Scanner Van and Buggy System Road Scans: Lowerline Project, New Orleans, Louisiana, June-July, 2019 Prepared for Greg Fife, OSC, Region 6

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Sandra Elkouz, MS, Project Lead
Scott Faller, PhD, Project Technical Lead
National Center for Radiation Field Operations, Office of Radiation and Indoor Air,
US Environmental Protection Agency
4220 S. Maryland Pkwy, Building C
Las Vegas, NV 89119

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I. Introduction

In the spring of 2019, the USEPA National Center for Radiation Field Operations (NCRFO) located in Las Vegas, NV was contacted by the EPA Region 6 office concerning the Lowerline Site, located in the New Orleans, Louisiana neighborhood of Gert Town. Anomalously high gamma-ray readings had been detected sometime before at the site, with a strong spectral indication of Radium-226 (Ra-226). In 2018, a company contracted by the city of New Orleans had performed a preliminary investigation and confirmed high levels of radium beneath the road surface. A survey of the site (Lowerline Street in the vicinity of Coolidge Court) showed a variation of gamma readings implying that the radioactive material was unevenly distributed beneath the surface. Some of the phase I activities included very limited excavation and removal of contaminated soil and road base. In May-July of 2019, USEPA Region 6 performed additional removal activities at the Lowerline Site including excavation of the radium-contaminated roadbed, soil sampling, laboratory analysis, disposal of contaminated soils, backfill to street level, and repaving.

During the period of June to July 2019, personnel from NCRFO conducted qualitative gamma survey scans in support of Region 6 removal activities at the Lowerline Site. Surveys of the site on Lowerline St. near the intersection of Coolidge Ct. were performed using the NCRFO Environmental Radiation Buggy Scanning System ("Buggy System"), and surveys of the surrounding neighborhood were performed with the NCRFO Scanner Van ("Scanner Van"). All Buggy System and Scanner Van data provided to Region 6 is qualitative (see Section VII) and intended to complement other survey/analytical work performed by the Region.

II. Objective

The project objectives were for NCRFO personnel to perform qualitative surveys of the neighborhood surrounding Lowerline St. and Coolidge Ct. using the Scanner Van, and Lowerline Site street surface using the Buggy System. The specific areas that were surveyed were determined and communicated by Region 6. The purpose of these surveys was to identify any anomalous locations and detected radioisotopes, post removal activities. Survey data collected complements survey/analytical work performed by Region 6.

Scanner Van and Buggy System data files (such as qualitative total gamma counting rates, spectra, time stamps, and location (GPS coordinate) information) are being provided to Region 6 as a separate deliverable.

III. Methods and Materials

Radiation Solutions Incorporated (RSI) RSX-1 units, each containing a 4" X 4" X 16" sodium iodide detector, are used in NCRFO scanning systems. The Scanner Van contains two units, with Detector 1 being enclosed in lead shielding that allows it to detect gamma radiation from the passenger side of the vehicle. Detector 2 is not shielded and is omni-directional. The Buggy System has a single RSX-1 unit and is omni-directional. The output signals from the detectors are routed to an RS-701 console device that is PC-driven and interfaced to a GPS unit. Scanning system data are collected and managed using the PC-based RSI RadAssist software installed on a laptop PC system. In scanning mode, the systems collect data continuously, at a frequency of one-spectrum-per-second, and all data are automatically saved to

the laptop hard drive. The system simultaneously records radiation data (gross gamma count rates and 1000 channel spectra), GPS, and time and date stamps. These data are automatically saved to disk and can be converted to common CSV spreadsheet files for post-processing. The data can be overlaid onto a map or satellite image of the scanned areas, allowing for visual inspection.

IV. Scanner Van Operations

Daily background measurements (Table 1) were performed for both detectors at the background location ("Norwood Thompson Playground" at the intersection of Earhart Blvd. and Pine St). This background location had already been identified and utilized by Regional personnel. Background survey data was used in the identification process of anomalies. When obtaining background measurements, the Scanner Van was parked on the right shoulder of Pine St., approximately halfway between Earhart Blvd. and Forshey St., facing northeast (Figure 4).

