Stan A. Huber Consultants, Inc.
Health Physics and Radiation Safety Services

200 North Cedar Road – New Lenox, Illinois 60451-1751 – (800) 383-0468 or (815) 485-6161 – FAX (815) 485-4433 – Email sahci@sahci.com – Home Page www.sahci.com

November 9, 2019

Paul Muszynski
Electric Conduit Construction
816 Hicks Drive
Elburn, IL 60119

RE: Thorium Monitoring 568-659 E. Grand Ave.
CDOT Permit #1160010

Dear Mr. Muszynski:

Stan A. Huber Consultants, Inc (SAHCI) was hired by your firm to provide radiation monitoring during the excavation and installation of a fiber optic and power conduit at 568-659 E. Grand Avenue in Chicago, Illinois. The monitoring was performed by Mark Dewald, SAHCI Health Physicist, on October 8, 2019 through October 24, 2019.

Potential radiological contamination was identified in concentrations exceeding the United States Environmental Protection Agency (USEPA) limit of 7.1 picocuries per gram (pCi/g) of total radium.

Instrumentation

Surface gamma scans were performed using a Ludlum Model 2221 Scaler / Ratemeter (serial no. 126497) with attached Ludlum Model 44-10 2”x2” NaI Detector (w/ 6” collimated lead shield). The instrument was last calibrated on October 18, 2019. The US Environmental Protection Agency (USEPA) action level of 7.1 picocuries per gram (pCi/g) total thorium for this instrument is 6,179 counts per minute (cpm).

The background count rate for this location was measured as 1,919 cpm (average).

Soil Gamma Scans

Gamma surface scans were performed using the Ludlum Model 2221 Scaler / Ratemeter described above. Survey data was collected by entering the excavation after each 18-inch lift and recording the highest count rate for the floors and walls to a maximum excavation depth of 4.5 feet below ground surface. Any material excavated below 3 feet in depth was surveyed in the excavator bucket, rather than in the excavation. All non-contaminated soil was loaded directly into a truck for disposal.

The maximum gamma count rate for each lift was recorded on the attached Radiation Survey Form. The count rates in the excavation ranged from 1,400 cpm to 32,000 cpm, which exceeded the 7.1 pCi/g count rate threshold.

Potential Contamination

On October 17, 2019, elevated count rates indicative of radiologically contaminated soil were encountered in the trench excavation at the intersection of E. Grand Ave. and Park Dr. The potential contamination was identified approximately 3 feet below ground surface with a maximum count rate of 32,000 cpm. The elevated count rates were found along a 6-foot-long section of trench, 15 feet from the southwest corner of the intersection. Trenching work was temporarily suspended until the potential contamination could be evaluated.

Surveys were performed of the excavated material which had already been loaded into the truck for offsite disposal. The maximum observed count rate in the truck was 2,500 cpm, which is well below the threshold value.

Additional exploratory surveys were then performed at the location in the trench with highest observed count rate. Hand excavation was performed and the count rate continued to increase from 32,000 cpm to 70,000 cpm at 6 inches below the bottom surface of the trench, and then to 100,000 cpm at 12 inches below the bottom of the trench. The hand-dug material was screened outside of the trench and found to only have a count rate of 2,500 cpm. This indicates that the radiological contamination lies deeper than the completed bottom of the trench.

Since the excavation was already at its maximum planned depth when the elevated count rates were identified no further digging took place at this location. Samples were collected from the bottom of the trench (32,000 cpm) and in the truck (2,500 cpm) and sent to RSSI in Morton Grove, IL for gamma spectroscopy analysis. The total radium concentration (Ra-226 + Ra-228) in the truck was determined to be 1.19 pCi/g and 1.82 at the bottom of the excavation. See attached RSSI analytical report.

Based on the further investigation and sample results, no actual radiologically contaminated material was excavated or handled during this project. However, the increasing count rates at the bottom of the trench show that contamination is very likely to be present in the immediate vicinity.

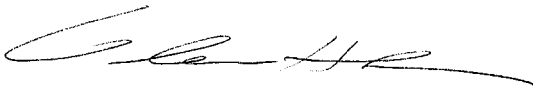
Regulatory Notification of Survey Completion

I contacted Gene Jablonowski, USEPA, by phone immediately after the elevated count rates were identified. After relaying the details of the potential contamination and then the results of the exploratory surveys and sampling, Dan Haag, USEPA, approved the continuation of the project and subsequent backfilling.

