

Block I      General details	
<b>1</b>	<p><b>Location of the PCB disposal facility:</b></p> <p>Name of Facility: <i>Powertech Labs Inc.</i></p> <p>City: <i>Surrey</i> Country: <i>Canada</i></p> <p><i>(Provide address information in Block IV)</i></p>
<b>2</b>	<p><b>License / authorization:</b></p> <p>Is this facility licensed or authorized to handle PCBs? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><i>BC Hydro (our client) is the owner of the plant. Powertech Labs Inc. is a technology provider and we will work with our clients to obtain licenses.</i></p> <p>If "Yes":</p> <p>(i) Nature of license / authorization: <i>PS-8610 (storage permit), PE-06026 (effluent permit), GVA 0363 (emission permit)</i></p> <p>(ii) Please submit the licensing history <i>(please attach to this questionnaire)</i></p> <p>Issuing authority <i>(name): BC Ministry of Water, Land and Air Protection; Greater Vancouver Regional District</i></p> <p><input type="checkbox"/> National <input checked="" type="checkbox"/> Local or <input type="checkbox"/> Independent</p>
<b>3</b>	<p><b>Please provide information on storage at the facility including:</b></p> <p>Capacity for the various PCB waste and equipment types:</p> <p><i>Waste PCB Liquids – 350,000 L</i></p> <p><i>Waste PCB Solids – 200,000 kg</i></p> <p>Method:</p> <p><i>In storage tank in tank farms.</i></p> <p>Holding time:</p> <p><i>No time restriction. Considered to be "temporary" while awaiting decontamination.</i></p>
<b>4</b>	<p><b>Worker protection</b> <i>(Please summarize protective measures applied during treatment of PCB wastes)</i></p> <p><i>The equipment is completely enclosed with no exposure of workers to PCB-contaminated oil. All workers wear personal protective equipment when handling contaminated materials directly. All workers receive training on the hazards and how to deal with them.</i></p> <p>Does the facility have an accident book? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Most frequent cause(s) of incidents involving PCBs:</p> <p><i>Spillage of contaminated material during manual handling.</i></p>

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**Opinion box - PCB Management issues** *(Please describe briefly)*

What are your major concerns?

Can you identify research and development needs in PCB management that would be beneficial for your region and waste managers worldwide?

*Standardization of decontamination regulations worldwide.*

**Block II      Types of PCB wastes**

**Part A: Treatment of PCB containing equipment/material**

**Part A1: Metallic Parts**

<b>A1.1</b>	<b>Types of metallic PCB equipment/material treated:</b>	<b>Limitation on waste accepted</b> <i>(please specify, if appropriate)</i>		
		<b>Concentration</b> <i>(specify the unit)</i>		<b>Quantity</b> <i>(specify the unit)</i>
		unit: %		unit: kg
		<b>min</b>	<b>max</b>	
	<input checked="" type="checkbox"/> Equipment containing 100 % PCB		100	110,000
<input checked="" type="checkbox"/> Equipment containing mineral oil contaminated by PCB		100	110,000	
<input type="checkbox"/> Others:				
<p><i>Please specify any other limitation on waste accepted: Plant is owned and operated by BC Hydro (our client). Size restriction is about 12 cm x 12 cm x 12 cm.</i></p>				
<b>A1.2</b>	<p><b>Presentation of metallic equipment/material</b></p> <p>In what form must the metallic PCB equipment/material be presented:</p> <p><input checked="" type="checkbox"/> Drums</p> <p><input checked="" type="checkbox"/> Other packaging: <i>flexible intermediate bulk containers</i></p> <p><input type="checkbox"/> Other constraints:</p>			

**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 <i>(please specify, if appropriate)</i>		
		Concentration <i>(specify the unit)</i> unit: %		Quantity <i>(specify the unit)</i> unit: kg
		min	max	
<input type="checkbox"/> PCB-containing materials (clothes, cables, etc.)				
<input type="checkbox"/> PCB-contaminated residues, sludges				
<input type="checkbox"/> PCB-contaminated soils and sediments				
<input checked="" type="checkbox"/> Packaged / drummed waste			100	200,000
<input type="checkbox"/> Other:				
<p><i>Please specify any other limitation on waste accepted: Plant is owned and operated by BC Hydro (our client). Size restriction is about 12 cm x 12 cm x 12 cm.</i></p>				
A2.2	<p><b>Presentation of non-metallic equipment/material</b></p> <p>In what form must the non-metallic PCB equipment/material be presented:</p> <p><input checked="" type="checkbox"/> Drums</p> <p><input checked="" type="checkbox"/> Other packaging: <i>flexible intermediate bulk containers</i></p> <p><input type="checkbox"/> Other constraints:</p>			

