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Ontario

MEMORANDUM

October 16, 2013

To: Kevin Webster, District Manager
Toronto District Office
Central Region

From: Gary DeBrou, Manager
Air Monitoring and Transboundary Air Sciences Section
Environmental Monitoring and Reporting Branch (EMRB)

Re: Soil Survey in the Vicinity of GE-Hitachi, Toronto, Ontario 2013

For your records, attached is the final Technical Memorandum summarizing the results of a soil survey conducted in the vicinity of GE-Hitachi in Toronto, Ontario, which was posted to the Ministry website on October 11, 2013.

For further information regarding this survey, please contact Chris Charron at 416-314-5047.

Gary DeBrou

cc: Chris Charron, EMRB

Technical Memorandum

Soil Survey in the Vicinity of GE-Hitachi, Toronto, Ontario 2013

Ontario

Technical Memorandum

Soil Survey in the Vicinity of GE-Hitachi, Toronto, Ontario 2013

Ontario Ministry of the Environment

Report Prepared by:

Terrestrial Assessment Unit
Air Monitoring and Transboundary Air Sciences Section
Environmental Monitoring and Reporting Branch

Report No. S3061-2013
Report Completion Date: September 2013

PIBS 9546e

Introduction

GE-Hitachi Nuclear Energy Canada Incorporated (GE-Hitachi) operates a uranium dioxide fuel pellet fabrication facility located at 1025 Lansdowne Avenue, Toronto, Ontario. At this facility, natural uranium dioxide powder is mixed with 0.2% zinc stearate and pressed into pellets. The pellets are sintered (heated just below the melting temperature so the particles fuse into a solid mass) to create a hard ceramic grade pellet. The pellet is dried, ground to meet specifications, and shipped to a GE-Hitachi facility in Peterborough, Ontario where they are used to make fuel bundles. The maximum foreseeable (5 year) annual production rate of natural uranium fuel pellets at GE-Hitachi's Lansdowne Avenue facility is 1200 Megagrams (Church and Trought, 2010).

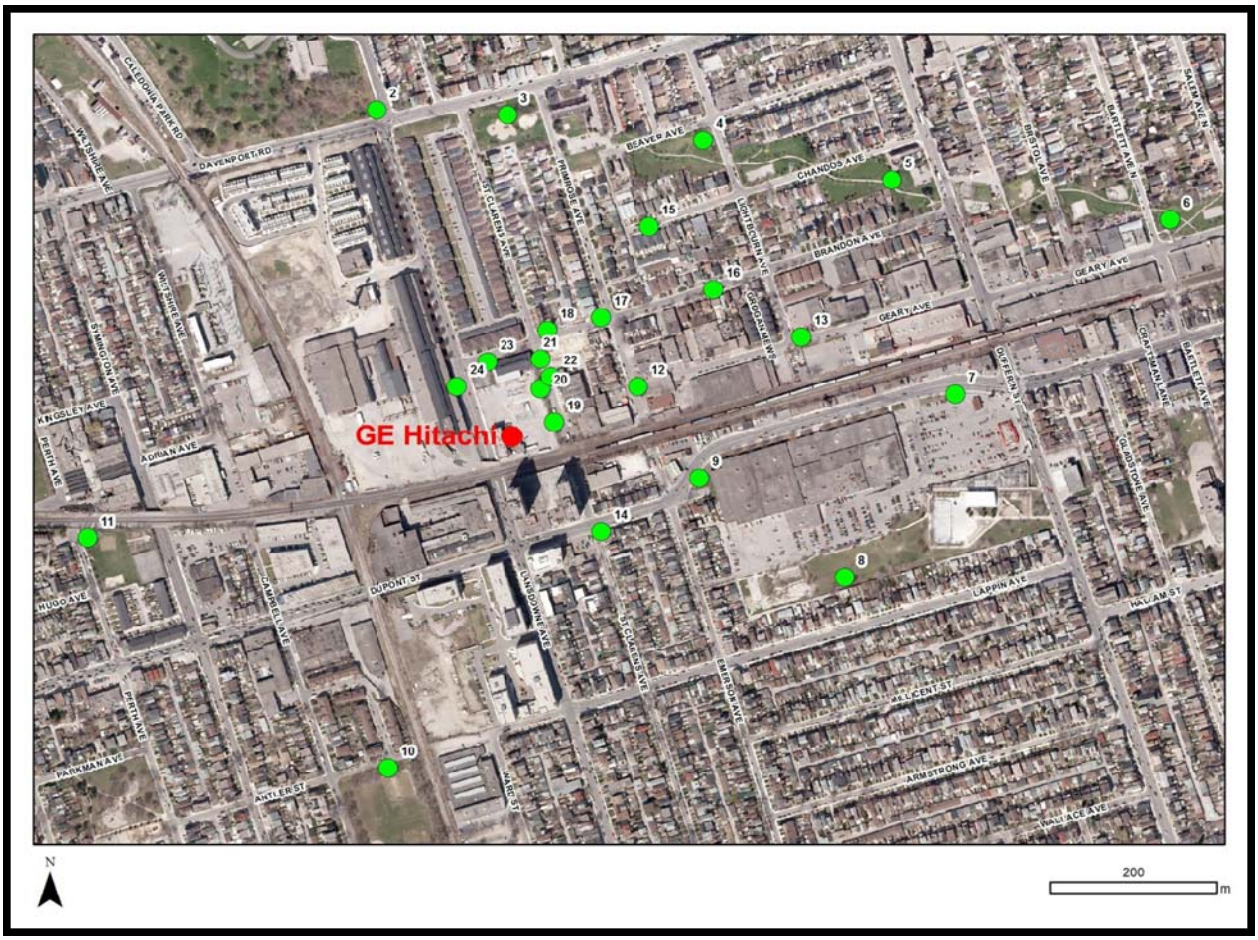
GE-Hitachi monitors air and water emissions of uranium at it Lansdowne facility as part of its license agreement and conducts an annual soil survey. The soil survey involves collecting soil samples from 49 sites in the vicinity of the facility, including soil deposited around storm sewer grates, soil at the base of fence posts, soil-like material on an adjacent railway right-of-way and soil from select boulevard sites. In 2012, the maximum soil uranium concentration reported by GE-Hitachi was 10.8 µg/g, with an average uranium concentration of 1.9 µg/g (GE-Hitachi, 2012).

