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DC No.: RST3-03-D-0211

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

February 24, 2017

Mr. Eric Daly, On-Scene Coordinator
U.S. Environmental Protection Agency
Removal Action Branch
2890 Woodbridge Avenue
Edison, NJ 08837

EPA CONTRACT No.: EP-S2-14-01
TDD No.: TO-0007-0014
DOCUMENT CONTROL No.: RST3-03-D-0211
SUBJECT: AREA 5 TREE REMOVAL GAMMA SURVEY AND SAMPLING TRIP REPORT, FEBRUARY 2017 – NIAGARA FALLS BOULEVARD RADIOLOGICAL SITE, NIAGARA FALLS, NIAGARA COUNTY, NEW YORK

Dear Mr. Daly,

Enclosed please find the Area 5 Tree Removal Gamma Survey and Sampling Trip Report, February 2017 for the gamma survey and sampling performed on trees removed in Area 5 at the Niagara Falls Boulevard Radiological Site located in Niagara Falls, Niagara County, New York on February 2, 2017. If you have any questions or comments, please do not hesitate to contact me at (832) 347-3430.

Sincerely,

Weston Solutions, Inc.

Chad Conway

R. Chad Conway
RST 3 Site Project Manager

Enclosure
cc: TDD File No.: TO-0007-0014

AREA 5 TREE REMOVAL GAMMA SURVEY AND SAMPLING TRIP REPORT, FEBRUARY 2017

Niagara Falls Boulevard Radiological Site
Niagara Falls, Niagara County, New York

Prepared for:

U.S. Environmental Protection Agency
Region II – Removal Action Branch
Edison, New Jersey 08837

Prepared by:

Removal Support Team 3
Weston Solutions, Inc.
Edison, New Jersey 08837

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February 2017

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AREA 5 TREE REMOVAL GAMMA SURVEY AND SAMPLING TRIP REPORT, FEBRUARY 2017

SITE NAME: Niagara Falls Boulevard Radiological Site
DC No.: RST3-03-D-0085
TDD No.: 0007-0011
CERCLIS ID: NYN000206699
EPA ID: A23Q
EVENT DATE: February 2, 2017

1.0 Introduction:

In 1978, the U.S. Department of Energy (DOE) conducted an aerial radiological survey of the Niagara Falls region and identified more than 15 properties having elevated levels of radiation above background levels. It is believed that in the early 1960s slag from the Union Carbide facility located on 47th Street in Niagara Falls was used as fill on the properties prior to paving. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material. Union Carbide subsequently obtained a license from the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), and the State of New York; however, the slag had already been used as fill throughout the Niagara Falls region prior to licensing. Based on the original survey and subsequent investigations, it is believed that the radioactive Union Carbide slag was deposited on the Niagara Falls Boulevard Radiological Site (the Site).

2.0 Site Location:

The Site is located in a mixed commercial and residential area of Niagara Falls, New York. The Site consists of two parcels, namely 9524 and 9540 Niagara Falls Boulevard and it encompasses approximately 2.53 acres. Currently, the 9524 Niagara Falls Boulevard property contains a bowling alley and an asphalt parking lot; the 9540 Niagara Falls Boulevard property is occupied by a hardware store, Greater Niagara Building Center, Inc. (GNBC) and an asphalt parking lot. The properties are bordered to the north by a wooded area; to the east by a church; to the south by Niagara Falls Boulevard, beyond which is a residential area; and to the west by a hotel and residential area. Refer to Attachment A, Figure 1: Site Location Map.

3.0 Site History:

In September/October 2006 and May 2007, the New York State Department of Environmental Conservation (NYSDEC) conducted radiological surveys of the interior and exterior of both properties on several occasions using gamma detectors, Exploranium-135 and Ludlum Model 2221 Ratemeter/Scaler (Ludlum-2221). With the exception of an office area and storage space at 9540 Niagara Falls Boulevard that were constructed after the original building, directly on top of the asphalt parking lot, interior radiation levels obtained with Exploranium-135 were relatively low. The highest reading in the newer area was 115 micro roentgens per hour (μR/hr); elsewhere throughout the building, radiation levels generally ranged between 10 and 20 μR/hr. Exterior readings taken at waist height generally ranged between 10 and 350 μR/hr, while the maximum reading of 600 μR/hr was recorded at contact (*i.e.*, at the ground surface). At a fenced area behind the building located at 9540 Niagara Falls Boulevard, waist-high readings ranged

