REGION 2
NEW YORK, N.Y. 10007

April 22, 2025

MEMORANDUM

SUBJECT: Removal Site Evaluation for the Canadian Radium and Uranium Site, Mt. Kisco, Westchester County, New York (SEMS ID NYC987001468, Site ID A23P)

FROM: Daniel J. Gaughan, On-Scene Coordinator
Removal Assessment and Enforcement Section

TO: Joseph D. Rotola, Chief
Removal Action Branch

I. INTRODUCTION

On June 22, 2015, the United States Environmental Protection Agency, Region II ("EPA") Removal Action Branch ("RAB") began its evaluation of the Canadian Radium and Uranium site ("Site") for a Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") removal action. This evaluation was initiated by a meeting between the Stagg Group ("Stagg"), which is associated with the owners of one of the Site parcels (105 Kisco Avenue), the EPA RAB, the EPA Air and Radiation Division ("ARD"), the EPA Office of Regional Counsel ("ORC"), the New York State Department of Environmental Conservation ("NYSDEC"), and the New York State Department of Health ("NYSDOH"). Stagg requested this meeting as it had recently learned of the Canadian Radium and Uranium Corporation's ("CRU's") historic occupancy and operation at the Site, and it sought to conduct commercial or residential development at its property at the Site. Stagg requested that EPA investigate any radioactive material at the Site which had been historically deposited by CRU.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Physical Location

The Site includes two parcels totaling 2.7 acres, which are located at 103 and 105 Kisco Avenue, in Mt. Kisco, Westchester County, NY (Figure 1), roughly bisected from west to east by Railroad Avenue. The 103 Kisco Avenue property (property C002; see Figure 2), the wedge-shaped southern portion of the Site, is owned by the Village of Mt. Kisco ("Village") and is currently leased to a landscaping company. The 105 Kisco Avenue property (sometimes referenced as 107 Kisco Avenue, property C003), the rectangular-shaped portion of the Site located to the north of 103 Kisco Avenue, is owned by 105 Mt. Kisco Associates LLC, and currently includes three buildings: a vacant hardware store (presently being used for storage) with a vacant second-floor office space, a storage building, and an old railroad depot building. 105 Mt. Kisco Associates LLC is currently leasing this property to a local car dealer to park cars there. Contamination was also identified at 125 Kisco Avenue which is approximately 0.9 acre in size 121 and is privately owned and currently leased to a car dealership.

The Site is situated within a residential and commercial section of Mt. Kisco and is bounded by Kisco Avenue to the west, railroad tracks owned by the Metropolitan Transportation Authority ("MTA") and operated by the Metro North Railroad to the east (property C001), and an auto parts and hardware store to the north. The MTA property contains two buildings utilized for power distribution to the rail line. The nearest residences are located approximately 200 feet to the east of the Site.

2. Site History

From 1943 until approximately 1966, CRU occupied and operated the central portion of the Site. It was developed with numerous buildings, including a two-story concrete block building with the former address of 69 Kisco Avenue as well as two smaller single-story concrete block buildings used by CRU. From 1943 to the 1950s, the primary product at the facility was uranium; subsequently, radium became the principal product until the facility's closure. On-site operations included the recovery of uranium and other radioactive elements from uranium-bearing sludge, old instrumentation, and watch dials; however, no information could be found regarding process areas or storage of uranium and radium-bearing material on-site. A figure from a January 1968 *Decontamination and Demolition of the Canadian Radium & Uranium Corporation Facility* report commissioned by the Mount Kisco Urban Renewal Agency ("1968

Demolition Report") indicates that there was a sump located on-site that may have received unknown wastes.

In 1957, charges were brought against CRU for radiation overexposure of three employees at the facility. A trial was held in Mount Kisco Police Court, and CRU entered a guilty plea and received a suspended sentence because the alleged violations were corrected.

In 1958, the NYSDOH established disposal parameters for radioactive waste from the CRU facility to a local landfill, Croton Point Park in Cortlandt, NY.

According to the 1968 Demolition Report, in November and December 1966, the facility buildings were decontaminated and demolished by the Mount Kisco Urban Renewal Agency ("MKURA") with the assistance of Westchester County, and the burial of these materials in a landfill was approved by the NYSDOH. Removal of radioactive soil to a depth of 12 inches was performed on the CRU premises. The most radioactive demolition materials were disposed of by Nuclear Diagnostic Laboratories located in Peekskill, New York, while the less contaminated materials were disposed of at Croton Point Sanitary Landfill located in Croton-on-Hudson, New York. After decontamination and demolition, a post-operation survey was conducted by Isotopes, Inc., a contractor for MKURA. Two locations within the masonry of a wall for the formerly adjacent Haggerty Millwork building to the north of the Site, which originally shared a wall with the former CRU facility, contained radioactive material at concentrations reported to be "above specifications." Contaminated material from one location was removed by chiseling out the masonry of the wall. The second contaminated area of the wall was a result of tailings from a leaking waste drum which CRU had stored on the second-floor fire escape. Readings from the contaminated wall were reported to be 1-2 millirems per hour ("mR/hr") at 1 cm. Because removal of the concrete blocks from the wall would have compromised the structure of the wall, approximately 12 square feet were sealed with one to two inches of mortar. No further information regarding radioactivity levels was reported in the 1968 Demolition Report.

Between 1964 (pre-decontamination/demolition) and 1971 (post-decontamination/ demolition), the layout of the Site completely changed, and it is believed that none of the original buildings at the Site remained in place after 1971. A former railroad storage depot building at the Site had been relocated approximately 300 feet north sometime between 1953 and 1958 and currently sits on property C003. From 1970-1971, two buildings were constructed at the Site: the current large, two-story rectangular shaped building that was utilized as a hardware store/landscaping supply and office space by Richard's Lumber (a former tenant) and a multi-bayed storage building. The location of Railroad Avenue was moved during this

redevelopment work and is believed to now be where the former main CRU building once stood.