In June 2012, the Ontario Ministry of the Environment's (MOE or Ministry) Terrestrial Assessment Unit (TAU) collected surface soil samples in the vicinity of GE-Hitachi's Lansdowne facility at the request of the Ministry's Toronto District Office to confirm surface soil concentrations of uranium in the surrounding community.

Methods

On June 12 and 13, 2013, TAU staff sampled soil from 24 boulevard, park and/or municipal right-of-way sites in the vicinity of GE-Hitachi, Toronto following standard operating procedures (Maps 1 and 2). Sampling started with the most distant sites (e.g., control sites) and ended with sites closest to the facility. At 17 of the sites, a two by two meter sampling area was delineated with orange traffic cones and nine cores of soil were collected in a three by three grid pattern and combined to form a composite sample (Photo 1). At 4 boulevard sites, the strip of grass was not wide enough to accommodate a two by two meter sampling design and a smaller area (0.6 to 1.5 m wide and 2 m long) was sampled in a similar manner. At 3 sites, the strip of grass was so narrow that the nine cores had to be collected in a line two or four meters long. In all cases, a buffer of at least 0.5 m was included next to any roads, sidewalks or driveways. At 21 of the 24 sites, the nine cores of soil were collected to a depth of 20 cm (or to refusal) using a stainless steel soil corer (Star Quality Samplers with 2.5 centimeter (cm) internal diameter). At 3 sites, the soil was only sampled to a depth of 0-5 cm due to refusal at depth (i.e., gravel, stones) or to maintain consistency with GE-Hitachi's sampling methodology (GE-Hitachi's boulevard sampling locations).

Map1: Aerial photograph of the Lansdowne Avenue and Dupont Street area of Toronto, with all MOE soil sampling sites superimposed on the map. Source:Data provided by Ontario Ministry of Natural Resources © Copyright: 2007 First Base Solutions Inc. All Rights Reserved.



Map2: Aerial photograph of the Lansdowne Avenue and Dupont Street area of Toronto, with MOE soil sampling sites within 1000 m of GE Hitachi superimposed on the map. Source:Data provided by Ontario Ministry of Natural Resources © Copyright: 2007 First Base Solutions Inc. All Rights Reserved.