I will be providing a copy of this report to both the City of Chicago Department of Public Health and US Environmental Protection Agency, as required.

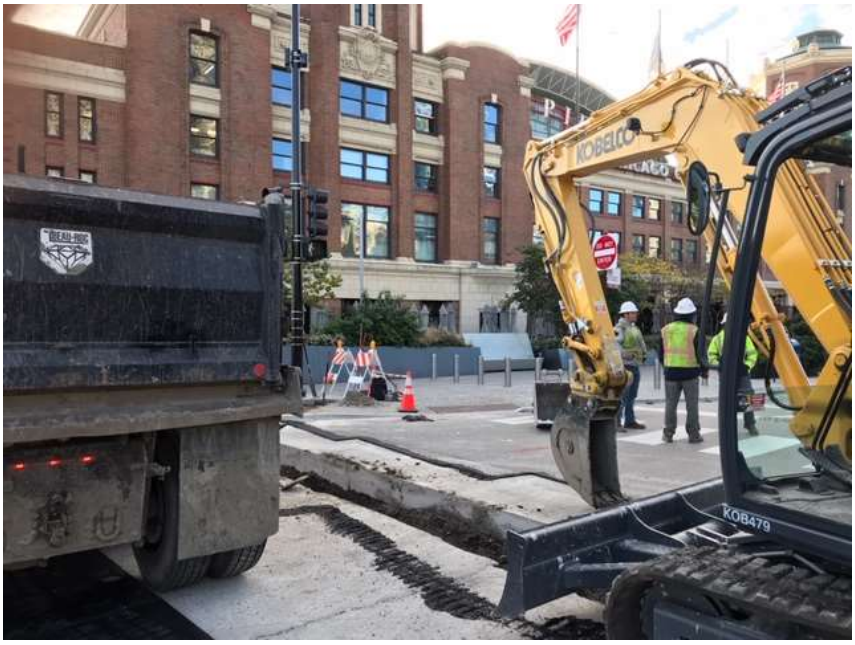
Thank you for your assistance with this project. If you have any questions or need additional information, please call me at (815) 485-6161.

Sincerely,
Stan A. Huber Consultants, Inc.



Glenn Huber, CHP
President

Photographs of Elevated Count Rate Trench



Radiation Survey Form

Stan A. Huber Consultants, Inc.

Location: Electric Conduit Construction - 568-659 E. Grand Ave. 500-555 N. Streeter Dr.
Name: Mark Dewald
Date: 10/8/19, 10/16/19-10/18/19, 10/21/19-10/24/19
Instrument ID: Ludlum Model 2221 Scaler/Ratemeter w/ Model 44-10 NaI Detector (w/ 6" Lead Shield)
7.1 pCi/g CPM: 6,319 CPM
BKG CPM: 1,919 CPM

Area 1

	Trench Segment ID (CPM)										
Depth	1	2	3	4	5	6	7	8	9	10	11
Surface	2600	1600	1800	2000	2400	1900	2200	1800	1700	1800	1700
-1.5'	2500	1600	1800	2200	1500	2100	2800	1900	1900	1800	1900
-3.0'	2700	1900	1900	2900	3100	4300	32000	2400	2400	2300	2100
-4.5'	3100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Area 2

	Trench Segment ID (CPM)									
Depth	1	2	3	4	5	6	7	8	9	10
Surface	1500	1600	1800	1400	1700	1900	1600	1700	1600	1800
-1.5'	1600	2600	1900	1500	2200	2100	1900	2000	1700	2800
-3.0'	2800	2700	2600	2600	2800	2600	2900	2400	3000	3200
-4.5'	3000	3000	3100	2900	3300	2800	3000	2500	3000	3400

= count rate exceeded action level

sahci
Stan A. Huber Consultants, Inc.

