Block I	General details
1	**Location of the PCB disposal facility:** **Name of Facility:** Sonic Environmental Solutions Inc. – Mobile PCB Contaminated Soil Treatment Plant **City:** On-site but located in Vancouver, British Columbia Country: Canada *(Provide address information in Block IV)*
2	**Licence / authorization:** **Is this facility licensed or authorized to handle PCBs?** ☑Yes ☐ No **If "Yes":** **(i) Nature of licence / authorization:** Certificate of Compliance **(ii) Please submit the licensing history *(please attach to this questionnaire)* *Please see attachment?*** : The Certificate is granted after demonstration of the technology and independent verification. **Issuing authority *(name)*:** Ministry of Water Land and Air Protection – British Columbia, Canada ☐ National ☑Local or ☐ Independent
3	**Please provide information on storage at the facility including:** **Capacity for the various PCB waste and equipment types:** Sonic deploys a mobile plant solution. Our plant is a complete knock down unit (KDU). Plant sub-components are transported on skids, and assembled on-site. It can process between 30 and 90 tons of soil per day **Method:** Storage is in temporary containment on-site with covers. The size is usually no more than 2 days feed to the treatment plant as the soil is excavated in parallel. **Holding time:** Maximum is duration of the site remediation project. Treated soil is either landfilled or put back in place on site.

4	**Worker protection** *(Please summarize protective measures applied during treatment of PCB wastes)* Sonic implements a state of the art Environmental Health and Safety policy which is consistent with ISO) 14001 standards. **Does the facility have an accident book?** ☑Yes ☐ No **Most frequent cause(s) of incidents involving PCBs:** No accidents have occurred to date.
5	**Opinion box - PCB Management issues** *(Please describe briefly)* **What are your major concerns?** Our major concerns are related to the effectiveness of environmental regulators with sufficient authority to require treatment by an appropriate “best available” method. **Can you identify research and development needs in PCB management that would be beneficial for your region and waste managers worldwide?** A quick, cost-effective and easy analysis of PCB levels in soil.

Block II	Types of PCB wastes			
Part A: Treatment of PCB containing equipment/material				
Part A1: Metallic Parts				
A1.1	**Types of metallic PCB equipment/material treated:**	**Limitation on waste accepted** *(please specify, if appropriate)* **Concentration** *(specify the unit)* unit: **min**	**max**	**Quantity** *(specify the unit)* unit:
	☐ Equipment containing 100 % PCB			
	☐ Equipment containing mineral oil contaminated by PCB			
	☐ Others:			
	Please specify any other limitation on waste accepted: Sonic Environmental Solutions does not treat metallic PCB equipment/materials.			
A1.2	**Presentation of metallic equipment/material** In what form must the metallic PCB equipment/material be presented: ☐ Drums ☐ Other packaging: ☐ Other constraints:			

A1.3	**Treatment of metallic PCB equipment/material** Immediate destruction of metallic equipment/material containing PCB? Yes ☐ No ☐ **If 'Yes',** please specify the applied technology in Part III Extraction of PCB? Yes ☐ No ☐ If 'Yes': • please specify the applied technology in Part III • Is the decontaminated metallic equipment/material subjected to reuse/recycling? Yes ☐ No ☐ If 'Yes', please specify in **Block II Part C (Reuse and recycling)**

Part A: Treatment of PCB containing equipment/material

Part A2: Non-metallic Parts

A2.1

Types of non-metallic PCB equipment/material treated:	**Limitation on waste accepted** *(please specify, if appropriate)*		
	Concentration *(specify the unit)* unit:		**Quantity** *(specify the unit)* unit: MT
	min	**max**	
☐ PCB-containing materials (clothes, cables, etc.)			
☑ PCB-contaminated residues, sludges	N/A	10% PCB	500 mt (minimum)
☑ PCB-contaminated soils and sediments	N/A	10% PCB	500 mt (minimum)
☐ Packaged / drummed waste			
☐ Other:			

Please specify any other limitation on waste accepted: Sonic requires sample testing to determine any limitations that may occur. Limitations are primarily concerned with subsequent remediation for other contaminants that are present.