At 16 sites, soil was collected by manually pushing the corer into the soil to a depth of 20 cm. The corer was extracted and the soil plug was divided into intervals of 0-5, 5-10, 10-15 and 15-20 cm using a five cm wide stainless steel scrapper. At 5 sites, where there was refusal before the 20 cm sampling depth, the samples were collected to a depth of 15 cm. At 3 sites, only the surface soil (0-5 cm) was collected. At all sites, each of the 5 cm long plugs of soil were placed in a new polyethylene bags that corresponded to the depth of soil sampled. This process was repeated nine times at each site to collect one composite soil sample comprised of nine plugs of soil for each of the depth intervals. Duplicate composite samples (identified as A and B) were collected at each site to provide a check on sampling and laboratory variability. In total, 176 soil samples were collected as part of the MOE's 2013 soil survey.

Prior to sampling, the soil corer and scrapper were washed in a solution of laboratory detergent and rinsed with distilled-deionized water. New disposable gloves (Neo Pro® powder-free chloroprene examination gloves) were worn at each site.

The sampling sites and one of the soil cores extracted at each site (usually the first core) were photographed using a digital camera (Canon Rebel XT) (Photos 1 and 2). The Universal Transverse Mercators (UTMs) for each site were recorded with a GPS receiver (GPSMAP 60CSx, Garmin Limited)(Table A1, Appendix A) and a sketch map of each site was prepared showing the sampling location and measured distances to structures such as fences, hydro poles, or roads (on file with the TAU).

Following collection, the 176 soil samples were forwarded to the TAU sample processing laboratory at 125 Resources Road in Toronto, where they were processed (air-dried, homogenized, and sieved, first through a 2mm sieve and then ground and passed through a 355µm sieve). The processed samples were submitted to the Ministry's Laboratory Services Branch (LSB) where they were analyzed for uranium using the laboratory accredited methodE3214A. Concentrations are reported in micrograms per gram (µg/g) on a dry weight basis.

Photo 1: Photograph of the northeast corner of Beaver Lightbourn Park showing four orange cones delineating a two by two meter area where soil samples were collected. Photograph by M. Dixon, 12 June, 2013.

Photo 2: Typical core of soil to a depth of 20 cm. Photograph by M. Dixon, 12 June, 2013

Results and Discussion

The Ministry's soil, ground water, and sediment standards are for use under *Part XV.I* of the *Environmental Protection Act* and are referred to in *Ontario Regulation 153/04 Record of Site Condition (O.Reg. 153/04)*. These standards were specifically developed to assist landowners in the clean-up and redevelopment of contaminated sites. The environmental standards in *O. Reg. 153/04* are, however, sometimes used to interpret soil, sediment, and ground water quality outside of the purposes of *O. Reg. 153/04*. In these situations, sampling results that are elevated with respect to the *O. Reg. 153/04* standards do not necessarily indicate that remediation is required or that adverse effects will or have occurred (see Appendix B for more information on the use of the *O. Reg. 153/04* soil standards to interpret soil sampling results).

In this report, soil concentrations of uranium are compared to the background (Table 1) and generic effects-based soil standards (Table 3) found under *O. Reg. 153/04*. Uranium is a common element in Ontario soils, with background concentrations ranging up to 1.9 µg/g in old urban parkland and 2.1 µg/g in rural parkland (MOE, 1993). The soils sampled in the vicinity of GE Hitachi were all within this typical background concentration range and noneof the samples collected were above either the O. Reg. 153/04 Table 1 background or Table 3 genericeffects based soil standards. It is understood that GE-Hitachi is a source of uranium, however there was no evidence that emissions from this facility have contaminated the surrounding neighbourhood to concentrations above typical background levels.

In the 2012 GE-Hitachi soil survey, uranium concentrations ranged up to 10.8 µg/g and several sites reported uranium concentrations that were elevated with respect to the *O. Reg. 153/04* Table 1 background standards (GE Hitachi, 2012). The results from the GE-Hitachi soil survey are not directly comparable to the Ministry soil survey due to differences in sampling methodologies, sampling design, sampling locations, and analytical methods. In the GE-Hitachi soil survey, the majority of the sites sampled were located on either the railway right-of-way immediately south of the facility or at the base of fence posts bordering the right-of-way. With the exception of one sample, all GE-Hitachi samples reporting uranium concentrations above the *O. Reg. 153/04* Table 1 background standard were collected from the railway lands.

