

Block I General Details	
1	<p>Location of the PCB disposal facility:</p> <p>Name of Facility: Semi-Mobile GPCR Plant (Note – this plant is not yet constructed – construction is expected to start in late 2004)</p> <p>City: _____ Country: Slovak Republic <i>(Provide address information in Block IV)</i></p>
2	<p>Licence / authorization:</p> <p>Is this facility licensed or authorized to handle PCBs? Yes No (Permitting is underway)</p> <p>If "Yes":</p> <p>(i) Nature of license/authorization:</p> <p>(ii) Please submit the licensing history <i>(please attach to this questionnaire)</i></p> <p>Issuing authority <i>(name)</i>:</p> <p><input type="checkbox"/> National Local <input type="checkbox"/> Independent</p>
3	<p>Please provide information on storage at the facility including:</p> <p>Capacity for the various PCB waste and equipment types: To be determined</p> <p>Method:</p> <p>Holding Time:</p>
4	<p>Worker Protection <i>(Please summarize protective measures applied during treatment of PCB wastes)</i></p> <p>It is expected that this project will require worker protection that has been used for other Eco Logic GPCR operations:</p> <ul style="list-style-type: none"> - A Health and Safety Plan is prepared for the plant - All workers have Hazardous Waste Operations training - All workers have plant operations training appropriate for their task - Other protection during operations is provided by interlocks and standard operating procedures - All workers wear protective clothing as necessary <p>Does the facility have an accident book? Yes No</p> <p>Most frequent cause(s) of incidents involving PCBs:</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?