A2.2

Presentation of non-metallic equipment/material

In what form must the non-metallic PCB equipment/material be presented:

☐ Drums

☐ Other packaging:

☑ Other constraints: Sonic will provide material handling and sorting which may include removal of debris (e.g. railway ties) and crushing of soil materials.

A2.3	**Treatment of non-metallic PCB equipment/material** Immediate destruction of non-metallic equipment/material containing PCB? Yes ☐ No ☑ If 'Yes', please specify the applied technology in Part III Extraction of PCB? Yes ☑ No ☐ If 'Yes': • please specify the applied technology in Part III • Is the decontaminated non-metallic equipment/material subjected to reuse/recycling? Yes ☑No ☐ If 'Yes', please specify in **Block II Part C** (Reuse and Recycling)

Part B: Treatment of PCB oils and PCB waste oils

B1

Types of PCB oils and PCB waste oils treated:	**Limitation on waste accepted** *(please specify, if appropriate)*		
	Concentration *(specify the unit)* unit:		**Quantity** *(specify the unit)* unit:
	min	**max**	
☑ 100 % PCB oils		100% PCB*	
☑ Mineral oils contaminated by PCB	N/A	100% PCB*	
☑ Waste oils contaminated by PCB	N/A	100% PCB*	
☐ Other:			

Please specify any other limitation on waste accepted: * THE LIMIT IS ONLY RELEVANT TO PRICE PER LITRE TREATED.

B2

Presentation of PCB oils and PCB waste oils

In what form must the PCB oils and PCB waste oils be presented:

☑ Drums

☑ Other packaging: Materials that contain PCBs must meet Canadian government and EPA hazardous material packaging identification requirements.

☐ Other constraints:

B3

Treatment of PCB oils and PCB waste oils

Please specify the applied technology for the destruction of PCB oils and PCB waste oils in Part III

Part C: Reuse & Recycling of **decontaminated PCB equipment/material**		
C1	**Types decontaminated PCB equipment/material treated:**	**Limitation on waste accepted** *(please specify, if appropriate)* **Quantity** *(specify the unit)* unit: Metric Tonne
	☐ Transformers	
	☐ Capacitors	
	☐ Materials (clothes, cables, etc.)	
	☑ Residues, sludges	
	☑Soils and sediments	
	☑ Other: Granular solids	
	Please specify any other limitation on waste accepted:	
C2	**Presentation of decontaminated PCB equipment/material** In what form must the decontaminated PCB equipment/material be presented: ☐ Drums ☐ Other packaging: ☐ Other constraints:	

C3	**Treatment of decontaminated PCB equipment/material** Reuse and Recycling of decontaminated PCB equipment/material? Yes ☑☐ No ☐ If 'Yes', please specify the applied technology in Part III Is the decontaminated PCB equipment/material disposed of? Yes ☐ No ☑ If 'Yes', please specify: Transport to the disposal site? Yes ☐ No ☐ If 'Yes': ☐ International transport ☐ National transport Location of disposal site: Please provide a short description of disposal site: PCB materials (soils, sediments, granular solids) are remediated and deposited on site.

Block III	Detailed information on applied technologies	
1	**The following description refers to Block II, Part:**	**Type of PCB waste or decontaminated equipment/material:**
	☐ **A1** *(Treatment of metallic PCB equipment/material)*	
	☑ **A2** *(Treatment of non-metallic PCB equipment/material)*	Soils, sediments, sludge, demolition debris (ashphalt, concrete, etc.) granular solids
	☑ **B** *(Treatment of PCB oil and PCB waste oil)*	PCB in mineral oil and waste oil
	☐ **C** *(Reuse and recycling of decontaminated PCB equipment/material)*	

