

**Enclosure**

**OAK RIDGE ASSOCIATED UNIVERSITIES:  
SITE STATUS REPORT FOR THE NORTH RIVERSIDE APARTMENTS AT  
330 QUEEN STREET IN BRISTOL, CONNECTICUT**

**JUNE 25, 2019**

## EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) requested that Oak Ridge Associated Universities (ORAU) perform an initial site visit/radiation survey of a suspected former dump site. The property at 330 Queen Street in Bristol, Connecticut, was identified as the site of a former vacant field where luminous clock parts containing radium may have been dumped approximately 60 years ago (ORNL 2015). The site currently contains the North Riverside Apartments, which consists of four apartment buildings and a parking lot. In 1998, a radiation survey performed by the Connecticut Department of Energy and Environmental Protection (CT-DEEP) reported a 50 microRoentgen per hour ( $\mu\text{R/hr}$ ) exposure rate on the front lawn and exposure rates 4-5 times background levels 3 feet deep in an animal hole. However, samples were not collected to confirm the elevated exposure rates were due to radium and a follow-up visit was not conducted by CT-DEEP (ORNL 2015). The primary objective of this initial site visit was to locate possible discrete sources of radium associated with radium clock parts.

On April 24, 2019, the NRC/ORAU team performed the radiation surveys in accessible grassy areas of the 330 Queen Street property and adjacent apartment properties; CT-DEEP personnel were also present. Surveys identified one small area exhibiting elevated radiation levels on the front (east) lawn of the 330 Queen Street building. However, *in situ* measurements with an identiFINDER® did not identify radium (or any other specific radionuclide) as the source of radiation. Parties in attendance concluded that, though radiation levels are elevated relative to elsewhere on the property, the levels are below conservative screening values and are likely attributed to naturally occurring radioactive material—thus a soil sample was not collected. Based on these results, it is recommended that the NRC pursue no additional action at the 330 Queen Street property.

## SITE STATUS REPORT

Property: Suspected Former Dump Site  
330 Queen Street  
Bristol, CT 06010

Docket Number: 03038952

Current Property Name(s): North Riverside Apartments

Current Property Owner(s): Harvest Properties, LLC

Inspection Dates: April 24, 2019

Inspector(s): Laurie Kauffman/U.S. Nuclear Regulatory Commission (NRC), supported by Stephen Pittman/Oak Ridge Associated Universities (ORAU)

### 1.0 INTRODUCTION

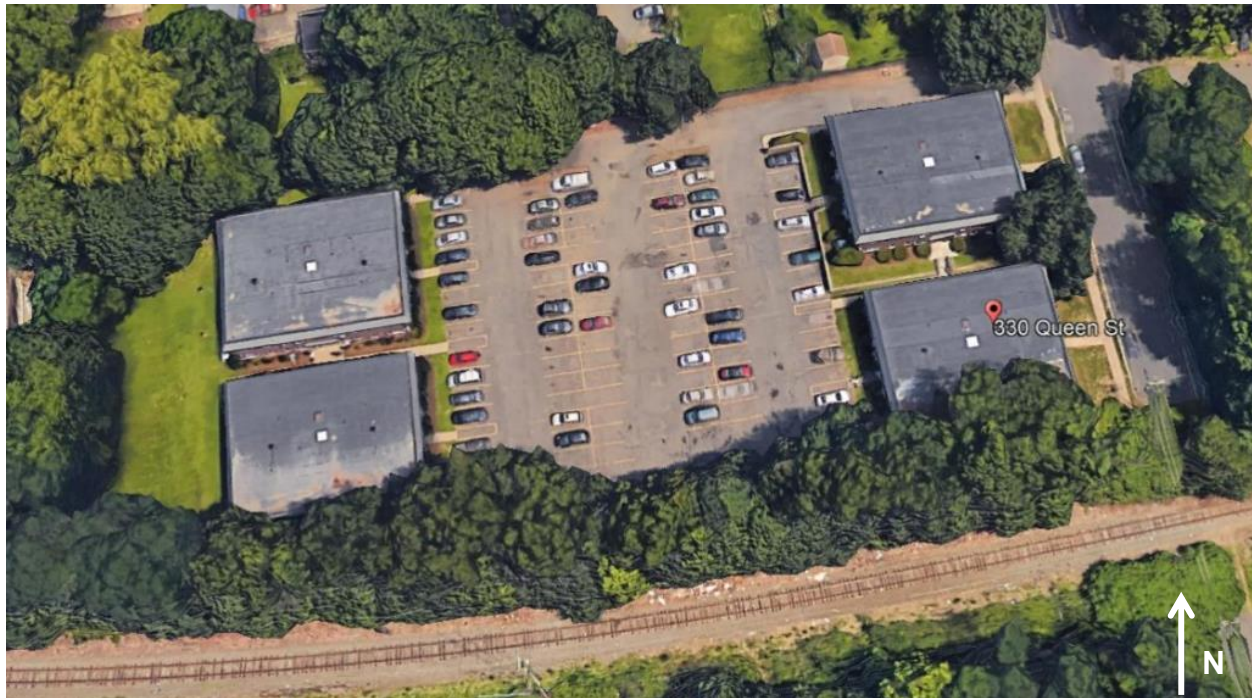
The Energy Policy Act of 2005 amended section 11e.(3) of the Atomic Energy Act of 1954 to place discrete sources of radium-226 (Ra-226) under the U.S. Nuclear Regulatory Commission (NRC) regulatory authority as byproduct material. The objectives of the initial site visit were to determine if discrete sources of Ra-226 and/or distributed Ra-226 contamination are present, to identify the areas of highest contamination, to determine if there are any current health and safety concerns, and to determine if a scoping survey is needed.