Quality control checks (Table 1) were performed at the beginning and end of each day of scanning to ensure that detector count rate and full-width-at-half-maximum values (FWHM) stayed within 20% from beginning to end of each day, as specified in the Quality Assurance Project Plan. The checks were performed at the background location using a Cs-137 button source placed at a fixed location relative to the detector crystals.

Table 1: Scanner Van QC Data

QC Data on 6/11/19								
	Count Rate			**FWHM**			**Daily Bkg (cps)**	**Bkg SD (cps)**
	Start Day (cps)	End Day (cps)	Variation	Start Day (keV)	End Day (keV)	Variation		
Detector 1	153.9	154.1	**0.13%**	8.89	8.99	**1.1%**	101.6	10.2
Detector 2	397.4	393.0	**1.1%**	7.72	7.73	**0.13%**	734	26

QC Data on 6/12/19								
	Count Rate			**FWHM**			**Daily Bkg (cps)**	**Bkg SD (cps)**
	Start Day (cps)	End Day (cps)	Variation	Start Day (keV)	End Day (keV)	Variation		
Detector 1	153.4	154.2	**0.52%**	8.90	8.87	**0.33%**	96.4	10.2
Detector 2	387.8	395.9	**2.1%**	7.67	7.72	**0.65%**	724	26

Scanner van operations were performed over a two-day period with a final day used for data compilation and debriefing with Regional personnel.

The three areas surveyed by the Scanner Van consisted of neighborhood areas surrounding the Lowerline Site and were predetermined and communicated to NCRFO by the Region 6 OSC. These three

areas are shown in Figures 1, 2, and 3 and are identified as Map 1, Map 2, and Map 3. The scans were performed as described in Table 2.

Table 2: Scan Areas (Scanner Van)

Scan Area (Scanner Van) on 6/11/19
1st scan – Map 3
2nd scan – Map 2
Scan Area (Scanner Van) on 6/12/19
1st scan – Map 1 (Part 1)
2nd scan – Map 1 (Part 2)

The neighborhood roads surveyed by the Scanner Van in this project were very narrow and generally had vehicles parked along both shoulders. Several of the streets were also one-way, making it impracticable to safely scan all roadways in both directions. Due to these circumstances, it was decided upon consultation with Regional personnel, that the Scanner Van data from Detector 2 would be used, since this detector is omni-directional and can scan both sides of the street during a single pass (communication with Regional personnel documented in Lowerline Project Logbook, page 7). Some streets terminated in dead end sections, which could not be entered with the Scanner Van. Some roadway sections were closed due to construction or overhung with low-hanging powerlines which prevented entry of the Scanner Van.

Meteorological conditions were typical for late spring to early summer in the vicinity. Temperature variations did not have a significant impact on the RSI detectors as both passed all quality control checks.

V. Buggy System Operations

Daily background measurements (Table 3) were performed at the background location ("Norwood Thompson Playground" at the intersection of Earhart Blvd. and Pine St). This background location had already been identified and utilized by Regional personnel. Background survey data was used in the identification process of anomalies. When obtaining background measurements, the Buggy was parked on a grassy area of the playground along Pine St., approximately halfway between Earhart Blvd. and Forshey St., facing northeast (Figure 4).

Quality control checks (Table 3) were performed at the beginning and end of each day of scanning to ensure that detector count rate and full-width-at-half-maximum values (FWHM) stayed within 20% from beginning to end of each day, as specified in the Quality Assurance Project Plan. The checks were performed at the background location using a Cs-137 button source placed at a fixed location relative to the detector crystals.

Meteorological conditions were typical for late spring to early summer in the vicinity. Temperature variations did not have a significant impact on the RSI detector as it passed all quality control checks.

Table 3: Buggy System QC Data

QC Data (Buggy) on 6/13/19								
	Count Rate			FWHM			Daily Bkg (cps)	Bkg SD (cps)
	Start Day (cps)	End Day (cps)	Variation	Start Day (keV)	End Day (keV)	Variation		
Detector	2291.2	2266.9	**1.1%**	7.38	7.54	**2.2%**	1471.5	38.6

QC Data (Buggy) on 7/18/19								
	Count Rate			FWHM			Daily Bkg (cps)	Bkg SD (cps)
	Start Day (cps)	End Day (cps)	Variation	Start Day (keV)	End Day (keV)	Variation		
Detector	2335.3	2340.8	**0.23%**	7.58	7.45	**1.7%**	1279.7	34.6

Scan operations were performed during two separate trips to the Lowerline Site with an additional day at the end of each trip used for data compilation and debriefing with Regional personnel.