The focus of the MOE's 2013 soil survey was not on the railway lands, which are fenced and not readily accessible to the public, but rather on the residential neighbourhoods surrounding GE-Hitachi. Also, many of the soil samples collected by GE-Hitachi were collected from storm sewer grates, which were not sampled by the Ministry. Nevertheless, two of the GE-Hitachi sampling sites (GE-Hitachi Sites 38 and 47) were collected on boulevards that were a close match to the type of sites sampled by the Ministry and so these areas were re-sampled by the MOE (MOE Sites 21 and 7). The values reported by GE-Hitachi for these two sites in 2012 are slightly higher than the MOE results (Table B), but given the differences in sampling methodologies, sample areas and analytical methods, the results can be considered similar.

Table B: Surface soil uranium concentrations in samples collected by GE-Hitachi and the MOE from two boulevard sites in the vicinity of GE-Hitachi, Toronto, 2013

MOE		GE-Hitachi	
Site	Uranium concentration (µg/g)	Site	Uranium concentration (µg/g)
7	0.81 ±0.13	47	1.2
7	0.81 ±0.13		
21	0.63 ±0.11	38	0.9
21	0.62 ±0.11		

The Ministry collected surface soil at a depth interval of 0-5 cm at all sites. This sampling depth is the same depth interval upon which the O. Reg. 153/04 Table 1 background soil standards are based. In the current survey, the soil was often sampled to a depth of 20 cm in five centimetre increments. This method of sampling has been used effectively by the Ministry in Port Hope to track the aerial deposition of uranium from an industrial source onto local soils. In Port Hope, a strong gradient of decreasing uranium concentrations with soil depth has been documented at sites close to the source (MOE, 2004). In the current survey, this type of gradient in soil uranium concentrations with depth was not generally observed. Only one site (Site 13) showed a weak pattern of decreasing uranium concentrations with depth (Table A). This site is downwind of GE-Hitachi and the pattern in uranium concentrations observed in the soil collected may reflect uranium deposition from GE-Hitachi. Overall, there was little evidence that emissions from GE-Hitachi have had a measureable effect on soil uranium concentrations in the residential areas surrounding this facility.

Although all of the results were relatively low and below background levels, uranium concentrations tended to be slightly higher in the deeper soil (15-20 cm) and lower in the surface soil (0-5 cm) at a few sites adjacent to GE-Hitachi (Sites 19, 20, and 23)(Table A). Although it is possible that historically deposited uranium may have leached down through the soil profile with time, metals such as uranium tend to bind to organic matter and finer soil particles and do not readily move down the soil profile. At these sites, it is more likely that cleaner soil has been deposited over soil with higher uranium concentrations, possibly due to construction activities, such as replacing curbs or re-sodding. These three sites, which are adjacent to the GE Hitachi property, had the highest uranium concentrations detected in the MOE's 2013 soil survey and it is likely that emissions or possibly run-off from the GE-Hitachi parking/loading dock area have slightly increased the soil uranium concentrations in these areas. Nevertheless, the uranium concentrations at these sites were relatively low and within normal background levels.

In order to determine whether there was a pattern of decreasing uranium concentrations with increasing distance from the source, surface soil (0-5 cm) uranium concentrations were plotted against distance from GE-Hitachi (Figure 1). As can be seen in this figure, there is no pattern of either decreasing or increasing soil uranium concentrations with distance from GE-Hitachi. One of the highest surface soil uranium concentrations was reported at a boulevard site located furthest from the facility. The surface soil sample taken at the control site, approximately 3 ½ kilometres from the GE Hitachi site, was comparable to the samples collected near the facility with all sample results being below background. These data suggest that uranium emissions from GE-Hitachi have not created a gradient in uranium concentrations in the soils in the surrounding residential neighbourhoods.