Area 1

Radiation Survey Form

Location/ Project ID: 568-659 E. Grand Ave., 500-555 N. Streeter Dr

Date: 10/8/19, 10/16/19, 10/21/19-10/24/19 **Technician:** Mark Oswald

Inst Model: Ludlum 2221 **Serial No. :** 126497

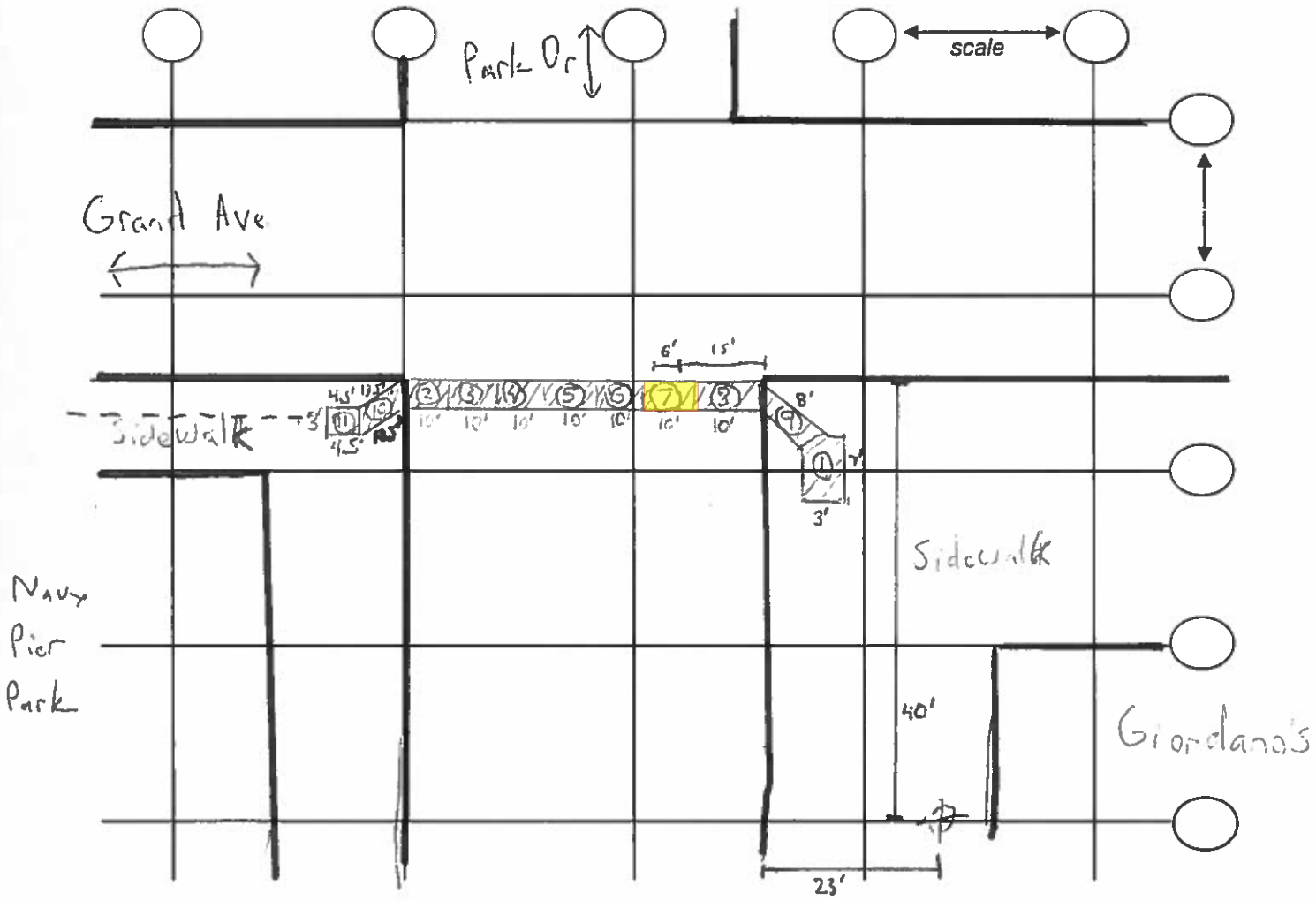
Probe Type: 1"x1" NaI / 2"x2" NaI
Shielded / Not Shielded

Lift Elevation: 0-56'

Background 2317 **cpm** **Action Level:** 6319 **cpm**

6,319 cpm before 10/18/19
6,179 cpm after re-calibration.
GAH

Write grid designations in circles. Record highest counts for grid in cpm. Record 30 second counts at grid intersections (if required). Shade areas of elevated counts and record max cpm.



