorene	100,000	386,000	27 J	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	280 J	U	U	U	100 J	U
phenanthrene	100,000	1,000,000	280 J	U	U	U	21 J	U
pyrene	100,000	1,000,000	370 J	21 J	U	18 J	38 J	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	330	47	3.8	440	480	140
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	0.78 J	U	U	U	0.49	U
endrin ketone	NA	NA	U	U	U	U	0.55 J	U
methoxychlor	NA	NA	U	U	U	22 J	19 J	5.1 J

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Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-13			FDASCS-14		
Sample ID			FDASCS1304AA	FDASCS1308AA	FDASCS1312AA	FDASCS1404AA	FDASCS1408AA	FDASCS1412AA
Date of Collection			5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	U	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	U	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	U	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	U	U	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	90 J	U	U	U	U
chrysene	1,000	1,000	U	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	U	U	U	U	U	U
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	U	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	U	U	U	U	U
phenanthrene	100,000	1,000,000	U	U	U	U	U	25 J
pyrene	100,000	1,000,000	20 J	U	U	13 J	U	21 J
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	0.42 J	U	U	U	U	U
gamma-Chlordane	NA	NA	0.36 J	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	4.7	0.87 J	1.5 J	8.2	2.1	1.2 J
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-15			FDASCS-16		
Sample ID			FDASCS1504AA	FDASCS1508AA	FDASCS1512AA	FDASCS1604AA	FDASCS1608AA	FDASCS1612AA
Date of Collection			7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	U	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	U	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	U	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	U	U	U	U	U	U
benzyl alcohol	100,000	330	U	11 J	15 J	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	U	U	U	U
chrysene	1,000	1,000	U	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	75 J	190 J	430 J	55 J	270 J	74 J
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	U	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	U	U	U	U	U
phenanthrene	100,000	1,000,000	U	U	U	U	U	U
pyrene	100,000	1,000,000	14 J	U	U	U	U	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	14 J	U	U	U	U	U
p,p'-DDE	1,800	17,000	8.8 J	U	U	U	U	U
p,p'-DDT	1,700	136,000	94	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	21	2	1.4 J	3.6	0.33 J	U
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-17			FDASCS-18		
Sample ID			FDASCS1704AA	FDASCS1708AA	FDASCS1712AA	FDASCS1804AA	FDASCS1808AA	FDASCS1812AA
Date of Collection			7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	34 J	U	U	U	U	U
acenaphthylene	100,000	107,000		U	U	U	U	U
anthracene	100,000	1,000,000	110 J	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	110 J	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	65 J	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	140 J ♦	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	24 J ♦	U	U	U	U	U
benzyl alcohol	100,000	330	15 J	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	U	U	97 J	U	U	88 J
chrysene	1,000	1,000	100 J ♦	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	47 J ♦	U	U	U	U	U
dimethyl phthalate	NA	NA	330 J	59 J	110 J	170 J	470	120 J
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	U	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	110 J ♦	U	U	U	U	U
phenanthrene	100,000	1,000,000	430 J ♦	U	U	20 J	20 J	U
pyrene	100,000	1,000,000	230 J ♦	U	U	26 J	27 J	16 J
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	8 ♦	U	U	4.7	0.65 J	0.77 J
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
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NA- Not available.
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Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-19			FDASCS-20		
Sample ID			FDASCS1904AA	FDASCS1908AA	FDASCS1912AA	FDASCS2004AA	FDASCS2008AA	FDASCS2012AA
Date of Collection			7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013	7/29/2013
Sample Depth (ft bgs)			0-4	4-8	8-12	0-4	4-8	8-12
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	U	U	U
acenaphthylene	100,000	107,000	U	U	U	U	U	U
anthracene	100,000	1,000,000	U	U	U	U	U	U
benzo(a)anthracene	1,000	1,000	56 J	U	U	U	U	U
benzo(a)pyrene	1,000	22,000	64 J	U	U	U	U	U
benzo(b)fluoranthene	1,000	1,700	110 J	U	U	U	U	U
benzo(g,h,i)perylene	1,000	1,000,000	45 J	U	U	U	U	U
benzyl alcohol	100,000	330	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	NA	NA	76 J	U	75 J	U	U	91 J
chrysene	1,000	1,000	62 J	U	U	U	U	U
dibenz(a,h)anthracene	330	1,000,000	U	U	U	U	U	U
dibenzofuran	NA	NA	U	U	U	U	U	U
dimethyl phthalate	NA	NA	72 J	140 J	50 J	120 J	91 J	30 J
fluoranthene	100,000	1,000,000	U	U	U	U	U	U
fluorene	100,000	386,000	100 J	U	U	U	U	U
indeno(1,2,3-c,d)pyrene	500	8,200	U	85 J	U	U	U	U
phenanthrene	100,000	1,000,000	51 J	20 J	U	U	U	U
pyrene	100,000	1,000,000	90 J	24 J	U	20 J	U	U
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	0.35 J	U	U	12	0.98 J	U
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-21			FDASCS-22	FDASCS-23	FDASCS-24
Sample ID			FDASCS2104AA	FDASCS2108AA	FDASCS1212AA	FDASCS2202AA	FDASCS2302AA	FDASCS2402AA
Date of Collection			7/29/2013	7/29/2013	7/29/2013	6/13/2014	6/13/2014	6/13/2014
Sample Depth (ft bgs)			0-4	4-8	8-12	0-2	0-2	0-2
SVOCs (µg/kg)								
acenaphthene	100,000	98,000	U	U	U	NS	NS	NS
acenaphthylene	100,000	107,000	U	U	U	NS	NS	NS
anthracene	100,000	1,000,000	21 J	U	U	NS	NS	NS
benzo(a)anthracene	1,000	1,000	130 J	U	U	NS	NS	NS
benzo(a)pyrene	1,000	22,000	130 J	U	U	NS	NS	NS
benzo(b)fluoranthene	1,000	1,700	280 J	U	U	NS	NS	NS
benzo(g,h,i)perylene	1,000	1,000,000	100 J	U	U	NS	NS	NS
benzyl alcohol	100,000	330	U	U	U	NS	NS	NS
bis(2-ethylhexyl) phthalate	NA	NA	U	U	U	NS	NS	NS
chrysene	1,000	1,000	150 J	U	U	NS	NS	NS
dibenz(a,h)anthracene	330	1,000,000	U	U	U	NS	NS	NS
dibenzofuran	NA	NA	U	U	U	NS	NS	NS
dimethyl phthalate	NA	NA	120 J	190 J	98 J	NS	NS	NS
fluoranthene	100,000	1,000,000	340 J	U	U	NS	NS	NS
fluorene	100,000	386,000	U	U	U	NS	NS	NS
indeno(1,2,3-c,d)pyrene	500	8,200	170 J	U	U	NS	NS	NS
phenanthrene	100,000	1,000,000	140 J	U	U	NS	NS	NS
pyrene	100,000	1,000,000	280 J	U	U	NS	NS	NS
Pesticides (µg/kg)								
beta BHC	72	90	U	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	1.4 J	U	2.6
p,p'-DDT	1,700	136,000	U	U	U	U	U	U
aldrin	19	190	U	U	U	U	U	U
dieldrin	39	100	U	9.8	8.7	1.7 J	41	0.96 J
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U	U
endrin	2200	60	U	U	U	U	U	U
endrin ketone	NA	NA	U	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 2
SS024 Fire Demonstration Area AOC
2013 and 2014 Soil Sampling Results