A NYSDOH *Survey of the Former Canadian Radium Site* dated October 1993 indicated that the recovery of uranium was performed for the United States Government's Manhattan Engineering District ("MED"), known as the Manhattan Project. The U.S. Department of Energy ("DOE") made its own determination that the Site had been operated as a commercial venture, not under the jurisdiction of the DOE predecessor agencies, and that therefore it did not qualify for cleanup under the U.S. DOE Formerly Utilized Sites Remedial Action Program ("FUSRAP"). The Site was eliminated from consideration for FUSRAP in 1987.

3. Previous Work Relevant to this Removal Site Evaluation

Between 1979 and 2013, multiple investigations were performed at the Site, including by a local newspaper reporter, Mount Kisco officials, the Westchester County Department of Health, the NYSDEC, and EPA. The investigations involved the use of several different types of radiation detection equipment, which reported results in differing units of measure. Each investigation identified low to moderate levels of radiation, including gamma and Radium-226, at multiple locations throughout the area formally occupied by the CRU facility. It appears that limited excavation of 12 inches of soil was performed over the entire facility property during the performance of the demolition work in 1966, and further excavation of an unknown amount was performed in the eastern central portion of property C003 in 1993. The general consensus of the past reports was that there was known radiological contamination at the Site, that workers should limit their time spent in the areas of higher concentrations, and that further investigations should be conducted. These investigations are detailed below.

In April 1979, a local reporter used a Gieger counter to survey areas of property C003 along Railroad Avenue and detected readings of 0.3 and 0.35 mR/hr. The article subsequently prepared by the reporter states that these readings exceeded the New York State Department of Labor radiation guidelines for an uncontrolled area of 0.25 mR/hr. The article also states that the observed level of radiation was considered very low by state experts. The article then refers to a 1957 interview with the plant manager who had said that "there was no call for alarm at the establishment or about radioactive fallout." The plant manager died of leukemia in September 1979, and autopsy reports noted radioactivity in his body.

On April 20, 1979, the Westchester Department of Health Assistant Commissioner of Health for Environmental Quality, along with the newspaper reporter and Mount Kisco representatives, took radiation measurements at property C003 with a Thyac III Victoreen Model 490, Geiger

counter, and an Eberline Instrument Corporation Geiger counter. Based on the survey, the highest dose rates (0.35 mR/hr) were found in a small portion of a locked, chain-link fenced area, which was located south of the railroad storage depot on the north side of Railroad Avenue, east of Richard's Lumber, and adjacent to the MTA railroad. All other elevated dose rates were found in areas covered by soil and vegetative growth. The report from the 1979 investigation states that the high readings were obtained from an area covering approximately one square yard ("sq. yd.") of the property, which was not used by the public. In addition, the report indicated that the dose rates found did not pose a public health hazard to persons passing the fenced area, working in buildings adjacent to the area, or living across the railroad tracks to the east.

In a memorandum dated February 7, 1980, the Westchester County Health Department described the 1979 investigation findings in more detail. The above-described contaminated area in question was approximately 78 feet by 60 feet, enclosed by a chain-link fence that was located between the railroad tracks and a concrete paved area. The most significant contamination was found in a strip of land measuring 15 feet by 5 feet that contained two separate "hot spots." A surface reading using an alpha probe survey meter measured 50 disintegrations per minute ("dpm") and did not reference a background level. Elevated readings several times above background were reported for an area extending about 50 feet south from the chain-link fence. The memorandum stated that the origin of this contamination was unknown and that it was not discovered in previous surveys.

In November 1988, the NYSDOH and Mount Kisco officials participated in a survey of the Site including new sewer lines installed along Kisco Avenue and the extent of residual contamination at property C003. Three instruments were utilized in the survey: a Ludlum Model 77-3 Stretch Scope, an Eberline Smart Portable Model ESP-IV connected to a sodium-iodide 1 inch by 1 inch detector, and a Ludlum Micro-R Meter to determine exposure rates from external gamma radiation. A total of 13 locations were surveyed throughout property C003. Results indicated one reading of 165 micro-Rem per hour ("μR/hr") on the Ludlum Stretch Probe in the northeast corner of property C003, and readings on the Micro-R Meter ranging from 10.0-280.0 μR/hr. The results did not reference any background levels. The investigation concluded that there was no significant contamination found in the sewers. There were several hot spots, but they were well within limits set by the New York Codes, Rules, and Regulations ("NYCRR") in Part 380.4.

EPA issued a Final Draft Preliminary Assessment ("PA") Report in January 1993, in which EPA reviewed past sampling data. In a March 1993 EPA Remedial Site Assessment Decision document, EPA recommended a high priority Screening Site Inspection ("SSI"). In October 1993,

the NYSDOH Bureau of Environmental Radiation Protection completed a surficial gamma survey and radon sampling of the Site prompted by the EPA PA and the concerns of employees of Richard's Lumber at property C003. At this time, the Site was occupied by Richard's Lumber and had been developed to include the main building, storage building, and the old railroad storage depot building. Background gamma readings were collected from the Mount Kisco Village Hall property and ranged between 7 and 15 µR/hr. Gamma survey results from property C002 indicated levels between 10-140 µR/hr. The PA states that readings more than 20 µR/hr above background were considered to be elevated. Excavation of trees and railroad ties/rails was occurring between the old railroad storage depot building and the southern fence line of property C003. Gamma survey results from this disturbed area indicated levels between 24-240 µR/hr. Indoor radon measurements were collected from the office, show room, and storage/sale floor of Richard's Lumber, which documented a maximum concentration of 9.8 picocuries per liter ("pCi/L"), averaging 8.1 pCi/L, which was above EPA's screening level of 4 pCi/L. The report recommended that employees should limit their time within areas of known higher gamma concentrations, EPA should confirm the radon results and determine if mitigation was necessary, and EPA should expedite the proposed SSI.