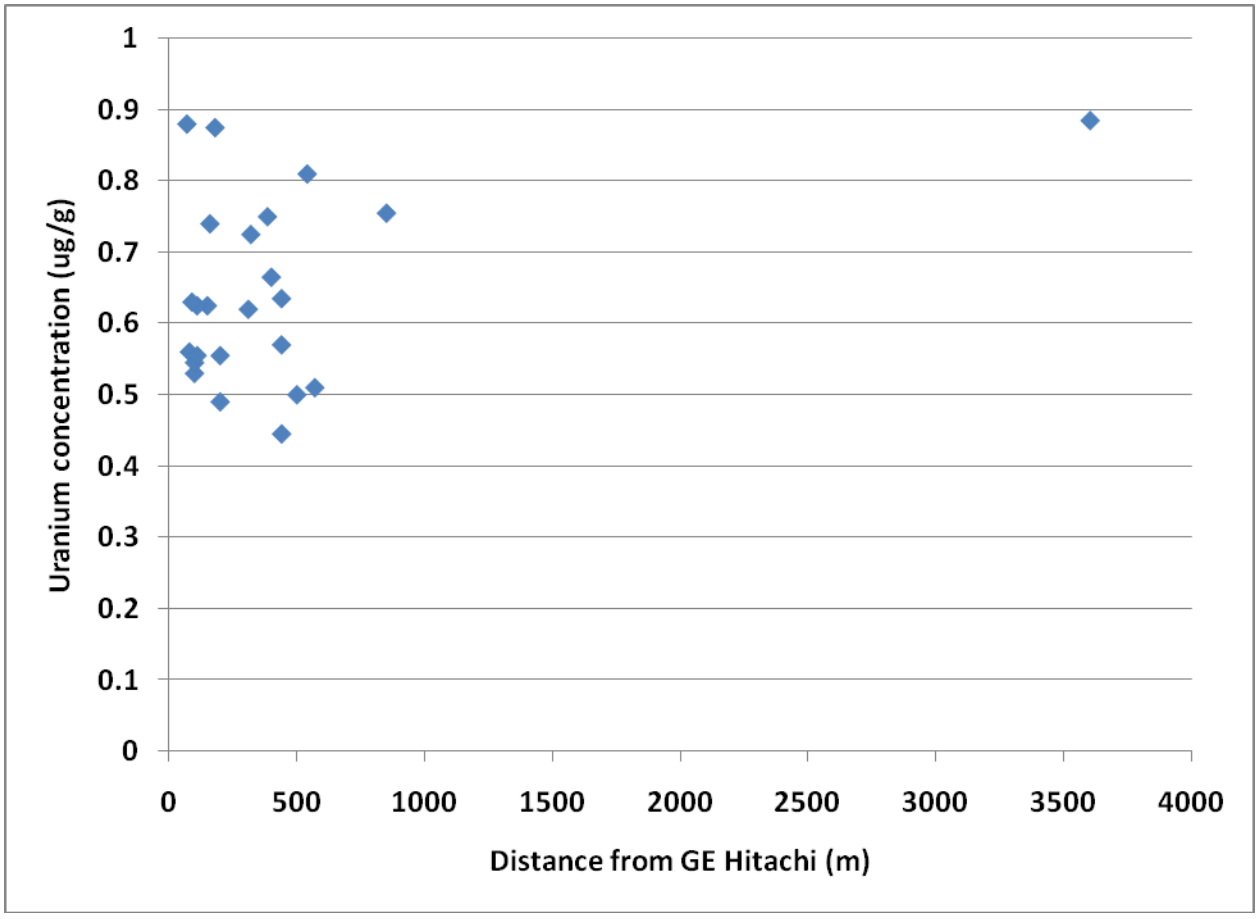


Figure 1: Average uranium concentrations in surface soil (0-5 cm) at 24 sites at various distances from GE Hitachi, Toronto - 2013

Table A: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE-Hitachi, Toronto, June 2013

Site	Depth (cm)	Replicate	Uranium (µg/g)
Site 1	0-5	A	0.9 ±0.14
Site 1	0-5	B	0.87 ±0.14
Site 1	5-10	A	0.61 ±0.1
Site 1	5-10	B	0.58 ±0.1
Site 1	10-15	A	0.7 ±0.11
Site 1	10-15	B	0.72 ±0.12
Site 1	15-20	A	0.83 ±0.13
Site 1	15-20	B	0.82 ±0.13
Site 2	0-5	A	0.62 ±0.11
Site 2	0-5	B	0.65 ±0.11
Site 2	5-10	A	0.66 ±0.11
Site 2	5-10	B	0.61 ±0.1
Site 2	10-15	A	0.61 ±0.1
Site 2	10-15	B	0.61 ±0.1
Site 2	15-20	A	0.58 ±0.1
Site 2	15-20	B	0.62 ±0.11
Site 3	0-5	A	0.71 ±0.12
Site 3	0-5	B	0.62 ±0.11
Site 3	5-10	A	0.64 ±0.11
Site 3	5-10	B	0.65 ±0.11
Site 3	10-15	A	0.62 ±0.11
Site 3	10-15	B	0.64 ±0.11
Site 3	15-20	A	0.6 ±0.1
Site 3	15-20	B	0.66 ±0.11
Site 4	0-5	A	0.46 ±0.09
Site 4	0-5	B	0.43 ±0.09
Site 4	5-10	A	0.49 ±0.09
Site 4	5-10	B	0.45 ±0.09
Site 4	10-15	A	0.54 ±0.1
Site 4	10-15	B	0.43 ±0.09
Maximum			0.9
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Table A con't: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE Hitachi, Toronto, June 2013