Sample Location	NYCRR Part 375 Residential use Soil Cleanup Objectives (µg/Kg)	NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (µg/Kg)	FDASCS-25	FDASCS-26	FDASCS-27	FDASCS-28	FDASCS-29
Sample ID			FDASCS2502AA	FDASCS2602AA	FDASCS2702AA	FDASCS2802AA	FDASCS2902AA
Date of Collection			6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
Sample Depth (ft bgs)			0-2	0-2	0-2	0-2	0-2
SVOCs (µg/kg)							
acenaphthene	100,000	98,000	NS	NS	NS	NS	NS
acenaphthylene	100,000	107,000	NS	NS	NS	NS	NS
anthracene	100,000	1,000,000	NS	NS	NS	NS	NS
benzo(a)anthracene	1,000	1,000	NS	NS	NS	NS	NS
benzo(a)pyrene	1,000	22,000	NS	NS	NS	NS	NS
benzo(b)fluoranthene	1,000	1,700	NS	NS	NS	NS	NS
benzo(g,h,i)perylene	1,000	1,000,000	NS	NS	NS	NS	NS
benzyl alcohol	100,000	330	NS	NS	NS	NS	NS
bis(2-ethylhexyl) phthalate	NA	NA	NS	NS	NS	NS	NS
chrysene	1,000	1,000	NS	NS	NS	NS	NS
dibenz(a,h)anthracene	330	1,000,000	NS	NS	NS	NS	NS
dibenzofuran	NA	NA	NS	NS	NS	NS	NS
dimethyl phthalate	NA	NA	NS	NS	NS	NS	NS
fluoranthene	100,000	1,000,000	NS	NS	NS	NS	NS
fluorene	100,000	386,000	NS	NS	NS	NS	NS
indeno(1,2,3-c,d)pyrene	500	8,200	NS	NS	NS	NS	NS
phenanthrene	100,000	1,000,000	NS	NS	NS	NS	NS
pyrene	100,000	1,000,000	NS	NS	NS	NS	NS
Pesticides (µg/kg)							
beta BHC	72	90	U	U	U	U	U
delta BHC	100,000	250	U	U	U	U	U
gamma BHC (Lindane)	29	100	U	U	U	U	U
alpha-Chlordane	91	2,900	U	U	U	U	U
gamma-Chlordane	NA	NA	U	U	U	U	U
p,p'-DDD	2,600	14,000	U	U	U	U	U
p,p'-DDE	1,800	17,000	U	U	U	U	U
p,p'-DDT	1,700	136,000	U	U	U	U	U
aldrin	19	190	1.1 J	U	0.31 J	U	U
dieldrin	39	100	180	510	U	110	97
endosulfan sulfate	4,800	1,000,000	U	U	U	U	U
endrin	2200	60	U	U	0.61 J	U	U
endrin ketone	NA	NA	U	U	U	U	U
methoxychlor	NA	NA	U	U	U	U	U