Data collected during the initial site visit are used by the NRC to either eliminate the property from future consideration or to plan future actions that may be needed to reduce Ra-226 exposure to current or future site occupants to levels that do not exceed the applicable regulatory requirement. It is important to note that destructive testing is not generally performed as described within NRC's procedures, Temporary Instruction (TI) 2800/043, Revision 2, *Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources* (NRC 2018) (Agencywide Documents Access and Management System [ADAMS] Accession number ML17297B921).

### 2.0 PROPERTY DESCRIPTION AND INITIAL SITE VISIT CONSIDERATIONS

#### 2.1 Property Description and History

The approximately 9,000 m<sup>2</sup> (2 acre) residential property in Bristol, Connecticut, is the site of the North Riverside Apartments, comprised of four buildings with eight apartments each. The two buildings on the eastern side of the property are 318 Queen Street (northeast) and 330 Queen Street (southeast). The two buildings on the western side of the property are 320 Queen Street (northwest) and 332 Queen Street (southwest). Eastern and western apartment buildings are separated by a parking lot, and each apartment is surrounded by a small grassy area. The property is shown in Figure 1.



**Figure 1. Former Dump Site in Bristol, Connecticut (Google Earth 2019)**

On April 14, 1998, an anonymous individual reported seeing a pile of luminous clock hands and dials being dumped in an empty field (now the 330 Queen Street property) approximately 40 years earlier. In 1998, a radiation survey performed by the Connecticut Department of Energy and Environmental Protection (CT-DEEP) reported a 50 microRoentgen per hour ( $\mu\text{R/hr}$ ) exposure rate on the front lawn and exposure rates 4-5 times background levels 3 feet deep in an animal hole. At that time, samples were not collected to confirm that the elevated levels were due to radium and a follow-up visit was not conducted. An extensive internet search of public records did not reveal any information about contamination/cleanup on this property involving radium (ORNL 2015).

## 2.2 Initial Site Visit Considerations

Prior to commencing radiation survey activities, the general property layout was examined to identify impediments to conducting the survey and/or health and safety considerations. No impediments or health and safety issues were noted.

## 3.0 SITE OBSERVATIONS AND FINDINGS

### 3.1 Summary of Activities

The inspection team conducted a survey at the Queen Street property on April 24, 2019. The inspection team consisted of Laurie Kauffman (NRC) and Stephen Pittman (ORAU). A representative for the site (Mr. Case), CT-DEEP (Jeff Semancik and Mike Firsick), and the NRC (Jim Trapp) were also present at different stages of the survey. The NRC informed the site representative of the intention to perform general area radiation surveys around grassy portions of the property and that soil samples would not be collected unless Ra-226 could be positively identified.

Radiological surveys performed by the inspection team consisted of gamma radiation scans of grassy land areas using a Ludlum model 44-10 2-inch by 2-inch (2×2) sodium iodide detector connected to a Ludlum model 2221 ratemeter/scaler and exposure rate measurements using a Ludlum model 192 sodium iodide-based  $\mu$ R ratemeter<sup>1</sup>. A hand-held identiFINDER® model R300-Z was available to confirm, if possible, the presence of Ra-226 if elevated radiation levels were encountered. Table 1 presents the specific instruments used during the site visit.