In November 1993, the NYSDOH requested by letter to the EPA Radiation Branch Chief that EPA conduct a CERCLA evaluation of the Site, including an on-site inspection to measure radon levels, collect indoor air and soil samples, and measure radiation exposure rates. EPA conducted a Site Inspection ("SI") at the Site in May and August 1994 and detailed the results in a December 1994 Final Site Inspection Report. The purpose of the investigation was to determine if conditions at the Site required immediate action and if the Site was eligible for long-term remediation under the federal Superfund Program. As detailed in the December 1994 Final SI Report, elevated exposure rate measurements, as compared to a background reading of 6 microroentgens per hour, were documented on both the northern (property C003) and southern (property C002) portions of the Site, at levels of 10–700 microroentgens per hour and 10–240 microroentgens per hour, respectively; these levels were higher than those detected in the same areas in September 1993. Radium-226 ("Ra-226") concentrations in soil samples collected from the upper 1.5 feet ranged from 3 to 150 picocuries per gram ("pCi/g"). All of the radon measurements were below EPA's screening level of 4 pCi/L and the indoor air samples collected at the Site did not indicate the presence of any radioactive contamination. EPA's 1994 SI report did not recommend further investigation or long-term remediation of the Site.

A NYSDEC July 1998 report titled *Radiological Survey for Village of Mt. Kisco and Richard's Lumber, former Canadian Radium and Uranium Corporation* details a radiological survey, including gamma screening and soil sampling, of property C002 and property C003 at the

request of the Village. Findings indicated the presence of Ra-226 contamination at property C002 over one large unpaved area of approximately 4,000 to 5,000 square feet ("$ft^{2"}$), several smaller areas between Railroad Avenue and the wooden fence, and along the eastern property boundary between property C001 and the access roadway to the east. The report indicates that on property C002, the highest concentrations of radium observed ranged from 1 to 6,000 pCi/g and that most of the contamination was in the upper foot of soil. The report also states that the distribution suggested that uranium-containing material was placed on the surface and then the area was graded during redevelopment. It indicates that Railroad Avenue had been built where the CRU facility once stood; soil sampling completed near Railroad Avenue showed elevated concentrations of radium down to four feet below the surface. The NYSDEC reported that the distribution of radioactive material near Railroad Avenue appeared to be consistent with movement of soil as part of the building demolition and subsequent construction of the road. Sampling beneath the Railroad Avenue surface was not performed. There is no documentation of shielding or other control measures implemented on property C002 at the time.

The 1998 report further states that the survey of property C003 indicated that radioactive materials were present under the parking lot, but no samples were collected from areas beneath the asphalt. The highest concentration of radium at property C003 was found just north of Railroad Avenue, at approximately 6,000 pCi/g. A large part of the main outside storage area was reported to be contaminated with radium near the surface as well as within some soil profiles to depths of approximately four feet. Survey data suggested that the contamination stopped abruptly at the edges of the paved areas. Railroad Avenue showed count rates that were lower than background soils. NYSDEC attributed these results to absorption by the road surface material (shielding). The report indicated that radiation doses to workers or visitors to the Site, as the Site was being used at the time, were not significant. The Site location where the dose rate was highest was a small area on property C003, just north of Railroad Avenue. Time spent by workers or visitors at this location was deemed to be insignificant; therefore, the accumulated dose was not expected to present a significant health threat. The July 1998 report suggested that significant radium contamination was present on both properties C002 and C003. The NYSDEC did not consider the Site to be fully characterized at the completion of the survey. The report included an appendix with recommendations for further sampling throughout both parcels. EPA did not obtain any information to suggest further characterization was completed under NYSDEC oversight.

In September 2013, the NYSDEC and NYSDOH requested that EPA investigate the CRU site again. As part of a Site Reassessment investigation by the EPA Pre-Remedial Program, Weston Solutions, Inc., Site Assessment Team ("SAT") performed an on-site reconnaissance and gamma

radiation screening of the historic CRU property and other suspected areas of contamination. Background readings collected approximately 500 feet north and northeast of the Site in the right-of-way alongside Kisco Avenue showed background gamma radiation levels of approximately 7,500 counts per minute ("cpm"). The highest reading of 73,637 cpm was located on property C003. Most readings were below two times (2x) the background concentration. There were three areas with readings that exceeded 2x background, ranging from 30,000 cpm to 73,637 cpm, all located in the back portion of property C003, east of the historic CRU facility.

In November 2013, SAT advanced eight boreholes on property C003 to depths of 10 feet for gamma screening and soil sample collection. Using a gamma scintillation meter (Ludlum 2221 Scaler Ratemeter), field gamma screening data collected during the sampling event documented the gamma exposure rates at six-inch depth intervals vertically through each borehole. The soil samples collected represented the highest levels of gamma radiation recorded for each borehole. The soil samples were analyzed for isotopic thorium (thorium-228, thorium-230 and thorium-232), isotopic uranium (uranium-233/234, uranium-235/236 and uranium-238), Ra-226, and Ra-228. Analytical results from the sampling effort suggested that there was measurable residual contamination remaining at the Site.

SAT reported in its *Final Site Reassessment Summary Letter*, dated June 11, 2014, that the Site overlies unconsolidated fluvial sands and gravels of glacial outwash origin which comprise a water table aquifer with a saturated zone of unknown thickness, and the depth of the water is estimated to be approximately 24 feet below ground surface ("bgs"). In addition, SAT indicated that a potential for the release of radioactive contamination to groundwater existed at the Site due to the proximity of contaminated soil to the water table. Furthermore, groundwater samples had not been collected at the Site and an observed release was not documented; however, there were 42 active drinking water wells within 4 miles of the Site.

B. Site Assessment Activities/Observations

In August 2015, as part of the Removal Site Evaluation for the Site, EPA RAB, the EPA Environmental Response Team ("ERT"), and Weston Solutions, Inc., Removal Support Team 3 ("RST 3") conducted ground radiological surveying and soil sampling at properties C001, C002, C003 and C004 associated with the former CRU facility at the request of NYSDEC and NYSDOH. The work was completed in several phases, denoted Phases 1 through 4, as findings indicated the need for expanding sampling efforts to characterize the Site. Property C001 is owned by MTA and houses two small buildings for power generation. Property C002 is owned by the Village and was leased to Hickory Homes and Properties, Inc., a small construction company

which utilizes the property as a construction storage yard with a small office trailer. Property C003 is owned by 105 Mt. Kisco Associates. It was mostly vacant at the beginning of the investigation except for one upstairs office space being leased, but later housed a hardware store and lumber yard. In the midst of the investigation the hardware store closed, and 105 Mt. Kisco Associates allowed a local car dealer to park cars on the property. Property C004 is a strip mall located approximately 0.1 miles north of property C003 along Kisco Avenue and was utilized for the collection of background samples. See Figure 2 for parcel locations.