U- Undetected at the Limit of Detection.
J- Estimated: The analyte was positively identfied; the quantitation is an estimation.
♦- Denotes higher nominal value of duplicate sample result.
NA- Not available.
NS- Not sampled.

Table 3
Summary of COPCs for HHRA

Chemical	Frequency Detected	Maximum Concentration (µg/Kg)	Screening Level	Source	Above Screening Level	Background Concentration[a] (µg/kg)	Above Background Level	Above Screening Criteria
0 to 2 ft bgs								
Dieldrin	7/8	510	39	NYS	YES	5	YES	YES
0 to 4 ft bgs								
Dieldrin	13/21	440	39	NYS	YES	5	YES	YES
Benzo(b)fluoranthene	8/21	360	1,000	NYS	NO	1,000	NO	NO
4 to 8 ft bgs								
Dieldrin	12/21	480	39	NYS	YES	5	YES	YES
Benzo(b)fluoranthene	5/21	1,200	1,000	NYS	YES	1,000	YES	NO
8 to 12 ft bgs								
Dieldrin	8/21	140	39	NYS	YES	5	YES	YES
Benzo(b)fluoranthene	1/21	35	1,000	NYS	NO	1,000	NO	NO

Notes:

a- Background Concentration from statewide rural surface soil survey conducted by NYSDOH and NYSDEC (August 2005).

Identified as a COPC and evaluated in the HHRA.

Table 4
HHRA Assumptions

Term	Definition	Receptor	
		Resident Child	Resident Adult
ATc	Averaging time cancer (days)	25550	25550
ATnc	Averaging time non-cancer (days)	2190	10950
BW	Body Weight (kg)	15	70
ED	Exposure Duration (years)	6	30
EF	Exposure Frequency (days/yr)	350	350
ET	Exposure Time (outdoor inhalation) (hrs/day)	10	10
IR	Ingestion Rate (mg/day)	200	100
M	Soil to Skin Adherence Factor (mg/cm^2-day)	0.2	0.07
SA	Exposed Skin Surface Area (cm^2)	2800	5700
ABS	Dermal Absorption Factor (unitless)	0.1	0.1
PEF	Particulate Emission Factor (m^3/kg)	1.36E+09	1.36E+09