⊕ → background
▨ → excavated area
– – → debris fencing

Page 2 of ~~5~~

sahci
Stan A. Huber Counsultants, Inc.

Area 2

Radiation Survey Form

Location/ Project ID: 568-659 E Grand Ave, 500-555 N Streeter Dr

Date: 10/15/19, 10/21/19-10/24/19 **Technician:** Mark Oewald

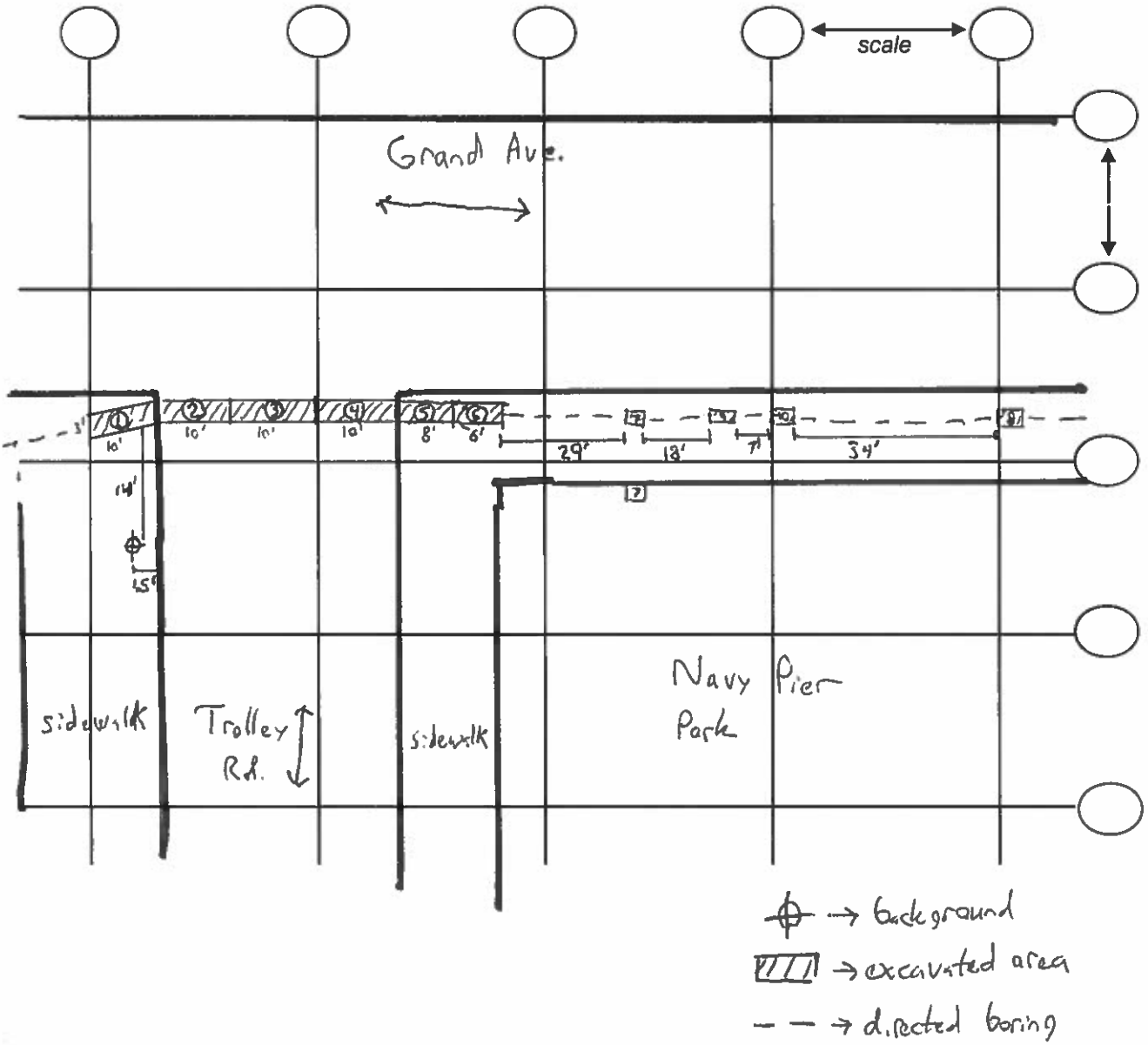
Inst Model: Ludlum 2221 **Serial No. :** 126497, 126496 for lowest depths

Probe Type: 1"x1" NaI / 2"x2" NaI (Shielded) / Not Shielded **Lift Elevation:** 0-40'

Background 1520 **cpm** **Action Level:** 6319 **cpm**

6,319 cpm before 10/18/19
6,179 cpm after re-calibration.
GAH

Write grid designations in circles. Record highest counts for grid in cpm. Record 30 second counts at grid intersections (if required). Shade areas of elevated counts and record max cpm.