Site	Depth (cm)	Replicate	Uranium (µg/g)
Site 5	0-5	A	0.5 ±0.09
Site 5	0-5	B	0.52 ±0.09
Site 5	5-10	A	0.57 ±0.1
Site 5	5-10	B	0.56 ±0.1
Site 5	10-15	A	0.52 ±0.09
Site 5	10-15	B	0.5 ±0.09
Site 5	15-20	A	0.52 ±0.09
Site 5	15-20	B	0.49 ±0.09
Site 6	0-5	A	0.72 ±0.12
Site 6	0-5	B	0.79 ±0.13
Site 6	5-10	A	0.91 ±0.14
Site 6	5-10	B	0.98 ±0.15
Site 6	10-15	A	0.92 ±0.14
Site 6	10-15	B	0.93 ±0.14
Site 8	0-5	A	0.56 ±0.1
Site 8	0-5	B	0.58 ±0.1
Site 8	5-10	A	0.68 ±0.11
Site 8	5-10	B	0.69 ±0.11
Site 8	10-15	A	0.69 ±0.11
Site 8	10-15	B	0.66 ±0.11
Site 8	15-20	A	0.67 ±0.11
Site 8	15-20	B	0.65 ±0.11
Site 9	0-5	A	0.52 ±0.09
Site 9	0-5	B	0.54 ±0.1
Site 9	5-10	A	0.57 ±0.1
Site 9	5-10	B	0.56 ±0.1
Site 9	10-15	A	0.53 ±0.1
Site 9	10-15	B	0.55 ±0.1
Site 9	15-20	A	0.55 ±0.1
Site 9	15-20	B	0.45 ±0.09
Maximum			0.98
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Table A con't: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE Hitachi, Toronto, June 2013

Site	Depth (cm)	Replicate	Uranium (µg/g)
Site 10	0-5	A	0.55 ±0.1
Site 10	0-5	B	0.56 ±0.1
Site 10	5-10	A	0.6 ±0.1
Site 10	5-10	B	0.58 ±0.1
Site 10	10-15	A	0.54 ±0.1
Site 10	10-15	B	0.52 ±0.09
Site 10	15-20	A	0.57 ±0.1
Site 10	15-20	B	0.63 ±0.11
Site 11	0-5	A	0.5 ±0.09
Site 11	0-5	B	0.5 ±0.09
Site 11	5-10	A	0.5 ±0.09
Site 11	5-10	B	0.47 ±0.09
Site 11	10-15	A	0.55 ±0.1
Site 11	10-15	B	0.55 ±0.1
Site 11	15-20	A	0.47 ±0.09
Site 11	15-20	B	0.49 ±0.09
Site 12	0-5	A	0.84 ±0.13
Site 12	0-5	B	0.91 ±0.14
Site 12	5-10	A	0.94 ±0.14
Site 12	5-10	B	0.92 ±0.14
Site 12	10-15	A	0.83 ±0.13
Site 12	10-15	B	0.82 ±0.13
Site 12	15-20	A	0.91 ±0.14
Site 12	15-20	B	0.94 ±0.14
Site 13	0-5	A	0.73 ±0.12
Site 13	0-5	B	0.77 ±0.12
Site 13	5-10	A	0.69 ±0.11
Site 13	5-10	B	0.7 ±0.11
Site 13	10-15	A	0.56 ±0.1
Site 13	10-15	B	0.67 ±0.11
Site 13	15-20	A	0.49 ±0.09
Site 13	15-20	B	0.52 ±0.09
Maximum			0.94
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Table A con't: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE Hitachi, Toronto, June 2013