Table 5
Toxicity Values for Dieldrin

Chemical	Toxicity Values					
	Carcinogenic			NonCarcinogenic		
	SFo $(mg/kg\text{-}day)^{-1}$	SFd $(mg/kg\text{-}day)^{-1}$	IUR $(ug/m^3)^{-1}$	RfDo (mg/kg-day)	RfDd (mg/kg-day)	RfC (ug/m^3)
Dieldrin	1.60E+01	1.60E+01	4.60E-03	5.00E-05	5.00E-05	na

Notes:
na - not available
SFo - Slope Factor Oral
SFd - Slope Factor Dermal
IUR - Inhalation Unit Risk
RfDo - Reference Dose Oral
RfDd - Reference Dose Dermal
RfC - Reference Concentration Inhalation

Table 6
HHRA Equations and Models

Soil Ingestion

Equation 1: $$HQ = \frac{CS \times IR \times EF \times ED}{BW \times ATnc \times RfDo}$$

Equation 2: $$CR = \frac{CS \times IR \times EF \times ED \times SFo}{BW \times ATc}$$

Soil Dermal Contact

Equation 3: $$HQ = \frac{CS \times SA \times M \times ABS \times EF \times ED}{BW \times ATnc \times RfDd}$$

Equation 4: $$CR = \frac{CS \times SA \times M \times ABS \times EF \times ED \times SFd}{BW \times ATc}$$

Inhalation of Particulates

Equation 5: $$HQ = \frac{CA \times ET \times EF \times ED}{ATnc \times RfC}$$

Equation 6: $$CR = \frac{CA \times ET \times EF \times ED \times IUR}{ATc}$$

Delivery of Particulate Chemicals from Soil to Air

Equation 7: $$CA = \frac{CS}{PEF}$$

Table 7
HHRA Soil Ingestion Risks

Soil Ingestion

Equation 1: $$HQ = \frac{CS \times IR \times EF \times ED}{BW \times ATnc \times RfDo}$$

Equation 2: $$CR = \frac{CS \times IR \times EF \times ED \times SFo}{BW \times ATc}$$

Adult-Cancer Risks

Soil Depth (ft bgs)	CS (mg/kg)	IR (kg/day)	EF (day/yr)	ED (yr)	BW (kg)	ATc (days)	SFo $(mg/kg\text{-}day)^{-1}$	CR (unitless)
0-2	0.2335	1.00E-04	350	30	70	25550	1.60E+01	2.19E-06
0-4	0.2987	1.00E-04	350	30	70	25550	1.60E+01	2.81E-06
4-8	0.07312	1.00E-04	350	30	70	25550	1.60E+01	6.87E-07
8-12	0.02062	1.00E-04	350	30	70	25550	1.60E+01	1.94E-07

Child-Cancer Risks

Soil Depth (ft bgs)	CS (mg/kg)	IR (kg/day)	EF (day/yr)	ED (yr)	BW (kg)	ATc (days)	SFo $(mg/kg\text{-}day)^{-1}$	CR (unitless)
0-2	0.2335	2.00E-04	350	6	15	25550	1.60E+01	4.09E-06
0-4	0.2987	2.00E-04	350	6	15	25550	1.60E+01	5.24E-06
4-8	0.07312	2.00E-04	350	6	15	25550	1.60E+01	1.28E-06
8-12	0.02062	2.00E-04	350	6	15	25550	1.60E+01	3.62E-07

Adult- Non-Cancer Hazard Indices

Soil Depth (ft bgs)	CS (mg/kg)	IR (kg/day)	EF (day/yr)	ED (yr)	BW (kg)	ATnc (days)	RfDo (mg/kg-day)	HQ (unitless)
0-2	0.2335	1.00E-04	350	30	70	10950	5.00E-05	6.40E-03
0-4	0.2987	1.00E-04	350	30	70	10950	5.00E-05	8.18E-03
4-8	0.07312	1.00E-04	350	30	70	10950	5.00E-05	2.00E-03
8-12	0.02062	1.00E-04	350	30	70	10950	5.00E-05	5.65E-04