Background gamma readings were collected from property C004 using a Ludlum-2241 equipped with a sodium iodide ("NaI") 2x2 scintillator, fluke photoionization chamber ("FPIC"), and high-pressure ion chamber ("HPIC"). Background gamma readings reported by each instrument were as follows: Ludlum-2241 at 7,500-9,500 cpm, FPIC at 11-13 µR/hr and 9-12 µR/hr at waist height, and HPIC at 8.9 µR/hr.

Real-time radiation measurements revealed elevated gamma radiation in on-site soil and within the southeast corner of the storage building as well as the electrical room of the main building on property C003. Gamma radiation measurements collected with the Ludlum-2241 were more than 2x background at six of the 11 soil sampling locations selected throughout properties C001, C002 and C003, with values ranging from 20,000 to 180,000 cpm. At property C003, above-background gamma readings (12,000 to 15,000 cpm) were observed in the southeast corner of the storage building. Gamma measurements collected with the FPIC indicated above-background values ranging from 9 to 15 µR/hr at waist level and 14 to 51 µR/hr in the electrical room of the main building, and from 14 to 16 µR/hr at waist level and 9 to 15 µR/hr in the southeast corner of the storage building. Gamma measurements collected with the HPIC indicated the above-background value of 14 µR/hr in the electrical room of property C003 and at six of the 11 soil sampling locations throughout properties C001, C002 and C003, with values ranging from 14.6 to 36 µR/hr. Radon/thoron measurements collected with RAD7 radon/thoron detectors did not indicate any elevated readings in exterior locations. See Figure 3 for Phase 1 gamma screening results. Past reports indicate that there are no signs of shielding existing at the properties that may interfere with the readings collected during this survey.

RST 3 utilized a subcontractor to collect short-term radon samples throughout the buildings on properties C001, C002 and C003. Passive activated carbon canisters were placed throughout the buildings for approximately 72 hours. A total of 44 activated charcoal canisters were placed in the buildings: five within the building at property C001, six within the building at property C002, and the remaining 33 within the buildings at property C003. Validated analytical results from canisters within buildings at properties C001 and C002 did not return results above the EPA Site Specific Action Level ("SSAL"). Results from canisters placed within the storage and

railroad storage depot buildings ranged from 0.6 to 5.2 pCi/L. Results from the main building at property C003 ranged from 3.2 to 19.5 pCi/L, exceeding the EPA SSAL of 4 pCi/L at 21 locations. After learning of these results, the property owners voluntarily installed a radon mitigation system within the main building at the Site, and EPA and RST 3 returned in October 2015 to resample for radon. All locations from the first event were duplicated for the second event. Analytical results from this second round of samples indicated no exceedances of the EPA SSAL, demonstrating that the radon mitigation system was operating effectively.

During the August 2015 event, RST 3 collected a total of 13 soil samples, including two field duplicates, from 11 soil borings advanced to depths of four feet bgs from properties C001 through C004. Soil samples were collected from the intervals exhibiting the highest level of gamma radiation, based on Ludlum-2241 screening data, within each borehole, where a fill layer was observed and/or at the discretion of the EPA On-Scene Coordinator ("OSC"). The sampling was conducted to verify the presence of contamination and potential releases of radiation-containing material in soil associated with the former CRU facility. The soil samples were submitted for laboratory analyses of isotopic thorium, isotopic uranium, and other alpha emitting actinides via alpha spectroscopy Health and Safety Laboratory ("HASL")-300 Method A-01-R; Ra-226 (21-day ingrowth), Ra-228, and other gamma emitting radioisotopes via gamma spectroscopy EPA Method GA-01-R; and target analyte ("TAL") metals, including mercury. ERT's health physicist calculated a Preliminary Remedial Goal ("PRG") for contaminated soil at the Site utilizing a composite worker scenario (indoor/outdoor worker). The PRG was calculated to be 4.06 pCi/g, which was considered to be the SSAL for the main contaminant of concern, Ra-226.

Phase 1 analytical results indicated that concentrations of Ra-226 exceeded the calculated SSAL of 4.06 pCi/g in two of the four soil samples collected from property C002. Exceedance of Ra-226 in property C002 was highest at 24-48 inches bgs with a concentration of 9.84 J (estimated concentration) pCi/g. One sample from property C002 was collected from one of five cubic-yard bags of soil that were excavated from underneath Railroad Avenue in 2010 for the installation of an electrical line for property C002. The cubic-yard bags were staged outside and were exposed to the environment. The bags were subsequently staged in a protected container box. The results of this sample (10.4 J pCi/g) exceeded the EPA SSAL. Ra-226 was also detected above the SSAL in all four soil samples, including one field duplicate, collected from property C003. Exceedance of Ra-226 was highest at 0 to 24 inches bgs, with a concentration of 129 J pCi/g. Additionally, the lead concentration was above the EPA Removal Management Level ("RML") of 400 milligrams per kilogram ("mg/kg") in one soil sample, with a concentration of 510 mg/kg. See Figure 6 for Phase 1 soil sample results.