When the NCRFO Buggy Scanning System was deployed to the Lowerline Site in June 2019, excavation and backfill activities were completed, but there were several metal roll-off containers located on the shoulders of Lowerline St. between Olive St. and Edinburgh St. in the vicinity of the excavation location and awaiting contents analysis and transport for disposal. A Buggy System scan was performed at that time of Lowerline St. between Olive St. and Edinburgh St. The road was scanned using multiple passes at walking speed as specified in the Project QAPP. Due to construction fencing around the excavation, the scan area of Lowerline St. was divided into four separate scans (see Table 4): Section 1 (between Olive St. and the south construction fence, Section 2 (south portion of the fenced work area), Section 3 (north portion of the fenced work area), and Section 4 (between the north construction fence and Edinburgh St.). The Buggy detected elevated levels of radium in the vicinity of the roll-offs, but a determination on the source of the elevated readings could not be made because the Buggy does not provide directional information and the roll-offs were filled with contaminated soil excavated from the roadbed. Upon consultation with Region 6 personnel, it was determined that NCRFO personnel would return to the Lowerline Site to repeat the scan after the roll-offs were removed from the site for disposal (communication with Regional personnel documented in Lowerline Project Logbook, page 13, and via email).

During the return trip to the Lowerline Site (July 2019), the area surveyed by the Buggy System consisted of a scan of Lowerline St. (between Olive St. and Edinburgh St.) and a scan of Coolidge Ct. (between Lowerline St. and Pine St.). The scan areas were determined and communicated to NCRFO by Region 6 personnel. The roads were scanned using multiple passes at walking speed as specified in the Project QAPP. The scans were performed as described in Table 4.

Table 4: Scan Areas (Buggy System)

Scan Area on 6/13/19 – Trip 1
1st scan: Lowerline St. (between Olive St. and the south construction fence)
2nd scan: Lowerline St. (south portion of the fenced work area)
3rd scan: Lowerline St. (north portion of the fenced work area)
4th scan: Lowerline St. (between the north construction fence and Edinburgh St.)
Scan Area on 7/18/19 – Trip 2
1st scan: Lowerline St. (between Olive St. and Edinburgh St.)
2nd scan: Coolidge Ct. (between Lowerline St. and Pine St.)