Child-Non-Cancer Hazard Indices

Soil Depth (ft bgs)	CS (mg/kg)	IR (kg/day)	EF (day/yr)	ED (yr)	BW (kg)	ATnc (days)	RfDo (mg/kg-day)	HQ (unitless)
0-2	0.2335	2.00E-04	350	6	15	2190	5.00E-05	5.97E-02
0-4	0.2987	2.00E-04	350	6	15	2190	5.00E-05	7.64E-02
4-8	0.07312	2.00E-04	350	6	15	2190	5.00E-05	1.87E-02
8-12	0.02062	2.00E-04	350	6	15	2190	5.00E-05	5.27E-03

Table 8
HHRA Soil Dermal Risks

Soil Dermal

Equation 3: $$HQ = \frac{CS \times SA \times M \times ABS \times EF \times ED}{BW \times ATnc \times RfDd}$$

Equation 4: $$CR = \frac{CS \times SA \times M \times ABS \times EF \times ED \times SFd}{BW \times ATc}$$

Adult-Cancer Risks

Soil Depth (ft bgs)	CS (mg/kg)	SA (cm^2)	M (kg/cm^2-day)	ABS (unitless)	EF (day/yr)	ED (yr)	BW (kg)	ATc (days)	SFd $(mg/kg\text{-}day)^{-1}$	CR (unitless)
0-2	0.2335	5700	7.00E-08	0.1	350	30	70	25550	1.60E+01	8.75E-07
0-4	0.2987	5700	7.00E-08	0.1	350	30	70	25550	1.60E+01	1.12E-06
4-8	0.07312	5700	7.00E-08	0.1	350	30	70	25550	1.60E+01	2.74E-07
8-12	0.02062	5700	7.00E-08	0.1	350	30	70	25550	1.60E+01	7.73E-08

Child-Cancer Risks

Soil Depth (ft bgs)	CS (mg/kg)	SA (cm^2)	M (kg/cm^2-day)	ABS (unitless)	EF (day/yr)	ED (yr)	BW (kg)	ATc (days)	SFd $(mg/kg\text{-}day)^{-1}$	CR (unitless)
0-2	0.2335	2800	2.00E-07	0.1	350	6	15	25550	1.60E+01	1.15E-06
0-4	0.2987	2800	2.00E-07	0.1	350	6	15	25550	1.60E+01	1.47E-06
4-8	0.07312	2800	2.00E-07	0.1	350	6	15	25550	1.60E+01	3.59E-07
8-12	0.02062	2800	2.00E-07	0.1	350	6	15	25550	1.60E+01	1.01E-07

Adult- Non-Cancer Hazard Indices

Soil Depth (ft bgs)	CS (mg/kg)	SA (cm^2)	M (kg/cm^2-day)	ABS (unitless)	EF (day/yr)	ED (yr)	BW (kg)	ATnc (days)	RfDd (mg/kg-day)	HQ (unitless)
0-2	0.2335	5700	7.00E-08	0.1	350	30	70	10950	5.00E-05	2.55E-03
0-4	0.2987	5700	7.00E-08	0.1	350	30	70	10950	5.00E-05	3.27E-03
4-8	0.07312	5700	7.00E-08	0.1	350	30	70	10950	5.00E-05	7.99E-04
8-12	0.02062	5700	7.00E-08	0.1	350	30	70	10950	5.00E-05	2.25E-04

Child-Non-Cancer Hazard Indices

Soil Depth (ft bgs)	CS (mg/kg)	SA (cm^2)	M (kg/cm^2-day)	ABS (unitless)	EF (day/yr)	ED (yr)	BW (kg)	ATnc (days)	RfDd (mg/kg-day)	HQ (unitless)
0-2	0.2335	2800	2.00E-07	0.1	350	6	15	2190	5.00E-05	1.67E-02
0-4	0.2987	2800	2.00E-07	0.1	350	6	15	2190	5.00E-05	2.14E-02
4-8	0.07312	2800	2.00E-07	0.1	350	6	15	2190	5.00E-05	5.24E-03
8-12	0.02062	2800	2.00E-07	0.1	350	6	15	2190	5.00E-05	1.48E-03