68 LINEAR FEET OF PROPOSED 2–4" HDPE CONDUIT FOR FIBER AND POWER VIA DIRECTIONAL BORE (SEE STANDARD CONSTRUCTION DETAILS SHEET)

STA: 0+00
BEGIN CONSTRUCTION BY CORING INTO PROPOSED 30" COMMUNICATIONS HANDHOLE DESIGNED BY TALMAN UNDER SEPARATE COVER (33135–U–S1) (SEE STANDARD CONSTRUCTION DETAILS SHEET)

46 LINEAR FEET OF PROPOSED 2–4" PVC CONDUIT FOR FIBER AND POWER VIA 3' MAX OPEN CUT TRENCH (SEE STANDARD CONSTRUCTION DETAILS SHEET)

221 LINEAR FEET OF PROPOSED 2–4" HDPE CONDUIT FOR FIBER AND POWER VIA DIRECTIONAL BORE (SEE STANDARD CONSTRUCTION DETAILS SHEET)

2 LINEAR FEET OF PROPOSED 2–1.25" PVC CONDUIT FOR FIBER AND POWER VIA 3' MAX OPEN CUT TRENCH (SEE STANDARD CONSTRUCTION DETAILS SHEET)

97 LINEAR FEET OF PROPOSED 2–4" PVC CONDUIT FOR FIBER AND POWER VIA 3' MAX OPEN CUT TRENCH (SEE STANDARD CONSTRUCTION DETAILS SHEET)

STA: 4+34
BEGIN CONSTRUCTION BY REMOVING EXISTING TRAFFIC POLE AND FOUNDATION. REPLACE AND RELOCATED WITH NEW POLE (CDOT DEO SPECIFICATION #808) AND NEW 9' FOUNDATION (DEO SPECIFICATION #818) (SEE STANDARD CONSTRUCTION DETAILS SHEET)

PARK DR.
FACE OF CURB
SIDEWALK
BRICK
E. GRAND AVE.
N. STREETER DR.
N. ST]
12" ST
6" ST
18" DI SF MAIN
MH 031
MH 116
GRATE
ADA
Area 1
Area 2
6' trench length = 32,000 cpm max
PROPOSED QUAZITE BOX (SEE STANDARD CONSTRUCTION DETAILS SHEET)

PLAN VIEW
SCALE 1" = 20'

PEOPLES GAS FACILITIES ARE PRESENT WITHIN AREA OF CONSTRUCTION. USE EXTREME CAUTION NEAR ALL GAS FACILITIES DURING CONSTRUCTION AND RELATED EXCAVATION ACTIVITIES. HAND EXCAVATION IS REQUIRED TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF GAS MAIN(S) PRIOR TO CROSSING AND WORKING WITHIN 3 FEET OF ALL GAS FACILITIES. A MINIMUM OF 3' HORIZONTAL EDGE TO EDGE CLEARANCE IS REQUIRED FOR GAS MAINS WITH DIAMETERS OF 16" OR SMALLER, AND 5FT EDGE TO EDGE CLEARANCE FOR GAS MAINS WITH DIAMETERS 18" AND LARGER. MAINTAIN A MINIMUM OF 18" EDGE TO EDGE VERTICAL CLEARANCE ON GAS MAINS 16" OR LESS IN DIAMETER, AND 24" EDGE TO EDGE VERTICAL CLEARANCE ON 18" AND LARGER DIAMETER GAS MAINS. CONTACT DIGGER 312-744-7000 FOR LOCATES 48 HOURS PRIOR TO START OF CONSTRUCTION.