Site	Depth (cm)	Replicate	Uranium (µg/g)
Site 14	0-5	A	0.78 ±0.12
Site 14	0-5	B	0.7 ±0.11
Site 14	5-10	A	0.89 ±0.14
Site 14	5-10	B	0.87 ±0.14
Site 14	10-15	A	1.04 ±0.16
Site 14	10-15	B	1.01 ±0.15
Site 14	15-20	A	0.99 ±0.15
Site 14	15-20	B	1.01 ±0.15
Site 15	0-5	A	0.62 ±0.11
Site 15	0-5	B	0.62 ±0.11
Site 15	5-10	A	0.77 ±0.12
Site 15	5-10	B	0.84 ±0.13
Site 15	10-15	A	0.82 ±0.13
Site 15	10-15	B	0.85 ±0.13
Site 15	15-20	A	0.76 ±0.12
Site 15	15-20	B	0.77 ±0.12
Site 16	0-5	A	0.75 ±0.12
Site 16	0-5	B	0.7 ±0.11
Site 16	5-10	A	0.72 ±0.12
Site 16	5-10	B	0.65 ±0.11
Site 16	10-15	A	0.62 ±0.11
Site 16	10-15	B	0.51 ±0.09
Site 17	0-5	A	0.51 ±0.09
Site 17	0-5	B	0.47 ±0.09
Site 17	5-10	A	0.49 ±0.09
Site 17	5-10	B	0.48 ±0.09
Site 17	10-15	A	0.52 ±0.09
Site 17	10-15	B	0.46 ±0.09
Site 17	15-20	A	0.48 ±0.09
Site 17	15-20	B	0.49 ±0.09
Maximum			1.04
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Table A con't: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE Hitachi, Toronto, June 2013

Site	Depth (cm)	Replicate	Uranium (µg/g)
Site 18	0-5	A	0.64 ±0.11
Site 18	0-5	B	0.61 ±0.1
Site 18	5-10	A	0.62 ±0.11
Site 18	5-10	B	0.61 ±0.1
Site 18	10-15	A	0.61 ±0.1
Site 18	10-15	B	0.66 ±0.11
Site 18	15-20	A	0.71 ±0.12
Site 18	15-20	B	0.64 ±0.11
Site 19	0-5	A	0.89 ±0.14
Site 19	0-5	B	0.87 ±0.14
Site 19	5-10	A	1.05 ±0.16
Site 19	5-10	B	0.89 ±0.14
Site 19	10-15	A	1.36 ±0.2
Site 19	10-15	B	1.35 ±0.2
Site 19	15-20	A	1.83 ±0.26
Site 19	15-20	B	1.8 ±0.26
Site 20	0-5	A	0.58 ±0.1
Site 20	0-5	B	0.54 ±0.1
Site 20	5-10	A	0.79 ±0.13
Site 20	5-10	B	0.72 ±0.12
Site 20	10-15	A	1.37 ±0.2
Site 20	10-15	B	1.67 ±0.24
Site 22	0-5	A	0.53 ±0.1
Site 22	0-5	B	0.56 ±0.1
Site 22	5-10	A	0.5 ±0.09
Site 22	5-10	B	0.52 ±0.09
Site 22	10-15	A	0.43 ±0.09
Site 22	10-15	B	0.45 ±0.09
Maximum			1.83
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Table A con't: Uranium concentrations (µg/g) in soil samples collected at depth intervals (0-5, 5-10, 10-15 and usually 15-20 cm) at 22 sites in the vicinity of GE Hitachi, Toronto, June 2013

Site	Depth(cm)	Replicate	Uranium (µg/g)
Site 23	0-5	A	0.54 ±0.1
Site 23	0-5	B	0.57 ±0.1
Site 23	5-10	A	0.58 ±0.1
Site 23	5-10	B	0.6 ±0.1
Site 23	10-15	A	0.66 ±0.11
Site 23	10-15	B	0.52 ±0.09
Site 23	15-20	A	1.12 ±0.17
Site 23	15-20	B	1.27 ±0.19
Site 24	0-5	A	0.61 ±0.1
Site 24	0-5	B	0.65 ±0.11
Maximum			1.27
O. Reg. 153/04 Table 1			2.5
O. Reg. 153/04 Table 3			23

O. Reg. 153/04 Table 1 refers to the Ministry's full depth background site condition standard for residential / parkland / institutional / industrial / commercial / community property use (MOE, 2011)
O. Reg. 153/04 Table 3 refers to the Ministry's full depth generic site condition standard in a non-potable ground water condition and residential/ parkland / institutional property use (MOE, 2011)

Conclusions

Uranium concentrations in boulevard, park and municipal right-of-way soils sampled by the Ministry in the vicinity of GE-Hitachi were all within the range of typical Ontario background concentrations and none of the samples collected were elevated relative to either the *O. Reg. 153/04* Table 1 background soil standards or the *O. Reg. 153/04* Table 3 generic effects-based soil standards. Overall there was no pattern of either increasing or decreasing soil uranium concentrations with distance from GE-Hitachi. All soil uranium concentrations in this survey were relatively low and there is little evidence that uranium emissions from GE Hitachi have had a measurable impact on soil uranium concentrations in the surrounding residential neighbourhoods.