Table 9
HHRA Soil Inhalation Risks

Soil Inhalation

Equation 5: $$HQ = \frac{CA \times ET \times EF \times ED}{ATnc \times RfC}$$

Equation 6: $$CR = \frac{CA \times ET \times EF \times ED \times IUR}{ATc}$$

Equation 7: $$CA = \frac{CS}{PEF}$$

Adult-Cancer Risks

Soil Depth (ft bgs)	PEF (m^3/kg)	CA (mg/m^3)	EF (day/yr)	ED (yr)	ATc (hrs)	ET (hrs/day)	IUR (mg/m^3)$^{-1}$	CR (unitless)
0-2	1.36E+09	1.72E-10	350	30	613200	10	4.60E-06	1.35E-16
0-4	1.36E+09	2.20E-10	350	30	613200	10	4.60E-06	1.73E-16
4-8	1.36E+09	5.38E-11	350	30	613200	10	4.60E-06	4.23E-17
8-12	1.36E+09	1.52E-11	350	30	613200	10	4.60E-06	1.19E-17

Child-Cancer Risks

Soil Depth (ft bgs)	PEF (m^3/kg)	CA (mg/m^3)	EF (day/yr)	ED (yr)	ATc (hrs)	ET (hrs/day)	IUR (mg/m^3)$^{-1}$	CR (unitless)
0-2	1.36E+09	1.72E-10	350	6	613200	10	4.60E-06	2.70E-17
0-4	1.36E+09	2.20E-10	350	6	613200	10	4.60E-06	3.46E-17
4-8	1.36E+09	5.38E-11	350	6	613200	10	4.60E-06	8.47E-18
8-12	1.36E+09	1.52E-11	350	6	613200	10	4.60E-06	2.39E-18