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 <i>(please specify, if appropriate)</i>		
		Concentration <i>(specify the unit)</i>		Quantity <i>(specify the unit)</i>
		unit: PPM		unit: L
		min	max	
<input type="checkbox"/> 100 % PCB oils				
<input checked="" type="checkbox"/> Mineral oils contaminated by PCB		5,000	350,000	
<input type="checkbox"/> Waste oils contaminated by PCB				
<input type="checkbox"/> Other:				
<p><i>Please specify any other limitation on waste accepted:</i></p>				
B2	<p><b>Presentation of PCB oils and PCB waste oils</b></p> <p>In what form must the PCB oils and PCB waste oils be presented:</p> <p><input checked="" type="checkbox"/> Drums</p> <p><input checked="" type="checkbox"/> Other packaging: <i>shipment to facility in bulk tankers</i></p> <p><input type="checkbox"/> Other constraints:</p>			
B3	<p><b>Treatment of PCB oils and PCB waste oils</b></p> <p>Please specify the applied technology for the destruction of PCB oils and PCB waste oils in Part III</p>			

**Part C: Reuse & Recycling of decontaminated PCB equipment/material**

<b>C1</b>	<b>Types decontaminated PCB equipment/material treated:</b>	<b>Limitation on waste accepted</b> <i>(please specify, if appropriate)</i>
		<b>Quantity</b> <i>(specify the unit)</i> unit:
	<input type="checkbox"/> Transformers	
	<input type="checkbox"/> Capacitors	
	<input type="checkbox"/> Materials (clothes, cables, etc.)	
	<input type="checkbox"/> Residues, sludges	
	<input type="checkbox"/> Soils and sediments	
	<input type="checkbox"/> Other:	
<i>Please specify any other limitation on waste accepted:</i>		
<b>C2</b>	<p><b>Presentation of decontaminated PCB equipment/material</b></p> <p>In what form must the decontaminated PCB equipment/material be presented:</p> <input type="checkbox"/> Drums <input type="checkbox"/> Other packaging: <input type="checkbox"/> 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:

Block III Detailed information on applied technologies		
1	The following description refers to Block II, Part:	Type of PCB waste or decontaminated equipment/material:
	<input checked="" type="checkbox"/> <b>A1</b> ( <i>Treatment of metallic PCB equipment/material</i> )	<i>Contaminated light ballast wastes</i>
	<input checked="" type="checkbox"/> <b>A2</b> ( <i>Treatment of non-metallic PCB equipment/material</i> )	<i>Contaminated light ballast wastes</i>
	<input checked="" type="checkbox"/> <b>B</b> ( <i>Treatment of PCB oil and PCB waste oil</i> )	<i>Contaminated Insulating Oil</i>
	<input type="checkbox"/> <b>C</b> ( <i>Reuse and recycling of decontaminated PCB equipment/material</i> )	
2	<p><b>Applied technologies</b> (<i>Please specify the technology used for disposal</i>):</p> <p><input type="checkbox"/> Pyrolysis / gasifiers</p> <p><input type="checkbox"/> Gas Phase Chemical Reduction (GPCR)</p> <p><input type="checkbox"/> Base Catalysed Decomposition (BCD)</p> <p><input checked="" type="checkbox"/> Sodium Reduction</p> <p><input type="checkbox"/> Super-Critical Water Oxidation (SCWO)</p> <p><input type="checkbox"/> Plasma Arc</p> <p><input type="checkbox"/> Molten Salt Oxidation</p> <p><input type="checkbox"/> Solvated Electron Technology</p> <p><input type="checkbox"/> Retrofilling</p> <p><input type="checkbox"/> Other:</p> <p><b>Type of technology (1-sentence description):</b>  <i>Sodium-based chemical process</i></p> <p><b>Description of the technology</b> please provide additional information as appropriate (<i>summarize here and, if necessary, attach documentation</i>)  <i>PCB is selectively destroyed in a low temperature chemical process. Insulating oil is recovered and may be purified for reuse.</i></p> <p><b>Commissioned?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No      Year: <i>1987 for liquids, 2003 for solids</i></p> <p><b>Can the technology be used in a mobile facility?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
3	<p><b>State of development</b></p> <p>Does the technology exist as an industrial unit? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If "No", please indicate when it will become operational:</p> <p>If "Yes", please indicate how many units exist: <i>5 (4 for liquids and 1 for solids)</i></p> <p>In what countries: <i>Canada (2), France (1), Spain (1), Japan (under construction)</i></p>	