<b>Radiation Type (units)</b>	<b>Detector Type</b>	<b>Detector Model (Number)</b>	<b>Ratemeter (Number)</b>
Gross gamma (cpm)	Sodium Iodide	44-10 (663) Calibrated 04/01/2019	2221 (694) Calibrated 04/17/2019
Gross gamma ( $\mu$ R/h)	Exposure Meter	192 (1127) Calibrated 05/21/2018	N/A
Gamma Spectrum Analyzer (identiFINDER) <sup>a</sup>	Cesium Iodide	R300-Z (CG0343) Calibrated 03/22/2018	N/A

<sup>a</sup>The ORAU instrument; though NRC inspectors used their own

N/A = not applicable

Number = ORAU equipment barcode

cpm = counts per minute

$\mu$ R/h = microRoentgen per hour

### 3.2 Summary of Results

Photographs taken during the initial site visit are presented in Appendix A. Survey maps are presented in Appendix B. Figures B-1 and B-2 show 2×2 sodium iodide and exposure rate detector measurements collected in the grassy areas around the apartment buildings. Approximately 100% of the grassy areas were surveyed during the initial site visit—no surveys were conducted in the parking lot or within buildings due to the low likelihood of detecting radium through asphalt and because the purported dumping of watch parts occurred prior to the construction of the buildings. Background levels for the 2×2 sodium iodide detector generally ranged from 7,000 (7k) counts per minute (cpm) to 10k cpm, and exposure rate measurements range from 6-10  $\mu$ R/hr across most of the property. The highest responses were collected at a location near the northeast corner of the 330 Queen Street property, as shown in Figure B-2. This area is marked with 3 flags in Figures A-1 and A-2, which lined up in a northwest to southeast direction, separated by 1 - 2 meters. The highest observed detector responses in this location were 22k cpm for the 2×2 sodium iodide and 11  $\mu$ R/hr for the exposure rate meter (the latter at 1-m above the ground surface). An exposure rate measurement of 16  $\mu$ R/hr on contact with the ground was also collected. *In situ* measurements with ORAU's FLIR R300-Z identiFINDER® and the NRC's Ludlum 702i portable isotopic measurement system did not identify Ra-226 as the source of the elevated measurements. Based upon the identiFINDER®

<sup>1</sup>Roentgen is a unit of exposure (energy absorbed in air), whereas a rem is a unit of dose delivered to a person (resulting from the radiation energy absorbed in that person). While Roentgen and rem are related, these are different units. Because they are similar for gamma ray energies from Ra-226, NRC makes the simplifying assumption in this case that these units are equivalent (1 Roentgen = 1 rem).

results, the inspection team concluded, and CT-DEEP concurred, that the slightly elevated radiation levels are due to naturally-occurring radioactive materials and a soil sample would not be collected.

### 3.3 Summary of Dose Assessment Results

A site-specific dose assessment associated with the former dump site property has not been performed because no elevated radiation levels associated with discrete sources of Ra-226 were identified during the April 2019 site visit.

## 4.0 OBSERVATIONS AND RECOMMENDATIONS

Based on the data collected, the former suspected dump site property at 330 Queen Street does not appear to contain discrete sources of Ra-226, as determined by the following observations:

- Gamma radiation levels across the site were generally consistent with background (including naturally occurring radioactive materials).
- Ra-226 was not identified in the small area with elevated radiation levels using both identiFINDER® detectors available to the inspection team.

Based on the above observations, it is recommended that the NRC not perform a more detailed scoping survey. The rationale behind this recommendation is that the initial site visit generated a robust dataset that already meets the scoping survey purpose. Furthermore, NRC staff should not pursue additional action at the 330 Queen Street property given that discrete sources of Ra-226 were not identified during the initial site visit. CT-DEEP personnel present during the initial site visit concurred that the single small area of elevated radiation levels is attributed to naturally-occurring radioactive material.

## 5.0 REFERENCES

NRC 2018. *Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources*, Temporary Instruction 2800/043, Revision 2, U. S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Washington, D.C., May. (ADAMS Accession No. ML17297B921).