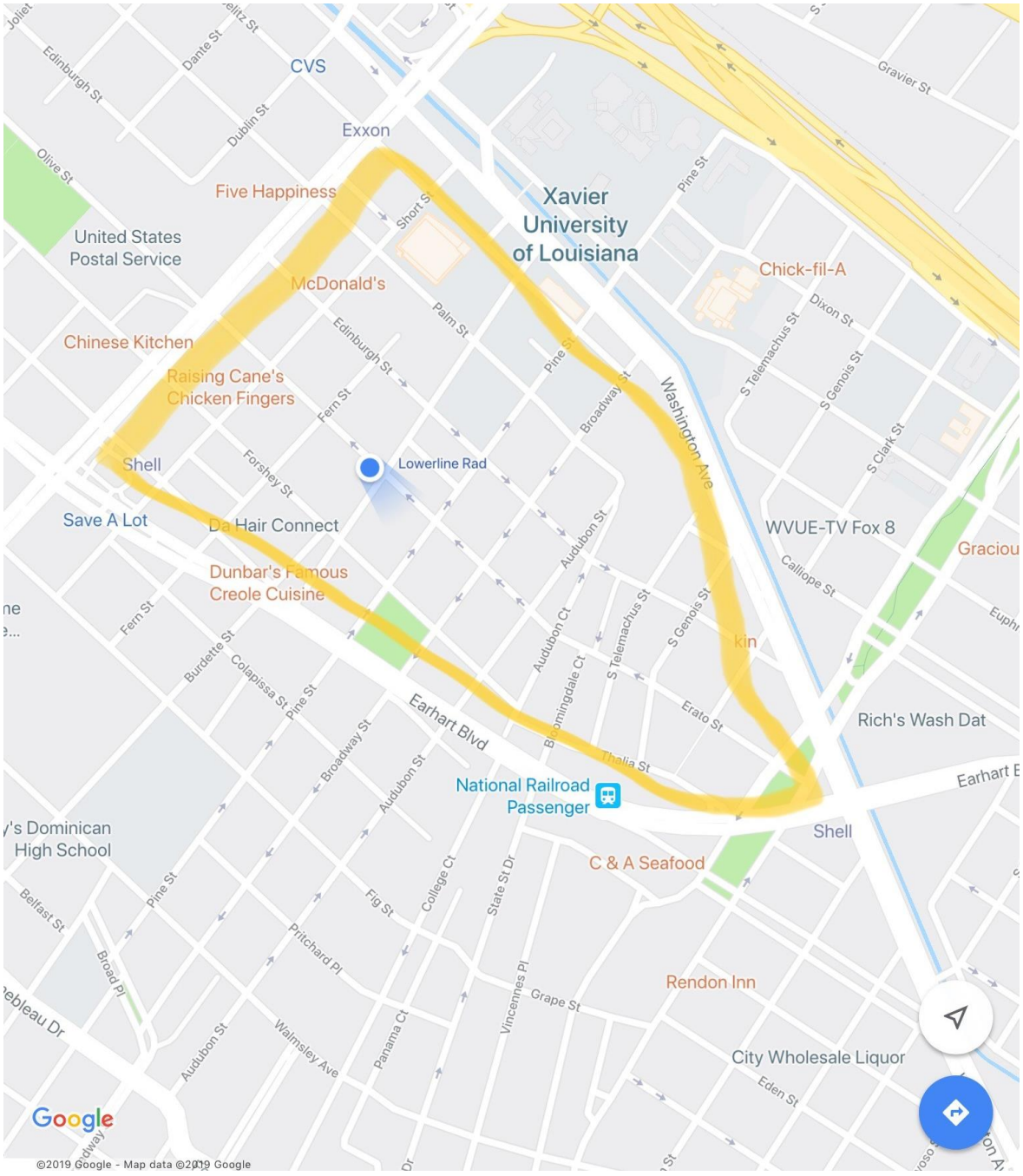

Figure 1: Map 1 (Map credit: Google)