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 <i>(please specify, if appropriate)</i>					
		Concentration <i>(specify the unit)</i>			Quantity <i>(specify the unit)</i>		
		min		max			
	<input checked="" type="checkbox"/> Equipment containing 100% PCB		No limitations		144		Tonnes/month
	<input checked="" type="checkbox"/> Equipment containing mineral oil contaminated by PCB		No limitations		100		Tonnes/month
<input type="checkbox"/> Others:							
<i>Please specify any other limitation on waste accepted:</i>							
There is no limitation on the concentration of PCBs in material. The GPCR technology can treat 100% strength organic material, including 100% PCBs.							
A1.2	Preparation of metallic equipment/material						
In what form must the metallic PCB equipment/material be presented:							
<input checked="" type="checkbox"/> Drums							
<input checked="" type="checkbox"/> Other packaging: Pallets, coffins, smaller containers, etc.							
<input checked="" type="checkbox"/> Other constraints: There are no other constraints on the form of waste. The technology can handle PCB waste in any matrix. Integrity of the container must be sound (i.e. no leaking containers).							
A1.3	Treatment of metallic PCB equipment/material						
Immediate destruction of metallic equipment/material containing PCB? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
If "Yes", please specify the applied technology in Part III							
Extraction of PCB? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
If "Yes":							
<ul style="list-style-type: none"> • Please specify the applied technology in Part III • Is the decontaminated metallic equipment/material subjected to reuse/recycling? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 							
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>		Quantity <i>(specify the unit)</i>
		min	max	
	<input checked="" type="checkbox"/> PCB-containing materials (clothes, cables, etc.)	0 %	100 %	120 T/month
	<input checked="" type="checkbox"/> PCB-contaminated residues, sludges	0 %	100 %	120 T/month
	<input checked="" type="checkbox"/> PCB-contaminated soils and sediments	0 %	100 %	See Note below
	<input checked="" type="checkbox"/> Packaged/drummed waste	0 %	100 %	144 T/month
<input checked="" type="checkbox"/> Others: Any PCB-contaminated solid; Activated Carbon	0 %	100 %	72 T/month	
Please specify any other limitation on waste accepted:				
None				
For soil and sediment treatment, a separate thermal desorption device (provided by a partner technology) is used to separate the PCBs from the soil/sediment matrix. The desorbed PCBs are then condensed into a liquid, and it is this liquid that is conveyed to the GPCR reactor for destruction. The GPCR reactor can process liquid condensate at a rate of 2 kg/min for the semi-mobile plant that will be deployed in Slovakia, which equates to roughly 15 to 30,000 Tonnes of soil/sediment processed per year.				
A2.2	Preparation of non-metallic equipment/material			
In what form must the non-metallic PCB equipment/material be presented:				
<input checked="" type="checkbox"/> Drums				
<input checked="" type="checkbox"/> Other packaging: Pallets, coffins, smaller containers, etc.				
<input type="checkbox"/> Other constraints: There are no other constraints on the form of waste. The technology can handle PCB waste in any matrix. Integrity of the container must be sound (i.e. no leaking containers).				
A2.3	Treatment of non-metallic PCB equipment/material			
Immediate destruction of non-metallic equipment/material containing PCB? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
If "Yes", please specify the applied technology in Part III				
Extraction of PCB? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Except for soil/sediment, where a separate front-end thermal desorption device is used to extract and concentrate the PCBs for GPCR destruction.				
If "Yes":				
<ul style="list-style-type: none"> • Please specify the applied technology in Part III • Is the decontaminated non-metallic equipment/material subjected to reuse/recycling? Yes <input type="checkbox"/> No <input type="checkbox"/> 				
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>
		min	max	
<input checked="" type="checkbox"/>	100% PCB oils	0 %	100 %	70 T/month
<input checked="" type="checkbox"/>	Mineral oils contaminated by PCB	0 %	100 %	35 T/month
<input checked="" type="checkbox"/>	Waste oils contaminated by PCB	0 %	100 %	25 T/month
<input checked="" type="checkbox"/>	Others:	0 %	100 %	
<i>Please specify any other limitation on waste accepted:</i>				
None				
B2	Preparation of PCB oil and PCB waste oil In what form must the PCB oil and PCB waste oil be presented: <input checked="" type="checkbox"/> Drums <input checked="" type="checkbox"/> Other packaging: Pallets, coffins, smaller containers, etc. <input type="checkbox"/> Other constraints: There are no other constraints on the form of waste. The technology can handle PCB waste in any matrix. Integrity of the container must be sound (i.e. no-leaking containers).			
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 of decontaminated PCB equipment/material treated:	Limitation on waste accepted <i>(please specify, if appropriate)</i>
		Quantity <i>(specify the unit)</i>
	<input checked="" type="checkbox"/> Transformers	200 Tonnes/month
	<input checked="" type="checkbox"/> Capacitors	144 Tonnes/month
	<input checked="" type="checkbox"/> Materials (clothes, cables, etc.)	120 Tonnes/month
	<input checked="" type="checkbox"/> Residues, sludges	120 Tonnes/month
	<input checked="" type="checkbox"/> Soils and sediments	See Note
	<input checked="" type="checkbox"/> Others: Activated Carbon	72 Tonnes/month
<p><i>Please specify any other limitation on waste accepted:</i></p> <p>None</p> <p>For soil and sediment treatment, a separate thermal desorption device (provided by a partner technology) is used to separate the PCBs from the soil/sediment matrix. The desorbed PCBs are then condensed into a liquid, and it is this liquid that is conveyed to the GPCR reactor for destruction. The GPCR reactor can process liquid condensate at a rate of 2 kg/min for the semi-mobile plant that will be deployed in Slovakia, which equates to roughly 15 to 30,000 Tonnes of soil/sediment processed per year.</p>		
C2	Presentation of decontaminated PCB equipment/material	
	<p>In what form must the decontaminated PCB equipment/material be presented:</p>	
	<p><input checked="" type="checkbox"/> Drums</p>	
	<p><input checked="" type="checkbox"/> Other packaging: Pallets, coffins, small containers, bags, etc.</p>	
	<p><input type="checkbox"/> Other constraints: None</p>	
C3	Treatment of decontaminated PCB equipment/material	
	<p>Reuse and Recycling of decontaminated PCB equipment/material? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>If "Yes", please specify the applied technology in Part III</p>	
	<p>Is the decontaminated PCB equipment/material disposed of? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	
	<p>If "Yes", please specify:</p>	
	<p>Transport to the disposal site? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	
	<p>If "Yes":</p> <p><input checked="" type="checkbox"/> International transport (to be determined)</p> <p><input checked="" type="checkbox"/> National transport (to be determined)</p>	
	<p>Location of disposal site: To be determined</p>	
	<p>Please provide a short description of disposal site: To be determined</p>	

