



Residual Waste Study

Review of International Best Practices of Environmental Surveillance for Energy-from-Waste Facilities

Presentation to:

Site Liaison Committee, March 4, 2009
Joint Waste Management Group, March 10, 2009

Presented by:

Christopher Ollson, Ph.D.



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Study Question

“THAT staff review the best practices of environmental monitoring programs which include environmental surveillance, health surveys, biological monitoring, health studies, and any other pertinent studies as determined through the review and consultation regarding environmental monitoring programs;

Durham Regional Council
May 28th, 2008



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Objective of the Study Team

“The consultant’s recommended option for an environmental surveillance program for the proposed Durham/York Residual EFW facility will be based on the fundamental tenant that the program must ensure the protection of public and environmental health.”

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Study Team Recommended Level of Environmental Surveillance





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Recommended Option 1 – Chemical Emissions Stack Monitoring and Testing

Recommended

Option 1 a) Compliance with Ontario MOE Guideline A-7

- Minimum level of environmental surveillance and monitoring to which the EFW facility must commit.
- A robust, continuous stack monitoring of combustion gases, in combination with annual source testing would ensure that chemical concentrations used in the risk assessment are being achieved.
- This level of environmental surveillance was found to be in place at all incineration facilities in the EU, US and Canada.

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Recommended Option 1 – Chemical Emissions Stack Monitoring and Testing

Recommended

Option 1b) Establishment of More Stringent Stack Chemical Emissions Standards than Provided in MOE Guideline A-7

Pollutant	Units (1)	Ontario Guideline A-7	EU Directive 2000/76/EC EU Limits	YD EFW Stack Emission Limits
Total Particulate Matter	mg/Rm ³	17	9	9
Sulphur Dioxide (SO ₂)	mg/Rm ³	56	46	35
Hydrogen Chloride (HCl)	mg/Rm ³	27	9	9
Hydrogen Fluoride (HF)	mg/Rm ³	Not Specified	0.92	0.92
Nitrogen Oxides (NO _x)	mg/Rm ³	207	183	180
Carbon Monoxide (CO)	mg/Rm ³	Not Specified	46	45
Mercury (Hg)	µg/Rm ³	20	46	15
Cadmium (Cd)	µg/Rm ³	14	Not Specified	7
Cadmium + Thallium (Cd + Th)	µg/Rm ³	Not Specified	46	46
Lead (Pb)	µg/Rm ³	142	Not Specified	50
Sum of (As, Ni, Co, Pb, Cr, Cu, V, Mn, Sb)	µg/Rm ³	Not Specified	460	460
Dioxins	pg/Rm ³	80	92	60
Organic Matter (as CH ₄)	mg/Rm ³	66	Not Specified	49



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Recommended Option 1 – Chemical Emissions Stack Monitoring and Testing

Recommended

Option 1c) Inclusion of New Stack Sampling Technology for Dioxins and Furans

- ◆ Technology now exists for continuous sampling (not monitoring) of dioxins and furans in stacks.
- ◆ The advantage of this technology is that more frequent sampling results for dioxins and furans can be collected and analyzed for an EFW facility.

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Recommended Site Liaison Committee

Recommended

- ◆ That a Site Liaison Committee (SLC) should be charged, in part, with review of any environmental surveillance program being undertaken for the Durham/York EFW facility.
- ◆ This would ensure public participation in the environmental surveillance program and evaluation of its efficacy in protecting public and environmental health.

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Additional Levels of Environmental Surveillance Not Recommended by the Study Team



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Additional Options Not Recommended by Study Team

- ◆ There are additional environmental surveillance options being employed around the world at individual incineration facilities.

- ◆ These options not recommended include:
 - ◆ Option 2: Ambient Air Monitoring;
 - ◆ Option 3: Environmental Monitoring (soil, vegetation, agricultural products); and,
 - ◆ Option 4: Human Biomonitoring.



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Additional Options Not Recommended by Study Team (cont'd)

- ◆ These environmental surveillance programs were reported to be conducted based on a combination of academic interest and/or a heightened level of public concern surrounding an individual facility.
- ◆ The recommendation of these additional options were not supported by this scientific review.