2	**Applied technologies** *(Please specify the technology used for disposal):* ☐ Pyrolysis / gasifiers ☐ Gas Phase Chemical Reduction (GPCR) ☐ Base Catalysed Decomposition (BCD) ☑ Sodium Reduction ☐ Super-Critical Water Oxidation (SCWO) ☐ Plasma Arc ☐ Molten Salt Oxidation ☐ Solvated Electron Technology ☐ Retrofilling ☑ Other: For oils and similar concentrated PCB material the process involves destruction of the PCB through sodium reduction using sonic energy to create an efficient reaction. For soils there is a preliminary step involving de-agglomeration of the PCB soil with a solvent using sonic energy. **Type of technology (1-sentence description**): Application of low frequency sonic energy to a solvent and soil slurry to create a sonoprocess which will allow the PCB to be de-agglomerated from the soil and subsequently a second sonoprocess is used to create an efficient reaction with the PCB and sodium. **Description of the technology** please provide additional information as appropriate *(summarize here and, if necessary, attach documentation)* The Sonic PCB Sonoprocess uses our Platform Technology (a patented Sonic Generator) which produces sonic energy on an industrial scale. Our Platform Technology consists of a patented electromagnetic drive system that drives a very large (2.8 ton) steel bar into its natural resonance frequency. The intense energy generated from the vibrating bar is captured and transferred into flow-through chambers that are mounted on each end of the bar. Materials are then processed through these "sonic chambers" and sonication improves the desired physical, chemical or biological processes by an order of magnitude (10X) over conventional processes. A process matrix slurry (combination of PCB contaminated soil (or sediments) and solvent) is pumped through the sonic chambers. Sonic's PCB sonoprocess de-agglomerates the PCB in the soil, into the process matrix. Once the PCBs are suspended in the matrix, we are able to chemically destroy them using a chemical reaction, again made possible by the sonic generator. Post sonication treatment includes conventional methods for separating the solvent from the soil and resulting end products are low grade fuel, salt and clean soil/sediment. Our PCB sonoprocess is an ex situ, semi-continuous process and operates at low temperature without any possibility of creating adverse by-products such as chloro-dioxins or furans, which if present, are also destroyed. Sonic's solution provides permanent destruction of PCB, and does it on-site in a sustainable and cost-effective manner. **Commissioned?** ☑ Yes ☐ No Year: 2004/5 **Can the technology be used in a mobile facility?** x Yes ☐ No

3	**State of development** Does the technology exist as an industrial unit? ☑ Yes ☐ No If “No”, please indicate when it will become operational: If “Yes”, please indicate how many units exist: 1 In what countries: Canada

4 **Pretreatment:**

Does the technology require any pretreatment procedures? ☑ Yes ☐ No

If "Yes", please specify required pretreatment procedures:

☐ Thermal Desorption

☐ Dilution

☐ Low Temperature Rinsing

☐ Electro-osmosis

☐ Draining/Solvent washing

☐ Dismantling/Shredding

☑ Other: Soil must be reduced to relatively uniform matrix

5 **Byproducts**

What byproducts does the technology produce? *(please specify below)*

Byproduct	Kind	Amount
Liquids:	Low grade heating oil fuel Process Water	10 – 20 L per tonne of soil treated 10 -20 L per tonne of soil treated
Solids:	Na (Salt)	1 Kg NaCl / Kg PCB
Air:	Vent gas – mainly nitrogen	16 m^3 per tonnes of waste treated

Does the technology allow all byproducts
to be monitored for POPs*/PTS** before release? ☑ Yes ☐ No

If POPs*/PTS** are discovered, can the byproducts
be returned to the process for further treatment? x Yes ☐ No

Are any of the byproducts classified
as other sorts of hazardous wastes? ☐ Yes x No

If "Yes" please specify:

What volumes of such byproducts are generated by handling a unit volume of
PCB wastes:

Can third party monitoring data be provided? ☐ Yes☑No

If "Yes", please attach to this questionnaire.

* POPs: Persistent Organic Pollutants
** PTS: Persistent Toxic Substances

How are byproducts disposed of? *(please describe briefly)*

Low grade fuel is typically marketed and sold to cement kilns.