THE USE OF CONCRETE, FLOW FILL, OR THE LIKE IS PROHIBITED WITHIN 24 INCHES OF ALL GAS FACILITIES, NOR SHALL IT ENCASE ANY GAS FACILITY. A BUFFER OF 24" SAND IS TO BE USED BETWEEN FLOW FILL AND ALL GAS FACILITIES. A MINIMUM OF 6" FA-02 OR FM-02 SAND SHALL BE USED WHEN BACKFILLING OTHER MATERIALS AROUND ANY EXPOSED GAS FACILITY. CONTRACTOR EXPOSING GAS FACILITY IS RESPONSIBLE FOR PROVIDING THE SAND. ANY DAMAGES TO PEOPLES GAS FACILITIES SHALL BE THE RESPONSIBILITY OF THE INSTALLING UTILITY AND THEIR CONTRACTOR(S). NOTIFY CENTRAL SHOP ENGINEER, ERNEST CRAFTON, 773-542-7867, IMMEDIATELY FOR ANY DAMAGES TO THE GAS FACILITIES. ALL GAS FACILITIES ARE TO BE MAINTAINED.

USE EXTREME CAUTION WHEN EXCAVATING / DIGGING NEAR EXISTING UTILITIES.

CONTRACTOR TO TEST HOLE AND VERIFY EXISTING UTILITY LOCATION & DEPTH WHEN BORING CONSTRUCTION METHOD IS BEING PERFORMED.

PROPOSED BORE PIT LOCATION CONTRACTOR TO DETERMINE EXACT LOCATION IN FIELD

AT A MINIMUM, THE CONTRACTOR IS REQUIRED TO DO THE FOLLOWING, UNLESS CDOT'S REQUIREMENTS ARE MORE STRINGENT. THE CONTRACTOR IS REQUIRED TO DO TEST HOLES OVER ANY WATER MAIN OR SERVICE THAT IS TO BE DIRECTIONALLY BORED ACROSS. THE TEST HOLES MUST BE EXCAVATED TO A MINIMUM DEPTH OF THE PROPOSED FACILITY INSTALLATION. A PICTURE OF THE INSTALLED FACILITY AT EACH CROSSING MUST BE SUBMITTED TO THE DWM THAT CLEARLY INDICATES THE DATE, DEPTH OF THE FACILITY, OUC FILE NUMBER, AND THE LOCATION OF THE CROSSING ON EACH PICTURE. ALL PICTURES OF THE CROSSINGS ARE TO BE SUBMITTED TOGETHER (AT ONE TIME) TO **FACM@CTRWATER.NET**. **FAILURE TO COMPLY WITH THESE REQUIREMENTS MAY RESULT IN ADDITIONAL EXPENSES TO THE PROPOSED PROJECT TO VERIFY THAT ALL WORK CONFORMS TO DWM'S STANDARDS.**

0 2.5 5 10 15
1 INCH = 5 FT

0 10 20 40 60
1 INCH = 20 FT

N

OWNER

DEVELOPER
sunesys

ENGINEER
TALMAN CONSULTANTS

CONTRACTOR

NOTES
CROWN CASTLE USE ONLY:
SUPER POLY ID: 2
HUB ID: CH20756E
NODE ID: CHPH33135
DEO WO#: 11717041

SHEET TITLE
PROJECT PLAN VIEW

FILE NAME/SEGMENT ID
33135-U-S2

JOB TITLE
FIBER OPTIC AND POWER CONDUIT INSTALLATION
E. GRAND AVE. &
N. STREETER DR.
JURISDICTION:
CHICAGO, ILLINOIS

PROJECT MANAGER
SAM CLEARY

CREATED	CHECKED	APPROVED
DY	SC	JDN
DATE CREATED	PAPER SIZE	SCALE
8/25/18	22" X 34"	AS SHOWN

PROJECT NUMBER	OUC NUMBER
DASC CRC-16-1001	2018-84736

REVISIONS

REV.	DATE	DESCRIPTION	BY
1	09/07/18	FOR OUC REVIEW	JR
2	11/11/18	REV PER PGL	JR
3	01/04/19	REV PER DIM	JR
4	02/04/19	REV PER DIM	JR
5			
6			
7			
8			
9			
10			