between 200 and 450 μR/hr, and at-contact readings ranged between 450 and 750 μR/hr. Elevated readings were also observed on the swath of grass between the 9524 Niagara Falls Boulevard property and the adjacent property to the west that contains a hotel, and in the marshy area beyond the parking lot behind the buildings. Two biased samples of slag were collected from locations that exhibited elevated static Ludlum-2221 readings: one slag sample collected from an area of loose blacktop indicated a reading of 515,905 counts per minute (cpm) and the second slag sample collected in the marshy area indicated a reading of 728,235 cpm. During a reconnaissance performed by the New York State Department of Health (NYSDOH) and NYSDEC on July 9, 2013, screening activities with a hand-held pressurized ion chamber (PIC) unit around an area of broken asphalt indicated gamma radiation levels at 200 μR/hr and 500 μR/hr from a soil pile containing slag at the Site. Readings over 600,000 cpm were recorded with a sodium iodide scintillator from the soil and slag pile.

On September 10, 2013, the U.S. Environmental Protection Agency (EPA) and Weston Solutions Inc., Site Assessment Team (SAT), conducted gamma radiation screening of the 9524 Niagara Falls Boulevard property using Ludlum-2221. On December 4 and 5, 2013, further radiological survey information was collected from the 9524 and 9540 Niagara Falls Boulevard properties, as well as the church property located further east of the two site parcels. The highest gamma radiation screening results were recorded from the exposed soil area in the rear northern portion of the 9540 Niagara Falls Boulevard property. From December 5 through 7, 2013, SAT documented and delineated the areas of observed contamination at the Site by measuring the gamma radiation exposure rates and determining where the gamma radiation exposure rate around the source equal or exceed two times (2x) the site-specific background gamma radiation exposure rates. The areas of observed contamination were defined by site-attributable gamma radiation exposure rates, as measured by a survey instrument held 1 meter above the ground surface, which equal or exceed 2x the site-specific background gamma radiation exposure rate. An area of the Site, approximately 168,832 square feet (sq. ft.), indicated gamma radiation levels exceeding 2x the background measurement of 8,391 counts per minute (cpm).

Subsequent Removal Assessments were conducted in December 2013 by SAT and in July 2015, August 2015 and March 2016 by Weston Solutions Inc., Removal Support Team 3 (RST 3). The Removal Assessments were conducted in order to verify potential releases of radiation-containing materials in soil and fill material associated with slag from the former Union Carbide facility, determine radiation source areas, and delineate the extent of on-site contamination through radiological surveys and soil sampling events. The screening and analytical results from these events confirmed prior findings which indicated the presence of radioactive contamination at location onsite.

As part of Removal Action activities, on August 8, 2016 through December 20, 2016, EPA's Emergency and Rapid Response Services (ERRS) contractor, Environmental Restoration Inc. (ER), conducted removal operations of contaminated soil/slag, within Area 5 (located on the northwest section of the Site). Before removing the contaminated soil/slag, it was necessary to clear the existing vegetation and approximately 100 trees located within Area 5. Prior to removing the trees, the coordinates (latitude and longitude) of each tree was recorded using a Trimble Global Positioning System (GPS). Once the trees were removed, a tag number stored in the GPS was assigned to each tree. The canopy and low hanging branches were removed from the trees and mulched using a wood chipper. The remaining trunks of the trees were staged on

poly sheeting and fenced off. Once all the contaminated soil/slag was removed (approximately 2,419 cubic yards) from Area 5, the excavated area was surveyed for gamma radiation to ensure that all contamination was removed. The excavated area was backfilled with imported stones to the original grade.

4.0 Personnel On-Site:

Name	Representing	Duties On-Site
Chad Conway	Weston Solutions Inc., RST 3, Region II	Site Project Manager, Site Health and Safety, Tree Scanning and Sampling
Michael Lang	Weston Solutions Inc., RST 3, Region II	Tree Scanning and Sampling

RST 3 – Removal Support Team 3

5.0 Summary of Site Activities:

On February 2, 2017, RST 3 and ERRS were tasked by EPA to relocate tree trunks which were staged on-site during the August 2016 removal operations to two predetermined locations within Area 5. Prior to relocating the tree trunks, RST 3 utilized a Ludlum (Model 3) Pancake Probe to characterize the background location areas at two zones within Area 5 in order to establish a screening value to determine if the trees were contaminated with elevated levels of radiation. The first zone (Zone 1) located on the west side of Area 5, measuring 60 feet by 7 feet, was used to conduct gamma survey of 15 preselected trees. The second zone (Zone 2) located on the north side of Area 5, measuring 60 feet by 30 feet, was used to stage the remaining trees after they were surveyed for gamma radiation. The trees that were preselected for sampling were staged in a separate location on the southeast side of Area 5.