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THE STUDY

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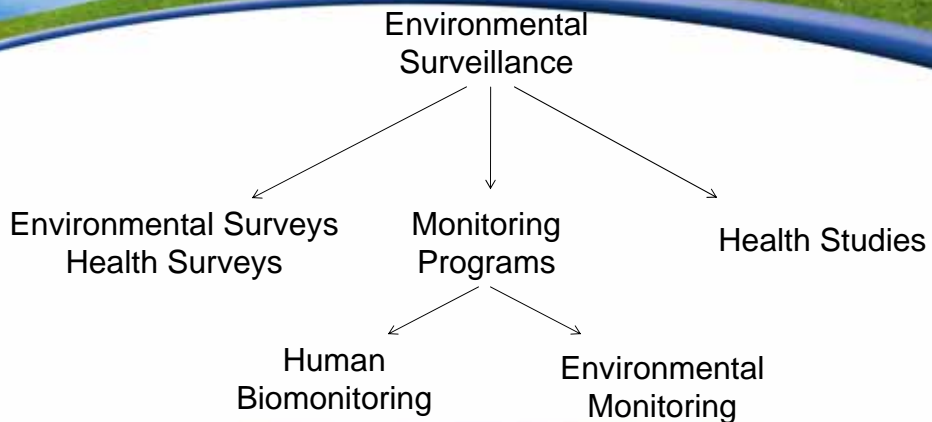
The Study Team

- ◆ Dr. Christopher Ollson, Ph.D.
- ◆ Dr. Christofer Balram, Ph.D.Med., MD(AM)
- ◆ Kaitryn Campbell, BAH, BEd, MLIS
- ◆ Mathieu Morin, M.Env.Sc.
- ◆ Sarah Henderson, BA(H)

- ◆ External Independent Peer Review on Behalf of the Medical Officer of Health
 - ◆ Dr. Lesbia Smith, MD



Study Terminology



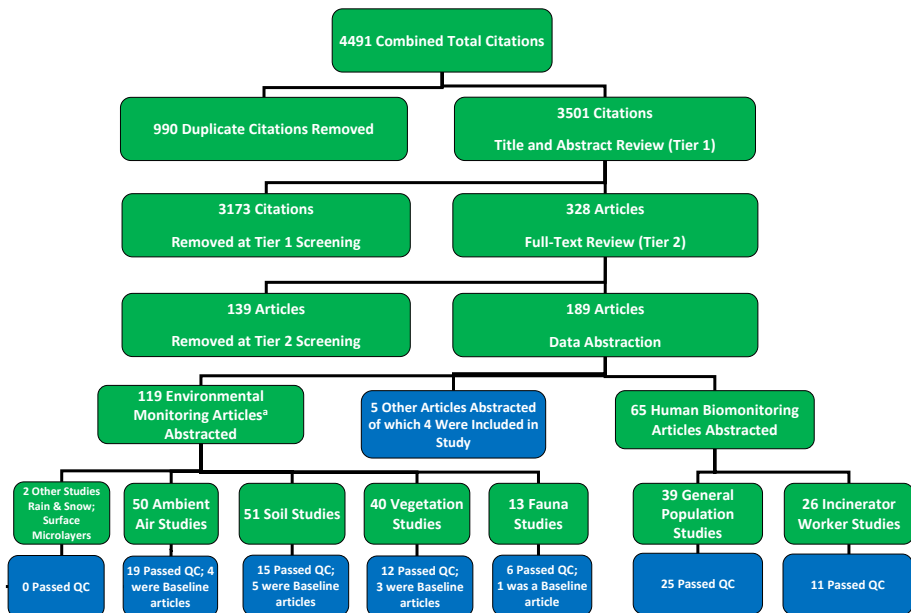


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Scientific Literature, Grey Literature and External Contact Review



Scientific Literature Review Results





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Environmental Baseline Studies

- ◆ Studies illustrate the importance of conducting chemical baseline investigations prior to commissioning of an EFW facility.
- ◆ Forms the benchmark against which any samples collected during the facility's operation would be evaluated.
- ◆ Durham and York Regions are in the process of finalizing an environmental baseline study, similar to those reported in the literature.

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Ambient Air Monitoring Studies

- ◆ Facilities that had an upgraded or modern pollution control technology do not appear to be a significant source of chemicals detected in ambient air surrounding the incineration facility.
- ◆ Zone of potential influence of the facilities studied appears to be no greater than 2 km from the stack, with the majority of research focused in areas less than 0.5 km from the facilities.

Study Team Finding

An ongoing ambient air monitoring program would not be required for the proposed Durham/York EFW facility to ensure the protection of human or environmental health.

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Soil Quality Monitoring Studies

Study Team Finding

An ongoing soil quality monitoring program would not be required for the proposed Durham/York EFW facility to ensure the protection of human or environmental health.