In April 2016, RST 3 collected a total of 103 soil samples throughout properties C002 and C003, including five field duplicates, to identify additional source areas of radiological material at the Site as part of Phase 2. Samples were collected from 20 soil borings at 6-inch intervals up to 4 feet bgs in 15 locations, and up to 8 feet bgs in five locations. The samples were submitted for laboratory analyses of isotopic thorium, isotopic uranium, and other alpha emitting actinides via alpha spectroscopy HASL-300 Method U-02, radium-226 (21-day ingrowth), radium-228, and other gamma emitting radioisotopes via gamma spectroscopy EPA Method 901.1. At Property C002, analytical results indicated that concentrations of Ra-226 exceeded the EPA SSAL (updated by ERT in April 2016) of 2.27 pCi/g in eight of the 25 soil samples collected from three locations. Exceedances of Ra-226 ranged from 2.57 to 89.39 pCi/g at 24-36 inches bgs. The concentration of Ra-226 was below the EPA SSAL in soil samples collected from 0-12 inches bgs at all three soil sample locations. At Property C003, analytical results indicated exceedances of Ra-226 above the EPA SSAL of 2.27 pCi/g in 32 of the 71 soil samples collected from 16 locations. Exceedances of Ra-226 ranged from 2.79 pCi/g at 12-24 inches bgs to 926.1 pCi/g at 36-48 inches bgs. The concentration of Ra-226 was below the EPA SSAL in soil samples collected from 0-12 inches bgs in 15 of the 16 soil sample locations. See Figure 4 and Figure 7 for Phase 2 gamma screening results and soil sample results.

In June 2016, EPA and the Department of Energy ("DOE") independently conducted two aerial overflights of the Site to determine the possibility of lateral spread of the radiological contamination. The EPA overflight was conducted as part of a larger radiation detection survey of the New York metropolitan area. The DOE overflight was conducted as part of a training flight and exercise within the same area. The DOE overflight indicated potential lateral spread to the west of the Site along Kisco Ave based on its aerial gamma survey. The EPA overflight indicated two other potential areas of low-level gamma results of potential concern. One area was a parking lot located immediately southeast of the Site off North Moger Avenue (property C007) and the second was the parking lot of a residential condominium complex (Diplomat Towers) located approximately one-half mile southwest of the Site (property C006). See Figure 2 for property locations.

In December 2016, EPA and RST 3 performed a non-intrusive ground radiological survey of property C006 and property C007. Background gamma readings at properties C006 and C007 ranged from 17-20 kilocounts per minute ("kcpm"). Gamma readings did not exceed 30 kcpm, which is below 2x background concentrations, indicating that a full soil investigation in these areas was not warranted.

Also in December 2016, EPA and RST 3 utilized a drilling subcontractor to install three temporary groundwater well points on property C003 in areas previously documented to have

higher concentrations of radiological parameters in soil samples to determine whether local groundwater was impacted. The three wells were constructed with a 10-ft long, two-inch diameter polyvinyl chloride ("PVC") screen and a five-ft long riser. All well construction information was documented by RST 3 and then locations were surveyed by a surveying subcontractor. Each well was purged utilizing a Whale pump to facilitate influx of fresh groundwater from the aquifer and allowed to stabilize overnight. RST collected samples from the three wells, including a duplicate sample. The wells were purged of three well volumes and samples were collected utilizing a submersible pump and Teflon tubing. Samples were analyzed for isotopic thorium, isotopic uranium, and other alpha emitting actinides.

Validated groundwater sample results were compared to the calculated EPA SSALs of 15 pCi/L for gross alpha particles and 4 pCi/L for gross beta particles; 5 pCi/L for Ra-226 and 0.702 pCi/L for Ra-228. Results indicated exceedances of gross alpha and beta particles in all three wells ranging from 44.1 to 109 pCi/L for gross alpha and from 29.6 to 202 pCi/L for gross beta particles. The concentration of Ra-226 in two wells exceeded the EPA SSAL at 7.18 pCi/L and 315 pCi/L and the concentration of Ra-228 exceeded the EPA SSAL in all four wells ranging from 1.14 to 46.7 pCi/L. Other exceedances above the EPA SSAL include bismuth-212, bismuth-214, lead-212, lead-214, Ra-224 and thallium-208. See Figure 3 and Figure 8 for Phase 3 gamma screening results and groundwater sample results.

In conjunction with the RAB work at the Site, EPA Pre-remedial and SAT conducted a Site Reassessment consisting of two rounds of groundwater sampling in December 2016 and June 2017 from six active water-supply wells located within or just beyond a one-mile radius of the Site to determine if known radiological contamination at the Site was impacting local public supply wells and therefore impacting the local community. The wells were purged for at least 15 minutes prior to sample collection to ensure fresh water from the aquifer was sampled. Samples from 2016 were analyzed for Gamma-Ray Spectrometry ("GAM-01"), Radium-226 Analysis by Eichrom ("RA226-EICHROM"), Actinides in Environmental Matrices by Extraction Chromatography ("TH-EICHROM and U-EICHROM"), and Gross Alpha and Beta Analysis ("GR-01"). Samples from 2017 were analyzed for total potassium, radon, Gross Alpha and Beta, Ra-226, Ra-228, Total Uranium, U-234, U-235, and U-238. Validated analytical results from the 2016 sampling suggested a possible Site-attributable release of contaminants to two nearby drinking water wells based on some concentrations being above the minimum detection limit and equal to or exceeding a value above the mean site-specific background concentration. The results were qualified with a "J" (estimated) value. Due to the estimated results, the sampling was repeated in 2017. The 2017 validated analytical results indicated no observed release of Site-attributable contaminants to the wells had occurred.

Because soil sample results near the northern property line of property C003 exceeded the EPA SSAL for Ra-226, EPA determined that an investigation of the privately owned property to the north of property C003 was necessary to determine if a health threat to the property occupants existed. EPA initiated contact with the property owners in May 2016 and informed them that a soil and radon gas investigation at 125 Kisco Avenue (property C008) was warranted. After protracted discussions regarding the proposed sampling and the property owner's refusal of access, EPA issued a Unilateral Administrative Order to the owners in March 2018 ordering the owners to provide access to EPA. The owners filed an action to challenge the order. At a court-mandated settlement conference in July 2019, the property owner agreed to grant EPA access to the property to conduct the proposed sampling.

In September 2019, EPA, ERT and the Superfund Technical Assessment and Response Team V ("START V", formerly RST 3) began the investigation at property C008. ERT performed a non-intrusive radiological survey of the exterior areas of property C008 and the right-of-way along Kisco Avenue. The instantaneous gamma readings as well as the geographical locations were reviewed, and gamma survey results indicated background gamma levels ranged from 0 to 13 µR/hr (approximately 14 to 20 kcpm). Most areas throughout the property exhibited readings similar to background readings. Three areas located in the eastern and central portions of the property exhibited readings of 2x background, and one area between the right-of-way and the southwest corner of the property exhibited elevated gamma readings of at least three times the background concentration (3x background). See Figure 9 for Phase 4 gamma screening results.