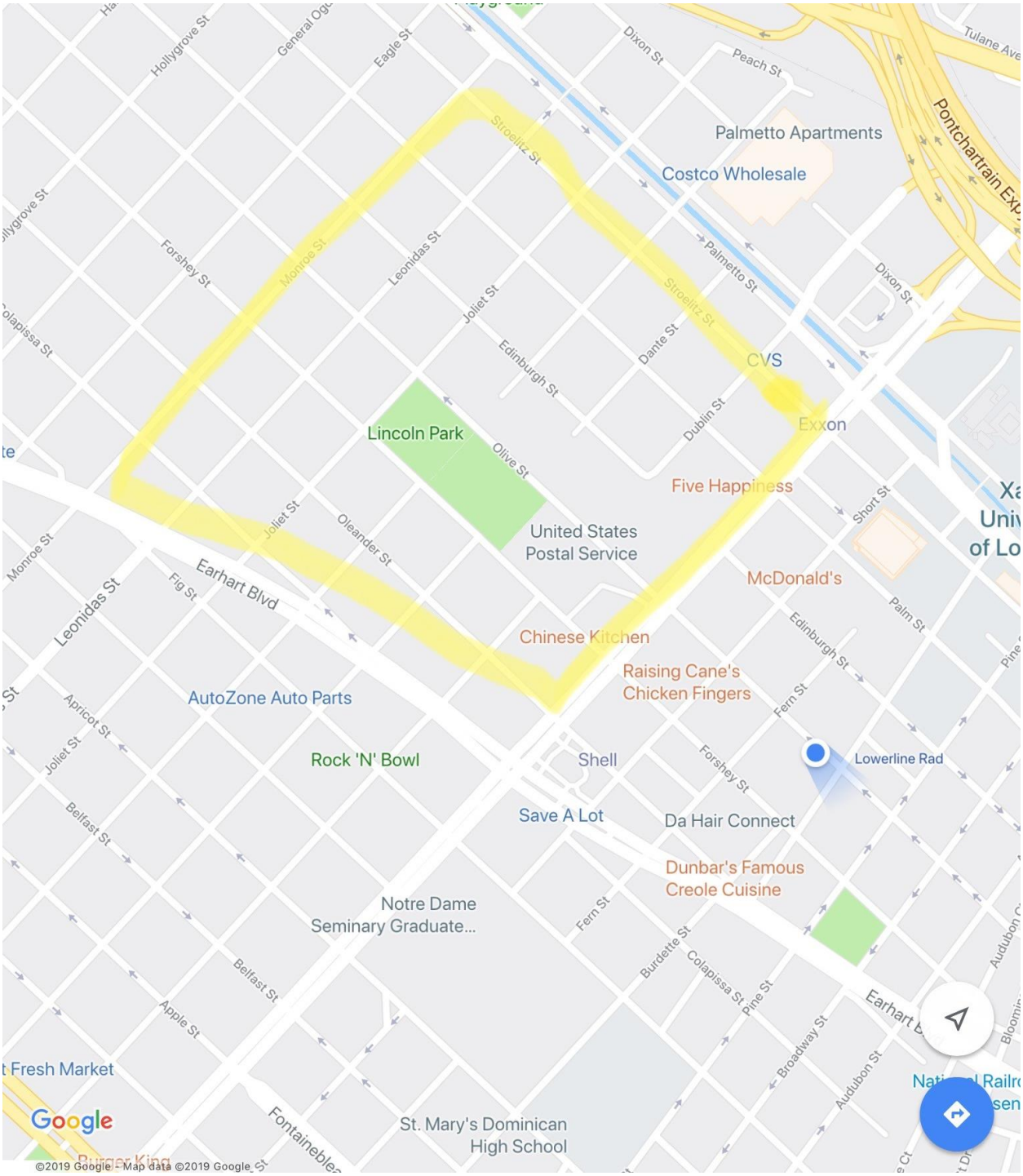

Figure 2: Map 2 (Map credit: Google)