References

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Appendix A

Table A1: Site numbers, Universal Transverse Mercators (UTMs) and location descriptions for 24 sites sampled in the vicinity of GE Hitachi, Toronto on 12 and 13 June, 2013

Site	Distance from Source(m)	Zone	Easting	Northing	Accuracy (±)	Description
1	3600 NW	17	622301	4838238	2.9	Municipal right of way next to sidewalk
2	440 NNW	17	625082	4836579	3.7	Park
3	400 N	17	625239	4836573	4	Park
4	440 NNE	17	625474	4836541	2.9	Park
5	570 NE	17	625701	4836491	2.2	Park
6	850 E	17	626035	4836442	1.3	Park
7	540 E	17	625777	4836223	4	Boulevard
8	440 SE	17	625644	4835994	2.5	Park
9	100 SE	17	625469	4836118	3	Boulevard
10	200 SSW	17	625096	4835755	2.2	Park
11	500 W	17	624735	4836043	2.9	Park
12	180 ENE	17	625396	4836233	3	Municipal right of way next to sidewalk
13	385 ENE	17	625592	4836295	3.3	Municipal right of way next to sidewalk
14	160 SW	17	625351	4836051	3.2	Municipal right of way next to sidewalk
15	310 NE	17	625409	4836433	3.2	Boulevard
16	320 ENE	17	625486	4836354	3.7	Boulevard
17	200 NE	17	625351	4836319	3.2	Boulevard
18	150 NNE	17	625287	4836303	3.1	Boulevard
19	70 E	17	625295	4836188	2.7	Municipal right of way next to sidewalk
20	80 NE	17	625279	4836230	3.1	Municipal right of way next to sidewalk
21	110 NNE	17	625279	4836267	3.5	Municipal right of way next to sidewalk
22	100 NE	17	625291	4836245	2.4	Boulevard
23	110 N	17	625215	4836264	2.9	Boulevard
24	90 NNE	17	625178	4836233	3	Municipal right of way next to sidewalk

Appendix B: Ontario Regulation 153/04 – Record of Site Condition

The Ministry's soil, ground water, and sediment standards are for use under *Part XV.I* of the *Environmental Protection Act* and are referred to in *Ontario Regulation 153/04 Record of Site Condition (O.Reg. 153/04)*. These standards were specifically developed to assist landowners in the clean-up and redevelopment of contaminated sites. The environmental standards in *O. Reg. 153/04* are, however, sometimes used to interpret soil, sediment, and ground water quality outside of the purposes of *O. Reg. 153/04*. In these situations, sampling results that are elevated with respect to the *O. Reg. 153/04* standards do not necessarily indicate that remediation is required or that adverse effects will or have occurred. A qualified person should consider, on a site specific basis, whether or not there is potential for effects when using the *O. Reg. 153/04* standards to interpret soil, sediment, and ground water quality. This could include consideration of how the standards were developed, supplementary environmental sampling, an ecological and/or a human health risk assessment and/or a human health study.

O. Reg. 153/04 contains a series of Tables, each having criteria for soil, sediment, and ground water for various land-use categories (e.g., agricultural, residential, industrial). *Table 1* criteria reflect the upper estimate of typical background concentrations found in Ontario. Soil sampling results that are elevated relative to the Ministry's background based (Table 1) soil standards indicates the possible presence of a contaminant source (either naturally occurring or anthropogenic in origin). *Tables 2* through *9* criteria are generic effects-based and relate to potable or non-potable ground water conditions. These standards were developed based on a number of assumptions and represent the lowest value from a table of "component" values established to protect different receptors (i.e., ecological receptors versus human health). The most sensitive of four main components (human health; leaching from soil to groundwater; vapour migration from soil to indoor air; and terrestrial ecological protection) is used to determine the soil Generic Site Condition Standards for each parameter.

In some situations, the most sensitive component (i.e., the component that drives the standard) may not be the most relevant component for a particular site and/or for purposes for which the standard is being used (e.g., the relevant receptor for a particular site may be human but the standard may have been selected based on the protection of plants). For additional details regarding the development of the Ministry's generic soil standards, please refer to the following document: "Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario (MOE, 2011)" which can be found at www.ene.gov.on.ca.