EPA, ERT, and START V also utilized a drilling subcontractor to install nine soil borings to a depth of eight feet throughout property C008. The soil cores were retrieved from each borehole, cut open, and screened at every 6-inch interval for gamma radiation using a Ludlum-2241 and a NaI 3x3 scintillator. At least two samples were collected from each soil core based on the highest gamma readings, the presence of fill and/or EPA OSC discretion. A total of 19 soil samples were collected for analysis of multiple radiological parameters. The validated soil sample results indicate 10 of 19 soil sample concentrations exceed the EPA SSAL for Ra-226. Concentrations ranged from 2.63 to 7.39 pCi/g throughout the property and at varying depths. The samples collected from the area with gamma screening levels at 3x background did not exhibit any results above the EPA SSAL. See Figure 10 for Phase 4 soil sample results.

Additionally, START V's subcontractor placed 17 radon canisters throughout the property building to determine whether radon gas entered the building. Canisters were left in place and undisturbed for 72 hours. After the 72 hours, the subcontractor collected the canisters and

delivered them to a lab for analysis. The radon results for all 17 samples collected were below the EPA SSAL of 4 pCi/L, ranging in value from 0.2 to 0.8 pCi/L.

C. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Findings of the removal assessment field work indicate that there has been a release of a CERCLA-designated hazardous substance as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), at the Site. The Site is a "facility" as defined under Section 101(9) of CERCLA. The following hazardous substances have been identified in soil at the Site:

Substance Identified (media) (property)	Maximum Concentration	Screening Level	Statutory Source for a Hazardous Substance
Radium-226 (soil) (C002, C003, C008)	926.1 pCi/g	2.27 pCi/g	112 CAA
Radon (gas) (C003)	19.5 pCi/L	4 pCi/L	112 CAA
Gamma Radiation (C002)	180,000 cpm	n/a	112 CAA
Lead (soil) (C003)	510 mg/kg	800 mg/kg	307(a) CWA, 112 CAA
Radium-228 (water) (C003)	46.7 pCi/L	n/a	112 CAA
Radium-226 (water) (C003)	315 pCi/L	n/a	112 CAA

n/a – Not Applicable
CWA- Clean Water Act, Section 307(a)
CAA- Clean Air Act, Section 112

A variety of radionuclides, including radium 226 and radium 228, have been identified at the Site, specifically on properties C002 and C003 where the former CRU facility was located. Based on the concentrations of these substances at levels exceeding background concentrations as well as historical information, it is suspected that the elevated concentrations resulted from CRU's on-site operations and the distribution of contamination across the Site properties during redevelopment activities. Radiological substances are listed in 40 CFR 302.4, List of Hazardous Substances and Reportable Quantities, Attachment B – Radionuclides. The statutory source for designating radionuclides as a hazardous substance under Section 102(a) of CERCLA, 42 U.S.C. § 9602(a), is Section 112 of the Clean Air Act, 42 U.S.C. § 7412.

III. THREATS TO PUBLIC HEALTH OR WELFARE OF THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

All results were reviewed and discussed with an EPA health physicist to determine whether there may be health risks to property occupants from the release at the Site. While the substances identified could impact full-time workers at the Site properties, since there are no full-time workers on-site, there is currently no significant threat or exposure hazard. Workers at Property C002 are not impacted, as no radon was detected within the on-site trailers, and workers do not spend a significant amount of time in any one area of the Site due to the nature of their work. Additionally, at property C002, the majority of soil contamination is located greater than two feet below grade; based on the sampling results, the cover by pavement or the depth of soil above contaminated material is sufficient to act as shielding. There are currently no full or part-time workers at property C003, only personnel moving cars around the property, therefore workers are not exposed to contamination found below the ground surface. The radon mitigation system is operational within the main on-site building. Workers at property C008 are not impacted through elevated radon gas concentrations nor by the contamination found in subsurface soils for these same reasons.

Additionally, there is no direct contact threat for Site occupants, as all contaminated soil is located below areas paved with either concrete or asphalt. Soil and groundwater sampling at property C003 and soil sampling at properties C002 and C008 indicate concentrations of Ra-226 exceeding the EPA SSAL. However, there are presently no workers at property C003, and the property has entered into the NYSDEC Brownfield program for a voluntary cleanup under state oversight to remediate the Site and convert it into a residential property. The workers at properties C002 and C008 are not being exposed to the contamination through radon gas, as

demonstrated via interior radon sampling, and the soil exceedances do not present an exposure threat due to their locations beneath two feet below ground surface.

B. Threats to the Environment

There is no known threat to sensitive environments or natural resources at this time. While on-site groundwater is impacted by the contamination within the soil, nearby public supply wells are not being impacted.

IV. CONCLUSIONS

The Canadian Radium and Uranium Site is a facility as defined under Section 101(9) of CERCLA, 42 U.S.C. § 9601(9). Based on sample data, a release of CERCLA hazardous substances, as defined in Section 101(22) of CERCLA § 9601(22), has occurred at the Site. Radioactivity, in the form of Ra-226, was measured in soil at properties C002, C003, and C008 at levels well above the SSALs developed for the Site. However, the soil contamination detected at these properties is located greater that two feet below ground surface and/or below concrete- or asphalt-paved surfaces which acts as sufficient shielding to the radioactivity such that it does not present a health risk to Site workers.