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"/> A1 (Treatment of metallic PCB equipment/material)	
	<input checked="" type="checkbox"/> A2 (Treatment of non-metallic PCB equipment/material)	
	<input checked="" type="checkbox"/> B (Treatment of PCB oil and PCB waste oil)	
	<input checked="" type="checkbox"/> C (Reuse and recycling of decontaminated PCB equipment/material)	
2	<p>Applied Technologies</p> <p><input type="checkbox"/> Pyrolysis/gasification</p> <p><input checked="" type="checkbox"/> Gas Phase Chemical Reduction (GPCR)</p> <p><input type="checkbox"/> Base Catalysed Decomposition (BCD)</p> <p><input 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>Type of technology (1-sentence description):</p> <p>Gas-Phase Chemical Reduction is a non-incineration technology whereby hydrogen and heat are used to reduce PCBs to methane and HCl.</p> <p>Description of the technology Please provide additional information as appropriate (<i>summarize here and, if necessary, attachment documentation</i>)</p> <p>Gas-Phase Chemical Reduction (GPCR) involves the reduction of organic compounds by hydrogen at temperatures of 850°C or greater. Organic compounds are ultimately reduced to methane, hydrogen chloride or hydrogen fluoride (if the waste is chlorinated or fluorinated, respectively), and minor amounts of low molecular weight hydrocarbons (benzene and ethylene). The hydrochloric acid and/or hydrobromic acid is neutralized by addition of caustic soda during initial cooling of the process gas, or can be taken off in acid form for reuse, if desired. Cooled, scrubbed gas from the reactor ("Product Gas") is compressed and analyzed. Product gas can then be reused as a fuel for plant components, or consumed in a burner.</p> <p>Eco Logic's GPCR™ technology can be broken down into three basic unit operations: the front-end system (where the contaminants are rendered into a suitable form for destruction in the reactor), the reactor (which reduces the contaminants, now in gas phase, using hydrogen and steam), and the gas scrubbing and compression system. The front-end units will differ depending on the waste matrix. For example, bulk solids such as drummed chemicals, electrical equipment, spent carbon, etc., are placed into a Thermal Reduction Batch Processor (TRBP), which desorbs the contaminants from the solid material, and then conveys them to the reactor for destruction. Watery wastes and high-</p>	

strength oily wastes are injected into a preheater that vaporises the liquids in an indirectly fired heat exchanger. The gases are mixed with hydrogen and steam to a temperature of 600°C prior to introduction to the GPCR™ reactor.

In the case of soil and sediment treatment, contaminants are first desorbed from the solids using a thermal desorption device (of which there are many proven and available worldwide). The gas containing the contaminants is then condensed, the water removed, and the remaining concentrated contaminant liquid fed to the preheater and GPCR™ reactor as a liquid waste feed.

See attached documentation for more detail.