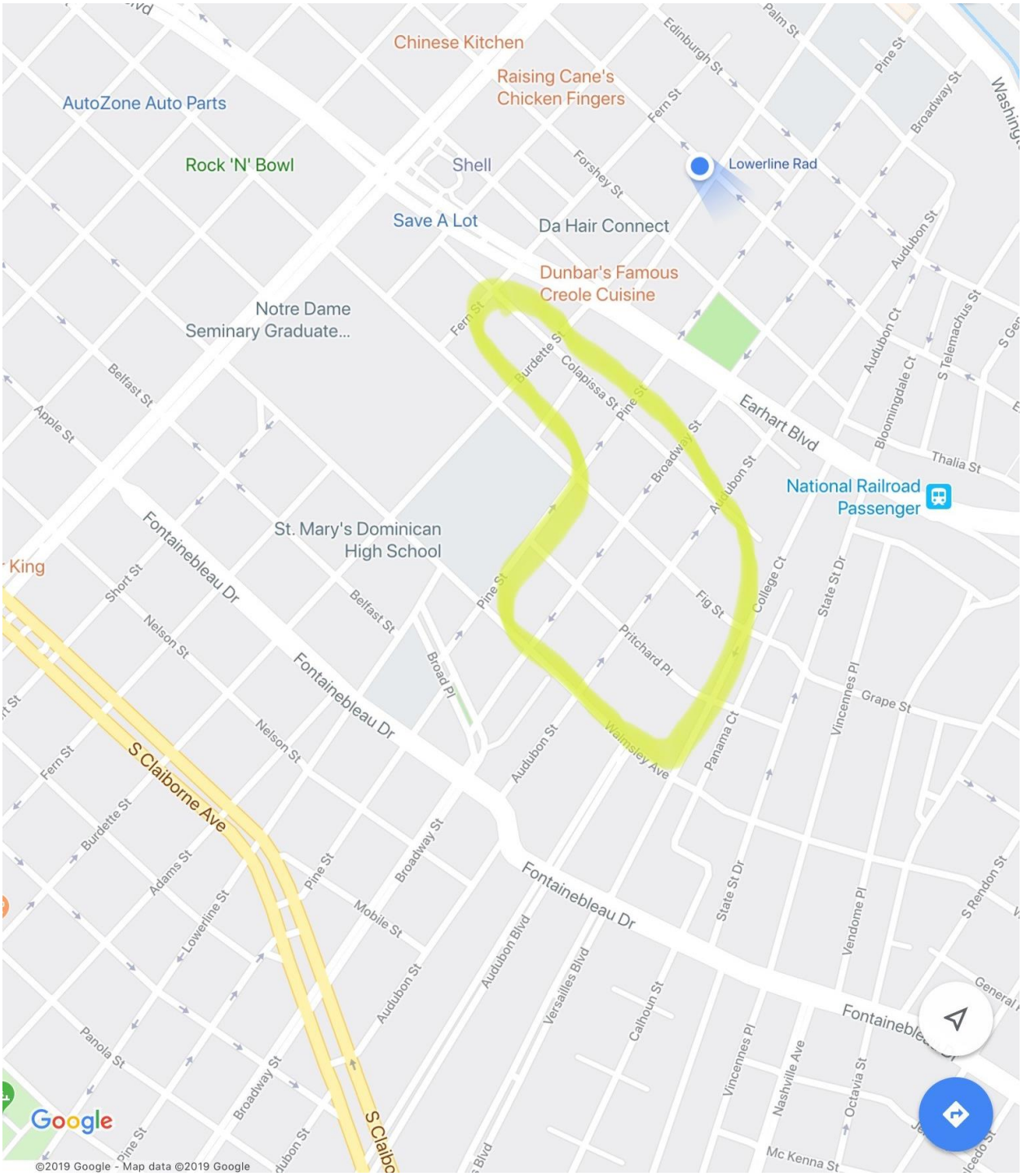

Figure 3: Map 3 (Map credit: Google)