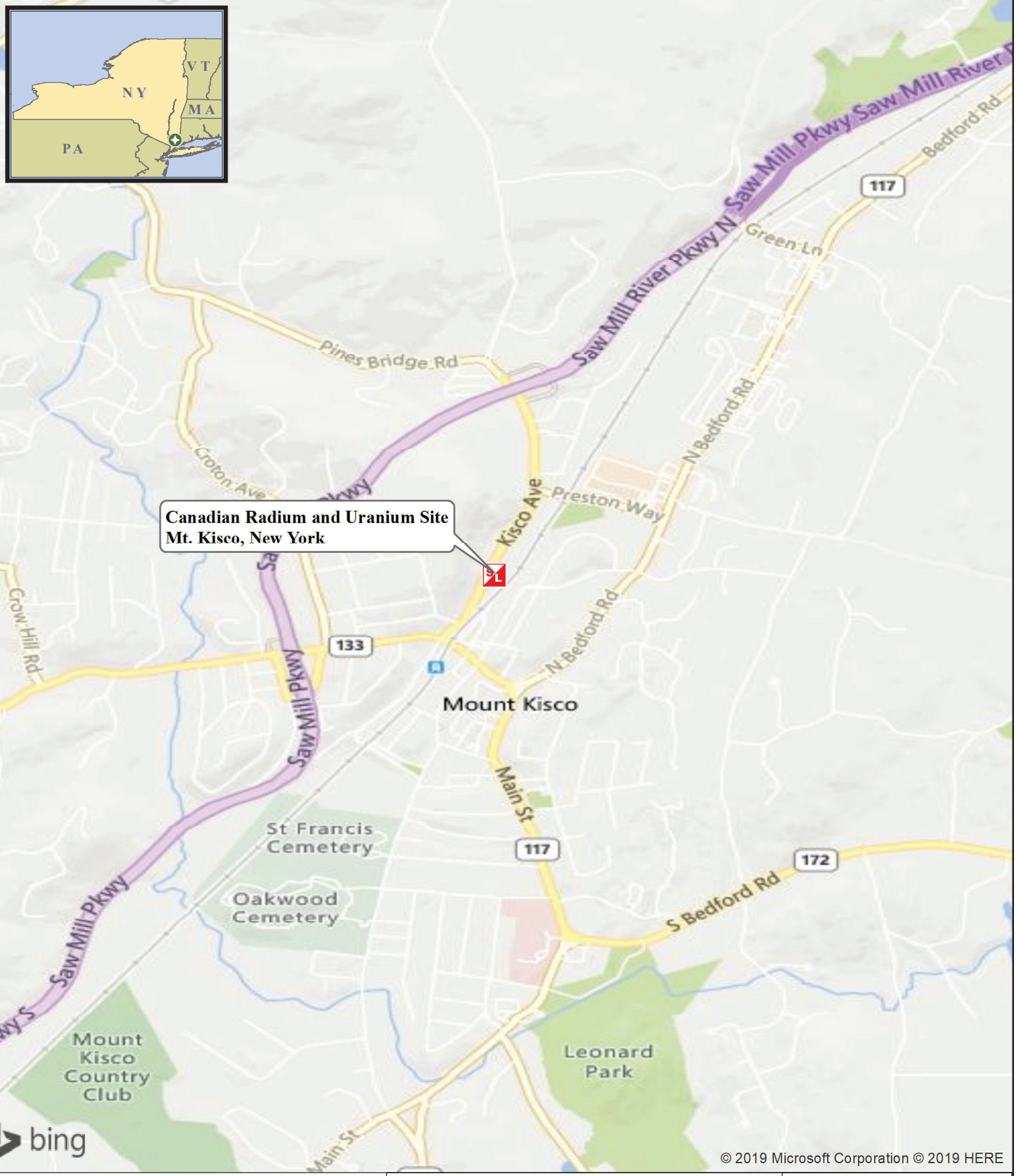
Additionally, radon gas sampling indicated radon concentrations above the screening criteria at property C003. However, under EPA oversight, the owners of property C003 installed a radon mitigation system which is effectively reducing radon concentrations to levels below the EPA SSAL, and there are currently no workers consistently occupying property C003, which exhibits the highest radon concentrations. The radon mitigation system should be maintained with routine testing to ensure it is working effectively. Workers at the four total properties sampled for radon are not currently being exposed to radon gas.

On-site contamination does not currently pose a threat to workers. Therefore, current conditions at the Site do not meet the requirements of Section 300.415 (b) of the National Contingency Plan (“NCP”) for the undertaking of a CERCLA removal action at this time.

As previously noted, one of the Site properties (property C003) is currently enrolled in the NYSDEC Brownfields Cleanup Program and the property owner is in the beginning stages of a cleanup of its portion of the Site. Property C002 is owned by the Village, and both the Village and the current lessee of the property are aware of the contamination in the Site soil. The owners of property C008 were made aware of the limited soil contamination on their property

and informed that no subsurface work should be performed at the property without proper precautions.

cc: M. Ludmer, ORC-NYCSB
EPA Region 2 Superfund Records Center



Legend

Site Location

N

0 0.125 0.25 0.5 0.75 1 Miles

Weston Solutions, Inc.
Federal East Division

In Association With
Eco-Risk; Avatar Environmental, LLC;
Pro-West & Associates, Inc.;
On-Site Environmental, Inc.;
and Sovereign Consulting, Inc.