6	**Efficiency** *(please specify, if appropriate)* Various efficiencies can be achieved. For example, Destruction efficiencies (Des): PCB residual in solids < 2ppm to < .01 ppm
7	**Monitoring & Control of releases** **What technologies are used to monitor releases: Standard Methods** **Air**: In-line sampling **Effluents:** GC analysis **Solids**: Sampling protocols based on PCB indicators and audit analysis **Are all releases monitored for POPs/PTS before release?** ☑ Yes ☐ No **If POPs*/PTS** are discovered, can the releases be returned to the process for further treatment?** ☑ Yes ☐ No **Are any of the releases classified as hazardous wastes?** ☐ Yes ☑ No If "Yes" please specify: **What technologies are used/ required to monitor and treat any such releases prior to release:** **What volumes of such releases are generated by handling a unit volume of PCB wastes:** **Is third party monitoring data available?** ☐Yes ☑ No *If "Yes", please attach to this questionnaire.* * POPs: Persistent Organic Pollutants ** PTS: Persistent Toxic Substances
	How are releases disposed of? *(please describe briefly)*

8 **Disposal costs**

What are the *approximate* costs for applying the technology per unit‡, **including** costs for all technical pretreatment steps, **excluding** all costs **not** related to the technical application of the technology (transport costs, costs for disposal of decontaminated transformers/capacitors/materials, etc.)?

Please specify type of treated/disposed PCB equipment/material/oil below:

	Costs per unit‡	**Currency**
a) non metallic PCB materials (soil, sediment, sludge granular solids)	750/Tonne	USD
b) transformer oils	750/Tonne *	USD
c)		
d)		
e)		
f)		
g)		

‡ Specify the unit for a) to g): Metric Ton *(UP TO 10,000 PPM PCB)

9 **Treatment capacities and scaling** *(tonnes per year for main waste & equipment types)*

Capacity of existing facilities: 7,500 - 21,000 tons/year based on single unit operation

Can the technology be adapted to higher or lower capacities? Yes ☑ No ☐

If "Yes":

(i) What is the capacity of the smallest commercially viable facility: 7500 tons/year

(ii) What is the capacity of the largest commercially viable facility: 22000 tons/yr

Does the adaptation cause additional costs? ☑ Yes ☐ No

If "Yes" specify the increase in costs for the adaptation (%) of the initial costs:

(i) For smaller plants: - increased operating costs proportionally

For larger plants: 0 %

‡ Please specify the unit: Metric Tons

Block IV	Facility: Address and Service Information
1	**Facility Name:** Sonic Environmental Solutions Inc. **Address:** Suite 2100 – 1066 West Hastings Street **City/Town:** Vancouver, BC **P.O. Box:** V6E 3X2 **District/State**: British Columbia **Country:** Canada **Telephone:** +1 604 736 2552 **Fax:** +1 604 736 2558 **Email:** info@sesi.ca **Web site:** www.sonicenvironmental.ca Person completing form **Name:** Paul Austin **Position:** Vice President, Marketing Parent Company *(if different)* Address: City/Town: P.O. Box: District/State: Country: Telephone: Fax: Email:

2	**Other Services offered by the company** ☐ Laboratory analysis / testing ☐ PCB waste packaging for shipment ☐ PCB classification / labeling ☑ Clean-up of PCB contaminated sites ☑ PCB wastes transport ☑ Other PCB-related services: reduction and handling
3	**Further information** Identify any company information (brochures, notes etc...) provided separately and if you wish provide additional comments on your services in **not** more than 50 words: Company sales brouchure and corporate brief is attached. Company sales flash video providing animated explanation of technology in English and Japanese available on website **Our proprietary PCB destruction sonoprocess offers the best available solution to PCB contaminated soils and PCBs in oils. Our solution deals with PCB problems onsite, eliminating the need to transport hazardous materials through populated communities. Our mobile solution is non-thermal, eliminating unwanted by-products such as chloro-dioxins and furans.**