RSSI

6312 Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

982988

RADIOLOGICAL MEASUREMENTS AT 631 NORTH MCCLURG COURT CHICAGO, ILLINOIS

FOR:

HARD SURFACE FINISHERS
855 LIVELY BOULEVARD
WOOD DALE, ILLINOIS 60191

ON:

MAY 17, 2023

BY:

RSSI
6312 OAKTON STREET
MORTON GROVE, ILLINOIS 60053

MAY 30, 2023

Introduction

On May 17, 2023, RSSI measured radiation levels in areas excavated in advance of a sidewalk replacement at 631 North McClurg Court in Chicago, Illinois. The purpose of the measurements was to determine if elevated radiation levels associated with thorium contaminated soils were present.

Thorium-contaminated soils have been found at multiple locations in the Streeterville area of Chicago. Beginning in 1915, the Lindsay Light and Chemical Company (Lindsay Light) refined and used thorium in industrial operations. The Lindsay Light operation produced large volumes of thorium-contaminated tailings used as fill throughout Streeterville.

All isotopes of thorium are radioactive. Thorium's predominant isotopes are in the uranium and thorium decay series of naturally-occurring radioactive isotopes. These series begin with uranium-238 (U-238) and thorium-232 (Th-232), respectively, and decay through a progression of radionuclides to stable isotopes of lead. The radionuclides include intermediate progeny such as radium-226 (Ra-226) in the uranium series and Ra-228 and Ra-224 in the thorium series.

The EPA has set an action level in soil of 5 picocuries per gram (pCi/g) total radium (Ra-226+Ra-228) above a background concentration of 2.1 pCi/g for an action level of 7.1 pCi/g total radium. The EPA guidelines permit release of areas for unrestricted use when the concentration of total radium in soil does not exceed the action level.

Methodology

RSSI measured radiation levels using a Ludlum Model 193 survey meter with a side-shielded Ludlum Model 44-10 gamma scintillation detector. The Ludlum Model 193 is a general-purpose portable survey instrument with a fixed-point alarm and a quick deviation alarm that is based on the rate of change in radiation levels. The quick deviation alarm enables detection of slight changes in radiation levels. The Ludlum Model 44-10 has a 2"×2" thallium-doped sodium iodide (NaI(Tl)) gamma scintillator that responds to photons. The shielded detector restricts the angular response to radiation to in front of the scintillator crystal when the probe is used to survey exposed, but un-excavated, areas.

The instrument response was 680 counts per minute (cpm) per pCi/g of total radium when calibrated against a thorium source block. The EPA's action level of 7.1 pCi/g total radium corresponds to 4828 cpm above the instrument background (net cpm).

Results

Two areas of the sidewalk, situated on the east side of McClurg and north of Ontario, had their existing concrete slabs removed between the curb and the fencing around a vacant site on May 17, 2023. The two areas were approximately 9 feet across (curb-to-fence) and 5 feet wide. Radiation levels were measured inside the exposed areas after the preexisting sidewalk slabs

were removed. All radiation levels were below the action level. The highest measurements were near the exposed soil adjacent to the vacant lot with around 2000 net cpm, corresponding to around 2.9 pCi/g total radium.

In general, these sites were comprised of concrete slabs placed on top of gravel fill. Other than the removed slabs, no material was removed from the site.

Results are in Appendix A and measurement locations are in Appendix B. Instrument calibration records are in Appendix C.

Conclusions

No measurements exceeded the action level of 7.1 pCi/g total radium. No further action is required at this time.

Appendix A: Full Results

Table 1: Daily Instrumentation Configuration

Date	Meter SN	Background [cpm]	Action Level [gross cpm]	Efficiency[1]
5/17/2023	149080	2000	6828	680

All measurements taken with a 3-foot cable and a side-shielded probe.

Table Notes:
[1] Efficiency measured in net cpm per pCi/g total radium based on thorium block calibration.

Table 2: Results

Date	Location	Depth[1]	[Gross cpm]	[net cpm]	Total Radium Concentration [pCi/g]
5/17/23	1	SS	4000	2000	2.9
5/17/23	2	SS	2800	800	1.2
5/17/23	1B (curb-side)	SS	2400	400	0.6

Table Notes:
[1] "SS" means sub-slab. SSS means sub-sub-slab (the secondary concrete layer below the pavers).