Figure 1:
Site Location Map

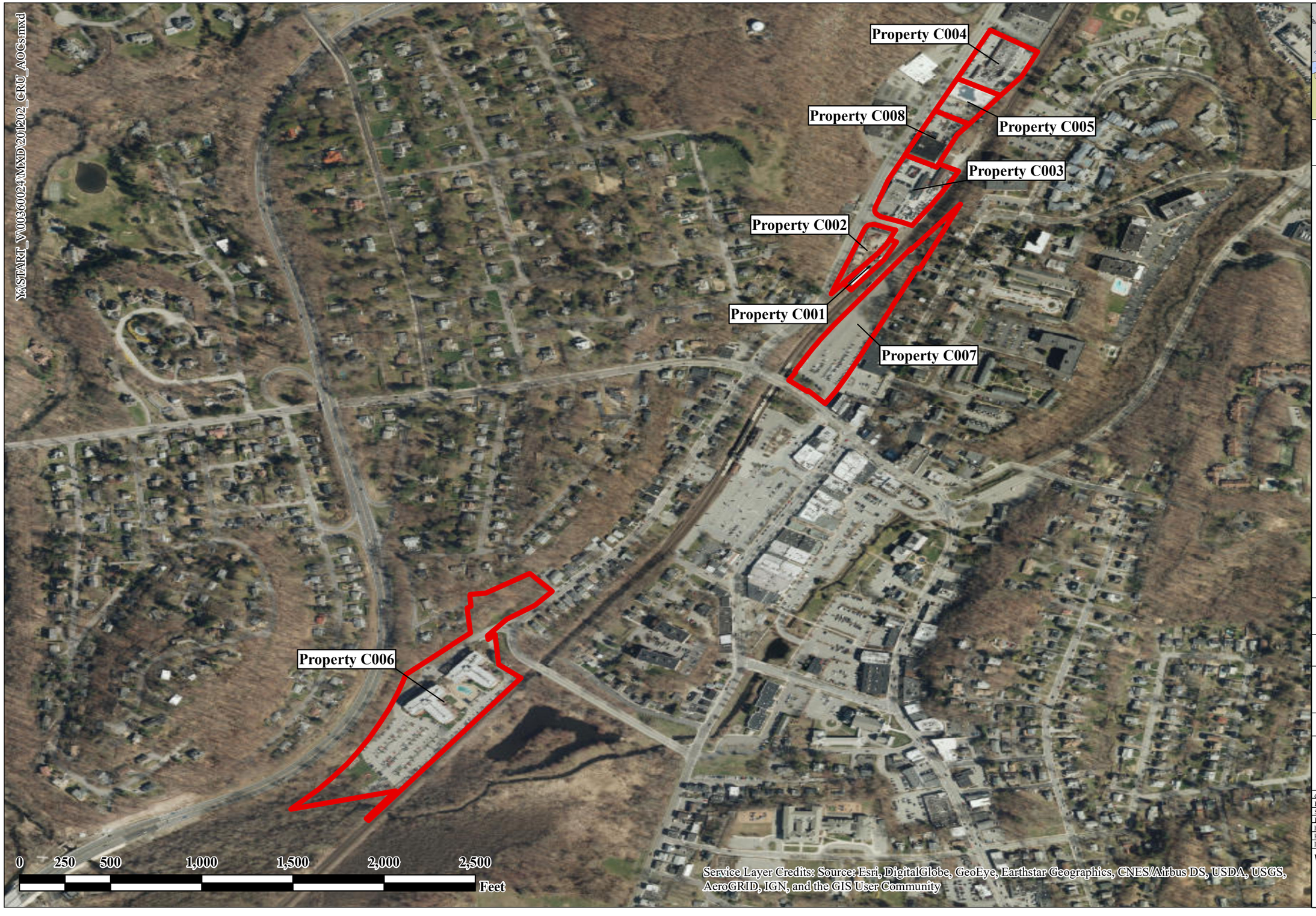
Canadian Radium and Uranium Site
Mt. Kisco, New York

U.S. ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND TECHNICAL ASSESSMENT & RESPONSE TEAM V
CONTRACT # 68HE0319D0004

GIS ANALYST:	T. BENTON
EPA OSC:	D. GAUGHAN
START V SPM:	B. NWOSU
CHARGE #::	40200.011.032.1030

DATE MODIFIED: 8/13/2019

W:\START_V\00320030\MXD\190813_CRU_SITELOCATIONMAP.MXD



Y:\START_V\00360024\MXD\201202_CRU_AOCs.mxd

SCALE

1:6,000

LEGEND

Subject Property

Figure 2: Area of Concern Overview Map

Canadian Radium Site
Mt. Kisco, New York

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND TECHNICAL ASSESSMENT & RESPONSE TEAM V
CONTRACT # 68HE0319D0004

Weston Solutions, Inc.

In Association With
Eco-Risk, Avatar Environmental, LLC,
Pro-West & Associates, Inc.,
On-Site Environmental, Inc.,
Sovereign Consulting, Inc.

GIS ANALYST:	M. LANG
EPA OSC:	D. GAUGHAN
START V SPM:	B. NWOSU
FILENAME:	201202_CRU_AOCs
FIGURE	2
REVISION	0.0
DATE MODIFIED	12/2/2020

WESTON SOLUTIONS

SCALE

1:766

LEGEND

- SAM - 940/HPIC Location
- Ludlum - 2241 Location
- RAD7/HPIC Location

Gamma Radiation Screening (SAT) Results (Counts per Minute)

- Less Than 7,500
- 7,501 - 15,000
- 15,001 - 30,000
- 30,001 - 73,637

Note(s):

1.) µR/HR = Microroentgen per hour.
2.) pCi/L = Picocuries per liter.
3.) µREM/HR = Microroentgen equivalent man per hour.
4.) CPM = Counts per minute.
5.) For Ludlum 2241 gamma survey results:
G = Gamma survey location ID.
6.) For Rad7 Radon/Thoron survey results:
SW = Sniff at waist level.
SC = Sniff at contact.
RW = Run at waist level.
RC = Run at contact.
If run mode screening was conducted at a particular location those survey readings are depicted. If no run mode screening was conducted the sniff mode survey readings are depicted.
7.) For HPIC gamma survey results:
HP = HPIC survey location ID.
8.) For SAM-940 gamma survey results:
CRU SPECTRA = SAM-940 gamma survey location ID.
9.) Values highlighted red exceed the background survey values.

Figure 3: Phase 1 Gamma Screen

Canadian Uranium Radiological Site
Mount Kisco, New York

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REMOVAL SUPPORT TEAM 3
CONTRACT # EP-S2-14-01

In Association With
Scientific and Environmental Associates, Inc., Environmental Compliance Consultants, Inc., Avatar Environmental, LLC, On-Site Environmental, Inc., and Sovereign Consulting, Inc.

GIS ANALYST:	T. BENTON
EPA OSC:	E. DALY
RST SPM:	B. NWOSU
PROJECT #:	00062053
FIGURE:	5
REVISION	0
DATE MODIFIED	10/5/2015

WESTON SOLUTIONS

\\FSED2DATA1\GISDATA\RST_3\00060053\MXD\150929_HPICRAD7.MXD