SHEET: UG-01 4 OF 9

DRAWINGS PLOTTED FULL SCALE ON 22X34 SHEETS
DRAWINGS PLOTTED HALF SCALE ON 11X17 SHEETS

RSSI

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

Friday, November 08, 2019

Glenn Huber
Stan A. Huber Consultants, Inc.
200 N. Cedar Rd.
New Lenox, IL 60451

RE: Truck 101719 & Trench 101719

Dear Mr. Huber:

A summary of gamma spectroscopy results for our sample numbers G190174-5 is in Table 1. Stan A. Huber Consultants, Inc. identified the samples as Truck 101719 and Trench 101719. The table below lists the concentrations of selected radionuclides. Values with a less-than symbol ("<") indicate a concentration below RSSI's minimum detectable concentration (MDC). Additional identified radionuclides are in the complete gamma spectroscopy report.

Table 1. High-resolution Gamma Spectroscopy Results [pCi/g]

Radionuclide	Samples	
	G190174	G190175
	Truck 101719	Trench 101719
Pb-214	0.52	1.02
Bi-214	0.54	1.02
Ra-226[1]	0.53	1.02
Ac-228	0.66	0.80
Ra-228[2]	0.66	0.80
Th-232[3]	0.66	0.80
Tl-208	0.20	0.23
K-40	7.80	8.05
Pb-212	0.55	0.66
Bi-212	0.73	1.00
Th-234	0.82	< 0.31
Pa-234m	< 0.43	< 0.73
U-238[4]	< 0.62	< 0.52

[1] The concentration of Ra-226 is based on the average concentration of Pb-214 and Bi-214.
[2] The concentration of Ra-228 is based on the surrogate Ac-228.
[3] The concentration of Th-232 is based on the surrogate Ac-228.
[4] The concentration of U-238 is based on the average concentrations of Th-234 and Pa-234m.

Some radionuclides of interest, thorium-232 (Th-232), radium-226 (Ra-226), radium-228 (Ra-228), and uranium-238 (U-238), are difficult to identify and quantify directly at low concentrations with reasonable counting intervals. The concentrations of surrogates with more abundant high energy photons usually represent the concentration of Th-232, Ra-226, Ra-228, and U-238. The successful use of surrogates depends upon the radionuclides in each series being in equilibrium.

Radium-226 (Ra-226), in the uranium series, has only one significant photon at 186.21 keV with a gamma fraction slightly greater than 0.03. Analysis for Ra-226 using this energy is difficult because of the possible presence of uranium-235 (U-235), which has an interfering 185.72 keV photon with a 0.57 gamma fraction, and protactinium-234 (Pa-234) which emits an interfering 186.15 keV photon with a 0.02 gamma fraction. The gamma fraction is the fraction of decays that produce a photon of a given energy. Bismuth-214 (Bi-214) and lead-214 (Pb-214) are used as surrogates for Ra-226.

The equilibrium between Ra-226 and its decay products, including Pb-214 and Bi-214, may be disturbed if radon-222 (Rn-222) is released when samples are collected. Rn-222, a gaseous Ra-226 decay product, has a half-life of 3.8 days. Pb-214 and Bi-214 reestablish equilibrium with Ra-226 in a sample after an in-growth period, typically seven Rn-222 half-lives. As a standard protocol, samples are normally held for 30 days to reestablish equilibrium. This sample was analyzed on receipt and was not held for in-growth. The average of the activities of Pb-214 and Bi-214 is shown as the activity of Ra-226.

Both Th-232 and Ra-228, in the thorium series, emit photons with very low gamma fractions at very low energies. In the thorium series, actinium-228 (Ac-228) is usually in equilibrium with both Th-232 and Ra-228 when collected. Bi-212 has a branching fraction of approximately 0.36 for decays to thallium-208 (Tl-208). Therefore, the activity of Tl-208 is approximately 36% the activity of other radionuclides in the thorium series. The branching fraction is the fraction of decays that proceed through a given decay path.

U-238, in the uranium series, emits photons with very low gamma fractions at low energies. Thorium-234 (Th-234) and protactinium-234m (Pa-234m), both with photons at higher energies and with larger gamma fractions, are usually in

RSSI

equilibrium with U-238. The average of the activities of Th-234 and Pa-234m is shown as the activity of U-238.

The complete spectroscopy analysis results are attached. Please call me at 847-965-1999 if you have any questions.

Sincerely,

Aaron D. Morris

Aaron Morris

attachment