Appendix B: Diagrams and Site Photos

Figure 1: Site Diagram

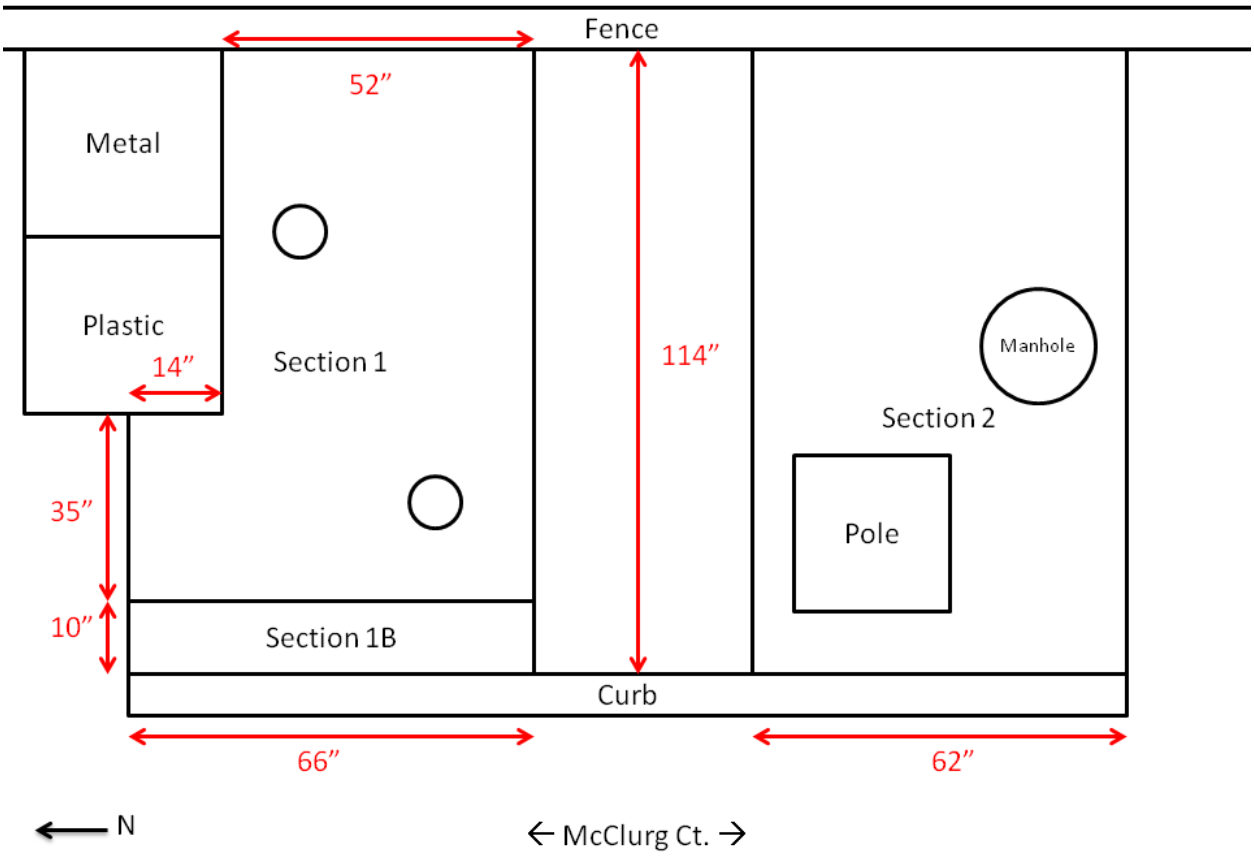

Figure 2: Area 1 and 1 B (north is to the top of the photograph)

Figure 3: Area 2 (north is to the bottom of the photograph)

Appendix C: Calibration Records

RSSI

6312 Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991
consult@rssi.us

CERTIFICATE OF CALIBRATION

Certificate No. 054813

RSSI
Attention: Eli A. Port
6312 Oakton Street
Morton Grove, IL 60053-2723

Manufacturer: LUDLUM
Model: 193
Serial No.: 149080
Probe(s): LUDLUM 44-10, Sn: PR155592 (#2)

CALIBRATION DATA

SOURCE*	SCALE	FIELD (cpm)	READING (cpm)	FIELD (cpm)	READING (cpm)
5	x1	200	200	800	800
5	x10	2 K	2 K	8 K	8 K
5	x100	20 K	20 K	80 K	80 K
5	x1000	200 K	200 K	800 K	800 K

If the accuracy of a scale is not within +/-10% but is within +/-20% a correction factor is supplied.

LUDLUM 44-10 γ Efficiencies in cpm per pCi/g:

	Thorium		Radium	
	Shielded	**Unshielded**	**Shielded**	**Unshielded**
3' Cable	680	1,760	680	1,960
25" Cable	282	356	282	366

LUDLUM 44-10 US EPA Action Level of 7.1 pCi/g in net cpm:

	Thorium		Radium	
	Shielded	**Unshielded**	**Shielded**	**Unshielded**
3' Cable	4,828	12,496	4,828	13,916
25" Cable	2,002	2,528	2,002	2,599

Check Source: Ba-133 **Reading:** 240 kcpm **Cable Length:** 3'
Check Source: Ba-133 **Reading:** 43 kcpm **Cable Length:** 25'

Comments: Check source readings taken with label side facing detector.

Calibrated by: Aaron D. Morris _____ **Date**: 05/08/23

Calibration Frequency: Annual **Recalibrate by**: 05/08/24

***SOURCE**	**1. Cs-137**	**2. Cs-137**	**5. Electronic**	**6. Other**
Manufacturer	U.S. Nuclear	Eon Corp.	LUDLUM	
Model	CCs-D-20E	64-764	500	
Serial Number	69036EZ	222	32789	
Activity	15 Ci	100 mCi	NONE	
Date	4/23/2009	5/2/1978	8/24/2021	

Calibration authorized by Illinois Department of Nuclear Safety License No. IL-01429-01 and meets the requirements of ANSI 323-1978 and MIL-STD-45662A. Exposure rate traceable to NIST with MDH model 1015 SN 2772 transfer instrument. Radcal Certificate of Conformance S130720. NRC-CNRC Exposure Calibration Report IRS-2023-3723.

PREVENTIVE MAINTENANCE PERFORMED

BATTERIES/CONTACTS CHECKED	✓	1.51, 1.50 V
HIGH VOLTAGE MEASURED	✓	882 VOLTS
SENSITIVITY MEASURED	✓	10 mVOLTS
METER ZERO CHECKED	✓	ADJUSTED
INSTRUMENT CLEANED	✓	

REPAIR AND PART INFORMATION

Quantity	Description

Repair Time: _____ hours

Comments: Calibrated on the IEMA source blocks in West Chicago on 5/9/2023.

Lab Reference: 36
Certificate No.: 054813