Table 10
Summary of Cancer Risks and Non-Cancer Hazard Indices

Summary of Cancer Risks

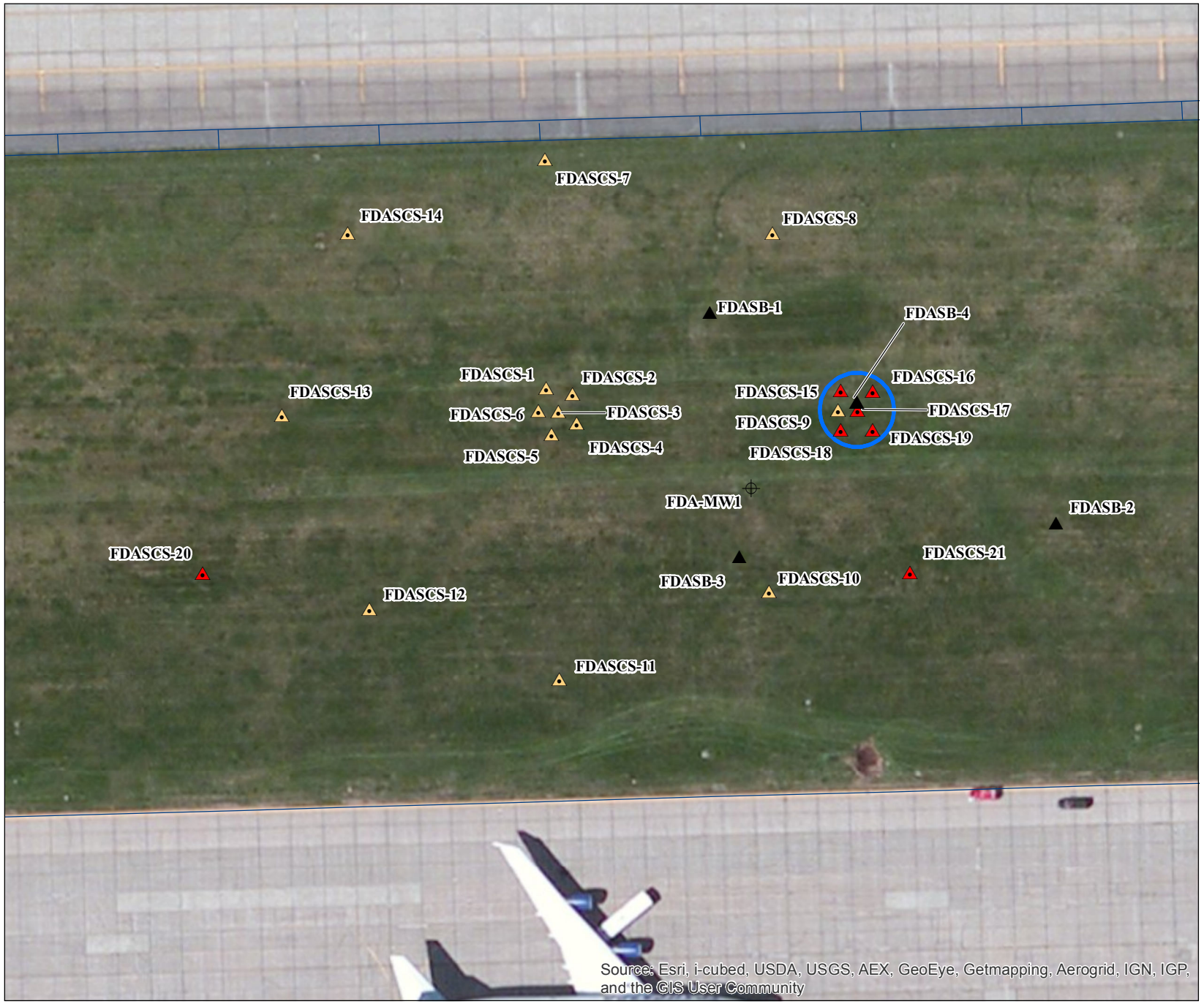
Exposure Media	Resident-Child Exposure Route			Resident-Adult Exposure Route			CR	CR (Ingestion)	CR (Dermal)	CR (Inhalation)
Soil Depth (ft bgs)	Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation				
0-2	4.1E-06	1.1E-06	2.7E-17	2.2E-06	8.8E-07	1.4E-16	8.3E-06	6.3E-06	2.0E-06	1.6E-16
0-4	5.2E-06	1.5E-06	3.5E-17	2.8E-06	1.1E-06	1.7E-16	1.1E-05	8.0E-06	2.6E-06	2.1E-16
4-8	1.3E-06	3.6E-07	8.5E-18	6.9E-07	2.7E-07	4.2E-17	2.6E-06	2.0E-06	6.3E-07	5.1E-17
8-12	3.6E-07	1.0E-07	2.4E-18	1.9E-07	7.7E-08	1.2E-17	7.3E-07	5.6E-07	1.8E-07	1.4E-17

Sumamry of Non-Cancer Hazard Indices

Exposure Media	Resident-Child Exposure Route			Resident-Adult Exposure Route			HI	HI (Ingestion)	HI (Dermal)
Soil Depth (ft bgs)	Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation			
0-2	6.0E-02	1.7E-02	--	6.4E-03	2.6E-03	--	8.5E-02	6.6E-02	1.9E-02
0-4	7.6E-02	2.1E-02	--	8.2E-03	3.3E-03	--	1.1E-01	8.5E-02	2.5E-02
4-8	1.9E-02	5.2E-03	--	2.0E-03	8.0E-04	--	2.7E-02	2.1E-02	6.0E-03
8-12	5.3E-03	1.5E-03	--	5.6E-04	2.3E-04	--	7.5E-03	5.8E-03	1.7E-03

Notes:
CR- Carcinogenic Risk
HI- Non-Carcinogenic Hazard Index

Figures



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Site Location

Legend

- Soil Sample Location - July 2013
- Soil Sample Location - May 2013
- Soil Boring Sample Location - RI
- Airfield
- FDA AOC Site Restriction Boundary
- Monitoring Well (removed)

50 25 0 50

Feet

United States Air Force
Former Griffiss Air Force Base
Rome, New York

Figure 1
SS024 FDA AOC
2013
Sampling Locations

FPM Remediations, Inc.