The trees designated for sampling were selected from locations in Area 5 where the highest gamma readings were identified during a gamma survey and soil/rock sampling event conducted prior to the commencement of removal operations. During the soil sampling event, a total of 98 soil/rock samples were collected from ground surface to approximately 48 inches below ground surface (bgs) in 6 inch intervals. Each soil/rock sample was analyzed using the onsite High-purity Germanium (HPGe). The initial gamma survey identified the areas where the 98 soil/rock samples were collected, and the analytical results generated by the HPGe directly correlated with the levels detected from the gamma survey. It was determined that a wood boring sample would be collected from 10% of the total amount of trees removed from Area 5, equating to ten wood boring samples to effectively obtain an accurate representation of all the trees removed from Area 5. Ten trees were determined efficient and representative of Area 5 based on the highest gamma readings, highest soil sample results, variation of trees, and their location within Area 5. The assumption was that trees within these identified locations may have potentially absorbed radioactive materials and/or potentially re-suspended onto the bark, and therefore met the criteria required for sampling and further analysis. To ensure that the representation of all the trees was met, an additional five trees were sampled from random locations within Area 5. A total of fifteen trees were sampled and analyzed via HPGe. Refer to Attachment B: Photographic Documentation Log.

6.0 Sampling and Analysis:

As the trees were being relocated from the initial staging location to the predetermined zones in Area 5, the entirety of each tree was scanned for gamma radiation using a Ludlum Pancake Probe to obtain a qualitative average reading, and ensure that no tree exceeded the Site Specific Screening Level (SSSL) of 40 counts per minute (cpm) located in Zone 1 and 47 cpm located in Zone 2. The majority of the trees surveyed for gamma radiation were staged in Zone 2. Trees selected for sampling were moved to Zone 1 and thoroughly surveyed again for gamma radiation. During the gamma scan of each tree, there were no levels that exceeded the SSSL for Zone 1 or Zone 2. The highest reading identified during the gamma scan was 37 cpm in Zone 1, and were below the established SSSL of 40 cpm. In addition, all gamma surveys from Zone 2 were less than 47 cpm. Samples were collected from the trees utilizing a hand-held drill equipped with an auger bit. Samples were collected at the base of each tree by drilling from the exterior of the trunk to the center, such that every ring within the tree was sampled. Approximately 5 to 7 boring were required to attain the sample volume needed for analysis. The extracted samples from the tree borings were collected in a clean polyethylene bag.

The sample volume collected from each tree was transferred into a 16 ounce (oz.) plastic jar for quantitative gamma spectrometry analysis utilizing a High-Purity Germanium (HPGe) detector. Gamma ray spectrometry is an analytical method that allows the identification and quantification of gamma emitting isotopes in a variety of matrices. In one single measurement with little sample preparation, gamma ray spectrometry allows for the detection of several gamma emitting radionuclides in a sample. The measurement gives a spectrum of lines, the amplitude of which is proportional to the activity of the radionuclide and its position on the horizontal axis gives an idea on its energy.

The results of gamma scan from each individual tree, as well the pile of trees, showed no levels exceeding the SSSL. In addition, the results of the tree boring samples, correlating with the highest elevated locations within Area 5 and analyzed quantitatively with the onsite HPGe, indicated that trees were not significantly different than the background wood sample or background soil samples. By these results, no radioactive material from Area 5 was taken up by the trees via the root system, absorbed into the trees, nor adhered to the exterior of the trees. Therefore, the trees can be free released from the site without any restrictions. Refer to Attachment C: Table 1: Area 5 Tree Removal Gamma Survey Results Summary Table.

Report prepared by: Chad Conway Date:

R. Chad Conway
RST 3 Site Project Manager

Report reviewed by: Date:

Bernard Nwosu

RST 3 Group Leader

Attachment A

Figure 1: Site Location Map

Attachment B

Photographic Documentation Log

Attachment C

Table 1: Area 5 Tree Removal HPGe Analysis Results Summary Table