- ◆ Older facilities, without modern pollution control technologies, reported either:
 - ◆ A significant distance-decay effect associated with soil chemical concentrations and incineration facilities.
 - ◆ No impact to local soil quality as a result of incinerator emissions.
- ◆ Soil sampling programs surrounding older facilities were most effective when samples were collected within close proximity (<1km) of facilities.

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Vegetation Monitoring Studies

- ◆ Vegetation monitoring programs further support the hypothesis that incinerators without modern pollution abatement technologies tend to have a more significant effect on chemical concentrations in environmental media.

Study Team Finding

An ongoing vegetation monitoring program would not be required for the proposed Durham/York EFW facility to ensure the protection of human or environmental health.

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Agricultural Products Monitoring Studies

Study Team Finding

An ongoing agricultural products monitoring program would not be required for the proposed Durham/York EFW facility to ensure the protection of human health or environmental health.

- ◆ Majority of the research studies were unable to find significant chemical concentrations in agricultural samples at levels that would adversely affect human health (consumption of the products) and ecological health.
- ◆ Where elevated concentrations were observed, the age of the incinerator and insufficient pollution control technologies were factors.

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Human Biomonitoring of Residents

- ◆ Results do not indicate a significant relationship between exposure to chemical emissions from incineration and measured chemical levels in human media such as blood, urine, breast milk and hair.
- ◆ The only study to identify significantly elevated dioxin and furan levels in humans did so in residents of a rural area containing an older municipal waste incinerator which, for nearly 20 years, emitted dioxins at levels 500 times greater than the current emissions limit in the European Union or the Ontario Guideline A-7 allowable limits.

Study Team Finding

An ongoing human biomonitoring program would not be required for the proposed Durham/York EFW facility to ensure the protection of human or environmental health.

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Grey Literature Review

- ◆ Various documents were found in support of the scientific literature.
- ◆ Stack emissions regulations from around the world vary, but in general, are similar.
- ◆ Facilities in Canada are required only to conduct stack emissions monitoring. With the exception of:
 - ◆ Peel Region EFW has conducted soil sampling every 3 years since 2002.
 - ◆ Clean Harbours Hazardous Waste Incinerator/landfill conducts environmental monitoring program (air, soil, groundwater, vegetation) yearly.
 - ◆ Note that no correlation between facility emissions and levels monitored in the environment for these facilities has been found.

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External Contact Review

Reviewers spoke with:

- ◆ 2 Industrial Representatives (Germany, Sweden)
- ◆ 4 Government Representatives (Health Canada , EU, Italy, BC)
- ◆ 4 Academic/Other Contacts (Portugal, Spain, Belgium, US)

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External Contact Review

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- ◆ In general terms, information obtained widely supported the knowledge already gained through the scientific and grey literature reviews.
- ◆ Environmental surveillance has been conducted where public opinion or facility licensing processes have deemed it to be necessary.
- ◆ The results of such programs highlight the difficulty in establishing a causal link between incineration and chemical levels in human and environmental media.

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Summary of Global Environmental Surveillance Requirements for EFW Facilities

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Country	Municipal Waste Incinerators							
	Continuous Stack Monitoring	Periodic Stack Testing	Periodic Ambient Air Monitoring	Continuous Ambient Air Monitoring	Soil Monitoring	Vegetation Monitoring	Agricultural Product Monitoring	Human Biomonitoring
Canada	X	X						
Ontario	X	X			X			
United States	X	X						
European Union	X	X						
Portugal	X	X	At some locations	At some locations				At some locations
Spain	X	X	At some locations	At some locations				
Belgium	X	X						
Germany	X	X						
Italy	X	X	At some locations	At some locations				
Sweden	X	X						
Taiwan	X	X						
Korea	X	X						
Japan	X	X						
Hong Kong	x	X						



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Study Team Recommended Level of Environmental Surveillance



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Recommended Option 1 – Chemical Emissions Stack Monitoring and Testing

Option 1a) Compliance with Ontario MOE Guideline A-7

Option 1b) Establishment of More Stringent Stack Chemical Emissions Standards than Provided in MOE Guideline A-7

**Option 1c) Inclusion of New Stack Sampling Technology for
Dioxins and Furans**

That a Site Liaison Committee (SLC) should be charged, in part, with review of any environmental surveillance program being undertaken for the Durham/York EFW facility.



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Questions?