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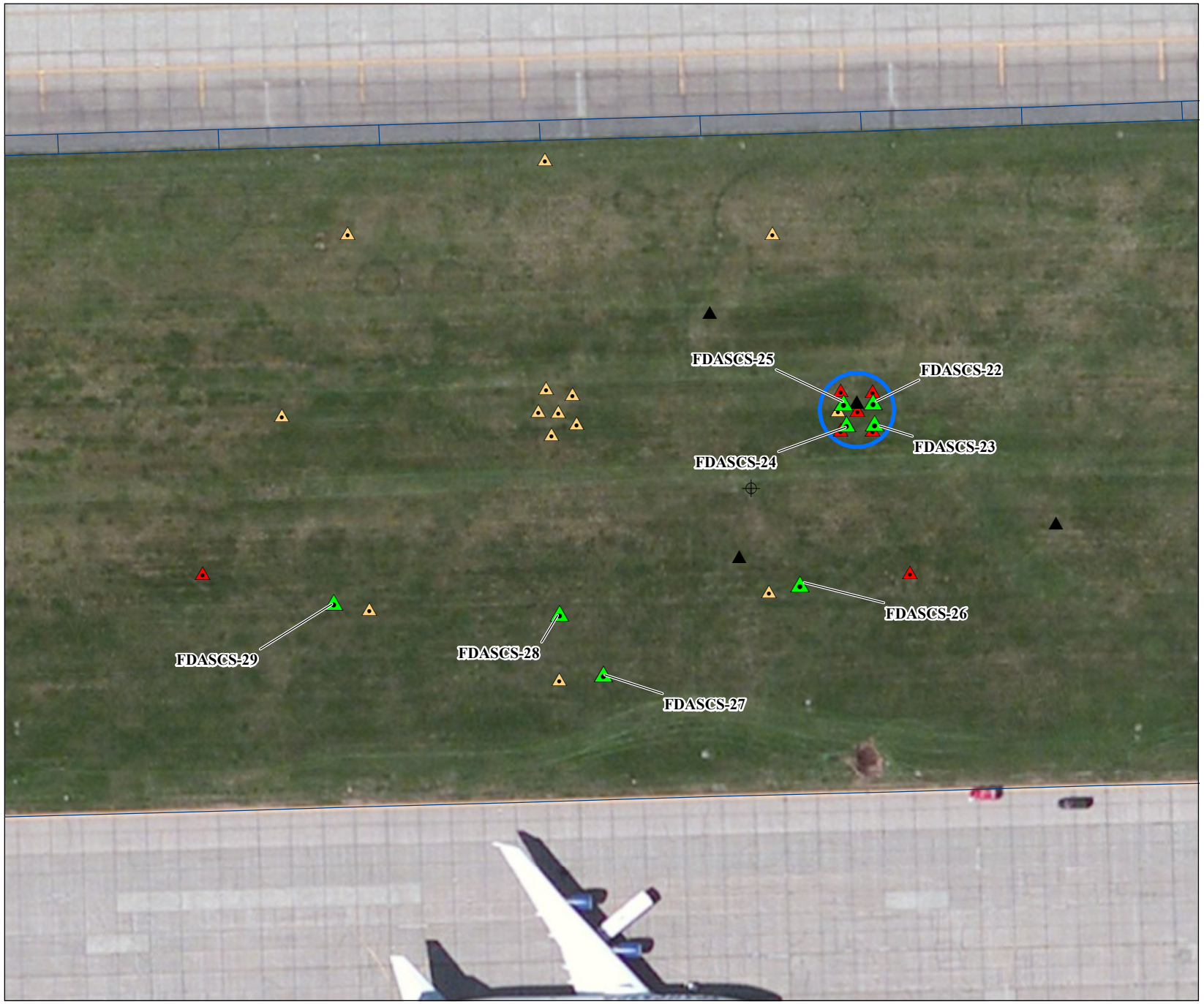

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Site Location

Legend

- Soil Sample Location - June 2014
- Soil Sample Location - July 2013
- Soil Sample Location - May 2013
- Soil Boring Sample Location - RI
- Airfield
- FDA AOC Site Restriction Boundary
- Monitoring Well (removed)

50 25 0 50

Feet

United States Air Force
Former Griffiss Air Force Base
Rome, New York

Figure 2
SS024 FDA AOC
2014
Sampling Locations

FPM Remediations, Inc.

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Figure 3
SS024 FDA AOC Pathway Analysis