ORNL 2015. *Historical Non-Military Radium Sites Research Effort Addendum. CT Dump Site: Site Summary*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, November 24. (ADAMS Accession No. ML16291A488)

**APPENDIX A**  
**PHOTOS FROM THE FORMER CONNECTICUT DUMP SITE INITIAL SITE VISIT**





**Figure A-1. Eastside of 330 Queen Street**



**Figure A-2. Elevated Locations at 330 Queen Street**



**Figure A-3. Southeast Corner of 330 Queen Street**



**Figure A-4. Northeast Corner of 318 Queen Street**



**Figure A-5. Eastside of 332 and 320 Queen Street**



**Figure A-6. Northeast Corner of 320 Queen Street**

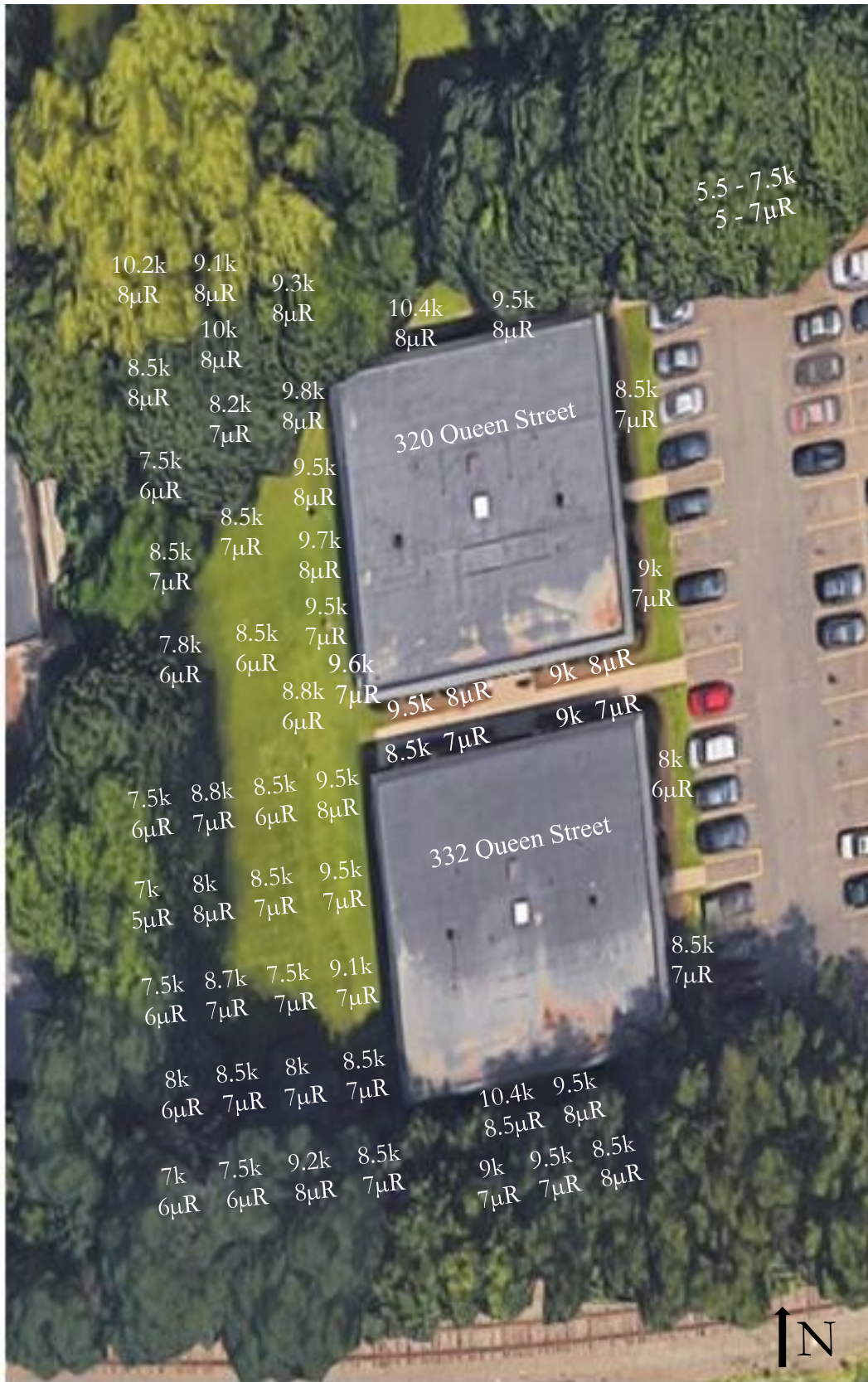


**Figure A-7. Southeast Corner of 332 Queen Street**

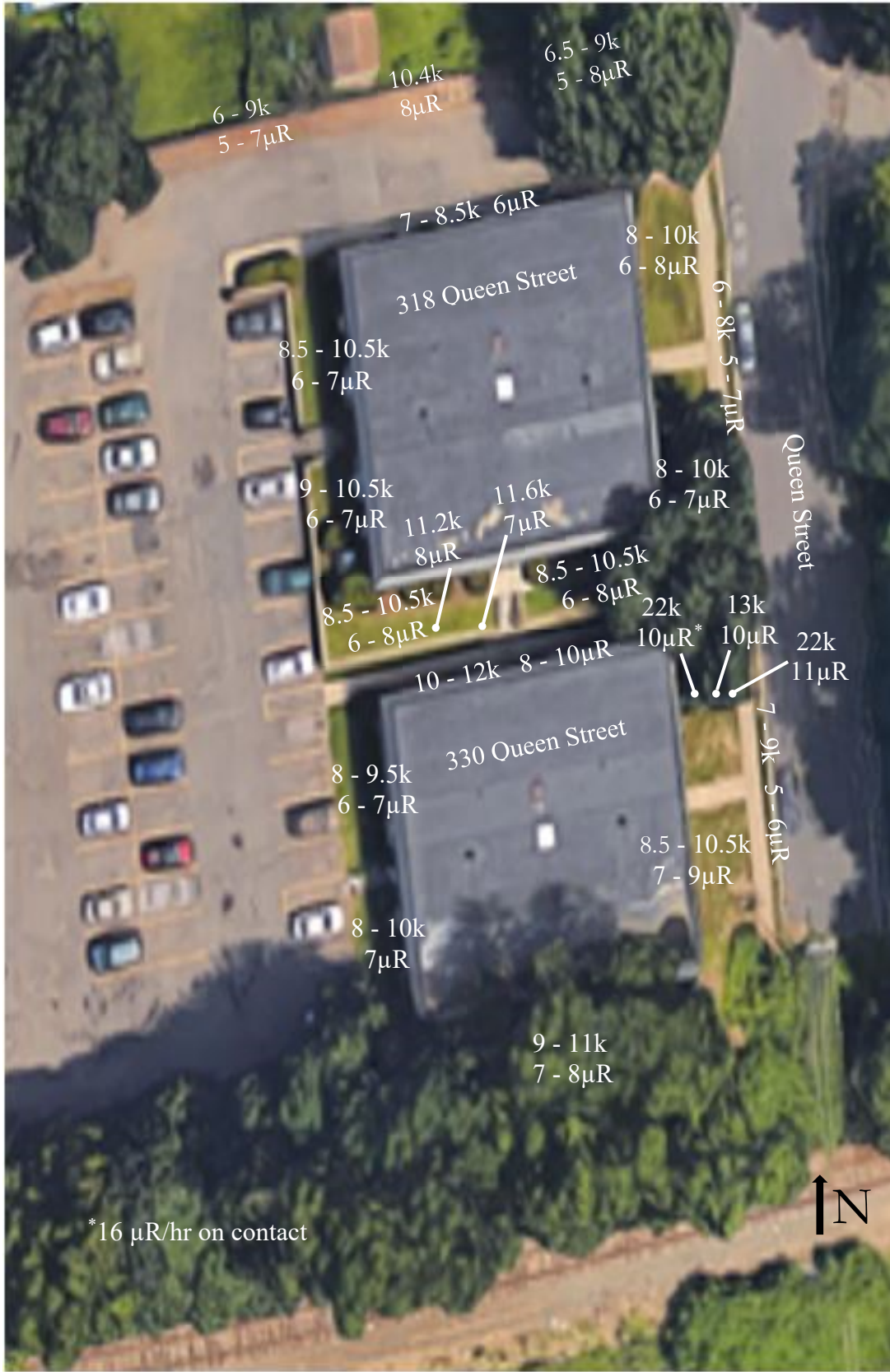


**Figure A-8. Westside of 332 and 320 Queen Street**

**APPENDIX B**  
**SURVEY RESULTS FROM THE FORMER CONNECTICUT DUMP SITE INITIAL SITE VISIT**



**Figure B-1. Westside Gamma Walkover Survey**



**Figure B-2. Eastside Gamma Walkover Survey**