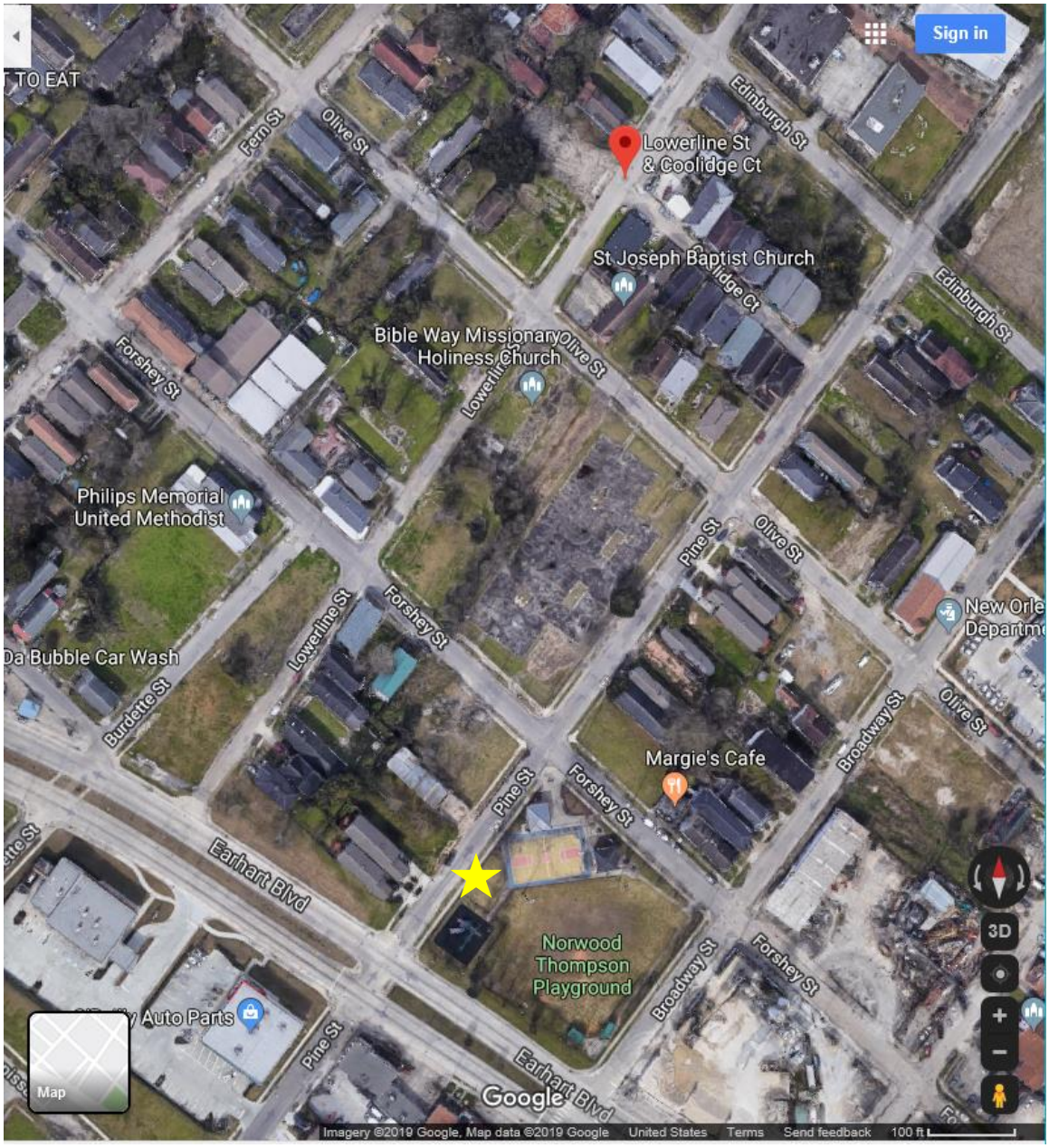

Figure 4: Background location (yellow star) and Lowerline Site (red location marker) (Map credit: Google)

VI. Results and Discussion

The street scans conducted with the scanner van were performed by visually monitoring the outputs of both detectors for anomalous readings defined by three times the average background as measured at the playground location. The Lowerline site and background location are shown in Figure 4. During the scan of Map 1 (Figure 1), an anomalous gamma-ray reading was observed at a warehouse location near 8000 Stroelitz Street and appeared to be coming from inside the building. This was tentatively identified as a signature of the isotope Th-232 (Table 5). It was speculated, but not confirmed, that the readings could be due to old welding rods that are known to contain thorium. No other anomalies were found during the scan of Map 1.

During the scan of Map 2 (Figure 2), a high reading was detected in the vicinity of 3116 General Ogden Street (Table 5). Collected spectra indicated that it was due to the isotope I-131 which is commonly used in medical procedures and has a short (8-day) half-life. No other anomalous readings were found during the scan of Map 2. No anomalous readings were found during the scan of Map 3 (Figure 3).

On the return visit to the site, the Buggy System was deployed at Lowerline Street and Coolidge Court once the material containers had been removed. Several passes on both streets were made to provide the maximum coverage. No anomalies were detected. The highest readings were observed at the southern end of Coolidge Court and were likely due to naturally-occurring isotopes in building materials such as plaster and brick. Most readings were below the background levels of the playground area, and none were greater than three times background.

The full data sets are provided under a separate deliverable.

Table 5: List of Detected Anomalous Locations (Scanner Van)

Anomaly	Radionuclide	Approximate Address	Date of Scan
1	I-131	3116 General Ogden St.	6/11/2019
2	Th-232	8000 Stroelitz St.	6/12/2019

VII. Data Limitations

The scan data provided by this study are gross gamma-ray measurements in the approximately 50 to 3000 keV range. This provides a complete coverage of all likely gamma-ray emitting sources, including Ra-226. The measurements are considered qualitative because they are reported as a total value relative to the background measurement (in counts per second) rather than radionuclide concentration values (e.g. activity per mass of soil).

VIII. References

1. U.S. EPA National Center for Radiation Field Operations. *Quality Assurance Project Plan for Scanning Systems Support to the Lowerline Street, New Orleans, LA Site*. DCN: 2019-QAPP-SS-Lowerline-LA, Rev. 00, May 2019.

2. U.S. EPA National Center for Radiation Field Operations. *NCRFO Standard Operating Procedure: Environmental Radiation Scanner Van Operation RPR-364, Rev. 4*, June 1, 2017.

3. U.S. EPA National Center for Radiation Field Operations. *NCRFO Standard Operating Procedure: Operation of the Environmental Radiation Buggy Scanning System RFO-366, Rev. 0*, January 31, 2017.