**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:

**5 Byproducts**

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

Byproduct	Kind	Amount
Liquids:	<i>waste water</i>	<i>80 L per tonnes of waste treated</i>
Solids:	<i>sludge</i>	<i>1 kg per tonnes of waste treated</i>
Air:		<i>m<sup>3</sup> per tonnes of waste treated</i>

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?  Yes  No

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

If "Yes" please specify: *sludge is classified as caustic waste*

What volumes of such byproducts are generated by handling a unit volume of PCB wastes: *0.001 L/L of PCB oil waste*

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)*

*Both wastewater and sludge are free of PCB and are disposed of by waste management contractor.*

<p><b>6</b></p>	<p><b>Efficiency</b></p> <p><i>(please specify, if appropriate)</i></p> <p>Destruction efficiencies (DEs): <i>PCB residual to less than 2 PPM for solids and less than 0.05 PPM for liquids</i></p>
<p><b>7</b></p>	<p><b>Monitoring &amp; Control of releases</b></p> <p>What technologies are used to monitor releases: <i>in accordance with EPA methods</i></p> <p>Air: <i>sampling and lab analysis (GC)</i></p> <p>Effluents:</p> <p>Solids:</p> <p>Are all releases monitored for POPs/PTS before release? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If POPs*/PTS** are discovered, can the releases be returned to the process for further treatment? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Are any of the releases classified as hazardous wastes? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If "Yes" please specify:</p> <p>What technologies are used/ required to monitor and treat any such releases prior to release: <i>coalescing filter for air emission</i></p> <p>What volumes of such releases are generated by handling a unit volume of PCB wastes:</p> <p>Is third party monitoring data available? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><i>If "Yes", please attach to this questionnaire.</i></p> <p style="text-align: right;">* POPs: Persistent Organic Pollutants ** PTS: Persistent Toxic Substances</p> <hr/> <p>How are releases disposed of? <i>(please describe briefly)</i></p>

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**Disposal costs**

What are the *approximate* costs for applying the technology per unit<sup>‡</sup>, **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:*

*Cost is dependent on the location of operation. The following costs are typical for operation in Canada.*

	Costs per unit <sup>‡</sup>	Currency
a) PCB contaminated mineral oil	\$0.15/L	Canadian
b) PCB contaminated capacitors	\$5.10/kg	Canadian
c) PCB contaminated fluorescent light ballast waste	\$1.10/kg	Canadian
d)		
e)		
f)		
g)		

<sup>‡</sup> Specify the unit for a) to g):

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

Capacity of existing facilities: 2,400,000 L oil, 1,650,000 kg solids per year

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: 2,000,000 L oil per year
- (ii) What is the capacity of the largest commercially viable facility: 10,000,000 L oil per year

Does the adaptation will cause additional costs?  Yes  No

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

- (i) For smaller plants: 0%
- For larger plants: 75%

<sup>‡</sup> Please specify the unit: L

**Block IV****Facility: Address and Service Information****1**

Facility Name: Powertech Labs Inc.

Address: 12388 – 88th Avenue

City/Town: Surrey

P.O. Box:

District/State: BC

Postal Code: V3W 7R7

Country: Canada

Telephone: +1 (604) 590-7438

Fax: +1 (604) 590-7489

Email: keith.lee@powertechlabs.com

Web site: www.powertechlabs.com

Person completing form

Name: Keith Lee

Position: Manager, Chemical Technologies

Parent Company (*if different*)

Address:

City/Town:

P.O. Box:

District/State:

Country:

Telephone:

Fax:

Email:

<b>2</b>	<p><b>Other Services offered by the company</b></p> <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Laboratory analysis / testing</li><li><input type="checkbox"/> PCB waste packaging for shipment</li><li><input type="checkbox"/> PCB classification / labeling</li><li><input type="checkbox"/> Clean-up of PCB contaminated sites</li><li><input type="checkbox"/> PCB wastes transport</li><li><input type="checkbox"/> Other PCB-related services:</li></ul>
<b>3</b>	<p><b>Further information</b></p> <p>Identify any company information (brochures, notes etc.) provided separately and if you wish provide additional comments on your services in <b>not</b> more than 50 words:</p>