Commissioned? Yes No Year: Various since 1995 (GPCR Demonstration Unit since 2000)

Can the technology be used in a mobile facility? 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: 2 (3rd in progress)

In what countries: Canada, Japan, pending for Slovakia

4 Pretreatment

Does the technology require any pretreatment procedures? Yes No (except for soil/sediment)

If "Yes", please specify required pretreatment procedures:

Thermal Desorption only for soil/sediment treatment

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:	Scrubber Effluent	1000 – 3000 L per tonne of waste treated
Solids:	Clean Treated Solids (no slag or fly ash are produced)	See note below
Air:	Stack emissions from burning clean product gas	3000 – 10,000 m ³ per tonne of waste treated

	<p>Does the technology allow all byproducts to be monitored for POPs/PTS before release? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If POPs/PTS are discovered, can the byproducts be returned to the process for further treatment? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Are any of the byproducts classified as other sorts of hazardous wastes? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If "Yes", please specify:</p> <p>What volumes of such byproducts are generated by handling a unit volume of PCB wastes:</p> <p>Can third party monitoring data be provided? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>If "Yes", please attach to this questionnaire</i></p>
	<p>How are byproducts disposed of? <i>(please describe briefly)</i></p> <p>Byproducts are non-hazardous, nevertheless a licensed hazardous waste disposal company is used to take away byproducts.</p> <p>Solids: Contaminated solids are treated and the contaminants are destroyed. The cleaned solids may be landfilled or be sent to a metals recycler.</p> <p>Liquid: Effluent from the scrubber is water with dissolved solids. In the past we have received permits for municipal sewer disposal and for open water discharges.</p> <p>Air: The product gas is a clean gas containing methane that can be used as a fuel. Air emissions from the methane combustion are normal products of combustion.</p>
6	<p>Efficiency <i>(please specify, if appropriate)</i></p> <p>Destruction efficiencies (DEs): > 99.9999 %</p>

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Monitoring & Control of releases

What technologies are used to monitor releases:

Air: On-line monitoring of product gas before it is used as a fuel

Effluents: Held and tested before discharge per permit conditions

Solids: Held and tested before disposal or recycling per permit conditions

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:

Can third party monitoring data be provided? Yes No
If "Yes", please attach to this questionnaire

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

See information under "byproducts"

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Disposal Costs

What are the approximate costs for applying the technology per unit, **including** costs for all technical pretreatment steps and **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)		
b)		
c)		
d)		
e)		
f)		
g)		

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

Capability of existing facilities: 1000 – 3000 Tonnes per year (PCB oil and electrical equipment – soil capacity is significantly higher) (multiple units can be used at a single site to increase capacity)

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: 40 – 80 Tonnes per year

(ii) What is the capacity of the largest commercially viable facility: 1000 – 3000 Tonnes per year (PCB oil and electrical equipment – soil capacity is significantly higher) (multiple units can be used at a single site to increase capacity)

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: 50 % increase in cost for 100% increase in capacity

(ii) For larger plants: 50 % increase in cost for 100% increase in capacity

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

1	<p>Facility Name</p> <p>Address: Unknown at present (facility is expected to begin construction in late 2004)</p> <p>City/Town:</p> <p>P.O. Box:</p> <p>District/State:</p> <p>Country: Slovak Republic</p> <p>Telephone:</p> <p>Fax:</p> <p>Email:</p> <p>Web site:</p> <p>Person completing form</p> <p>Name: Beth Kümmling, M.Sc.</p> <p>Position: Director of Business Development</p> <p>Parent Company (if different)</p> <p>Address: 143 Dennis Street</p> <p>City/Town: Rockwood</p> <p>P.O. Box:</p> <p>District/State: Ontario</p> <p>Country: Canada</p> <p>Telephone: 519-856-9591</p> <p>Fax: 519-856-9235</p> <p>Email: beth.kummling@ecologic.ca</p> <p>Web site: www.ecologic.ca</p>
2	<p>Other Services offered by the company</p> <p><input type="checkbox"/> Laboratory analysis/testing</p> <p><input type="checkbox"/> PCB waste packaging for shipment</p> <p><input type="checkbox"/> PCB classification/labelling</p> <p><input type="checkbox"/> Clean-up of PCB contaminated sites</p> <p><input type="checkbox"/> PCB waste transport</p> <p><input type="checkbox"/> Other PCB-related services:</p>
3	<p>Further information</p> <p>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:</p>

Additional material:

- General technology information
- Third-party data