

Action Plan for final disposal and complete elimination of entire stock of PCBs/PCB wastes in India

The overall objective of the GEF-MoEFCC-UNIDO project is to reduce and eliminate the use and releases of PCBs to the environment through the promotion of measures to minimize exposures and risks and by introducing environmentally sound management and disposal techniques for PCBs, PCB-containing equipment and PCB-containing mineral oils and wastes. This is aimed at the final disposal and complete elimination of entire PCBs inventory in India by 2025 and 2028, respectively. The project was designed to achieve, firstly, the removal of 7,700 tones of PCBs, PCB-containing equipment and PCB-containing mineral oils and wastes from targeted sites and transport them to disposal unit; and, secondly, the disposal of 7,700 tones PCBs, PCB-containing equipment and PCB-containing mineral oils and wastes in an environmentally sound manner using the destruction facilities set up by the project. This is being met through three facilities: (1) mobile dechlorination unit hosted by CPRI (for in situ removal and treatment of low PCB containing mineral oils) and two static facilities, respectively (2) plasma system for destruction of pure PCBs and (3) dechlorination treatment plant for low level PCBs, discarded PCB containing equipment and other PCB containing wastes. Provided these facilities will immediately be utilized to their full capacity, these would be sufficient to meet the entire requirement for treatment and disposal all PCB wastes as inventoried in the country's National Implementation Plan.

The details of the inventory developed during NIP and the suggested action plan for the country is as follows

Total quantity of PCB contaminated oil available in India as per NIP inventory ⁽¹⁾

i) Quantity of Pure PCB oils:	1,971.15 MT
ii) Quantity of PCB contaminated oils:	7,866.512 MT
Total quantity:	9,837.662 MT

The **primary scope of the project** is to provide a destruction facility of PCBs and decontamination of porous materials and Decontamination Facility of PCB in transformer oil and recycle the PCB free oil for continued further use. The mobile dechlorination facility, hosted by Central Power Research Institute (CPRI) has been commissioned and is fully operational to treat low level PCBs containing oil at owner's sites. The Static

¹ *National Implementation Plan (India) – Stockholm Convention on Persistent Organic Pollutants*, Ministry of Environment, Forests and Climate Change, 2011, <http://www.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/ctl/Download/mid/13657/Default.aspx?id=80&ObjID=11745>

facilities namely Plasma incineration (Plascon system) for destruction of pure PBs, dechlorination plant for low level PCBs and Indirect Thermal desorption (ITD) are at advance stage of commissioning to ensure:

- That the environmental impacts are minimized.
- That the resource conservation is maximized.
- The techno-economic feasibility of the Project.
- The Decontamination Facility to handle the hazardous wastes in a lawful manner.
- Prevention of accumulation of the hazardous wastes at the Facility.
- Establishment of an administrative framework and recommend the necessary infrastructure to ensure proper collection, transport, transit storage, treatment and disposal of the PCB contaminated waste.
- Minimization of the health effects associated with PCB Contaminated oil handling and management activities.
- The technical reliability of the adopted technology in terms of safety, flexibility and sustainability under local conditions.
- Minimizing waste generation.
- Compliance with regulatory requirements at every stage of transformer oil handling and treatment.

PCB Destruction Capacity

1. The facilities being installed at M/s Bhilai Steel Plant – Steel Authority of India Limited consists of static plant containing plasma incinerator (Plascon system) with capacity of 1 MT day and de-chlorination unit of capacity of 1.7 MT per batch.
 - The processing reactor of the dichlorination plant is designed to have an effective capacity of 1.7 MT/batch of 1,000 mg/kg Aroclor 1260. Five batches could run per day, the effective capacity per day, therefore, is 8.5 MT/day ($1.7 \times 5 = 8.5$ MT/day) and the yearly process capacity for this reactor is 2,040 MT/year ($8.5 \times 240 = 2040$ MT/year assuming 240 working days in a year). The designed capacity of the reactor is expected to decontaminate and destroy an estimated 3400 T of PCB contaminated electrical equipment (metal) during the demonstration phase of 4 years. The capacity of the plant is based on a mix of PCB contaminated wastes including the following matrices:

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Waste stream	Source	Fate	Units/day	Waste (kg/240 days)	Batch Size (Kg)	Batches / Day
TRANSFORMER (<10,000, 60% chlorine) (801 kg Units)	PCB	Chemical Destruction	9	127,440	1700	5
	Metal	Mineral Oil Extraction	9	296,680	9	
<8000 PCB oil from Transformers	PCB Oil	Chemical destruction	8	236,000	1700	5
	Metal	Mineral Oil Extraction	8	542,000	4336	1
2 - 49 ppm	PCB Oil	Chemical Destruction		2,040,000	1700	5
50 - 499 ppm				2,040,000	1700	5
500 – 8,000 ppm				2,040,000	1700	5
>8000 to<10000 ppm				1,200,000	1000	5
>10000to<50,000ppm				408,000	340	5

- The capacity of Plascon system for destruction of pure PCB is 45 kg/hr of PCBs containing 40% or higher PCB. The processing reactor of the plant for destruction of pure PCBs is designed to have a daily effective capacity of 1.00 MT / day. The yearly destruction capacity of pure PCBs for this is 330 MT/year. The capacity of the plant is based on pure PCB wastes (i.e. having 40+% PCB content).
- The dismantling of transformers and other equipment will result in a further waste stream of porous materials, like wood, paper, etc, which are contaminated with PCB containing oils. Hence a further indirect thermal desorption unit is being set up to remove the PCB containing oil from this porous material with a daily capacity of 1,000 kg/day. The yearly decontamination capacity of Porous material is 330 MT/year. This would

generate estimated amount of 200 MT/year low concentration PCB waste which is to then be treated in the dichlorination unit to destruct the PCBs.

The present status, as on date, of static facility at BSP is as follows:

	TASK	PROGRESS TILL DATE	PENDING WORK
1	Plascon System	<ul style="list-style-type: none"> Laying of water and air line work from source up to required location completed. Container of equipment pushed inside near the base. Plascon System placed on the base. 	<ul style="list-style-type: none"> Commissioning of system. Commissioning depends upon completion of overhead tank by BSP.
2	Process Tanks Erection	<ul style="list-style-type: none"> Inside the main equipment building the process tanks pipelines work completed. Ramky requested for Joint leakage testing and individual pump testing. 	<ul style="list-style-type: none"> Joint leakage and individual pump testing.
3	ITD Equipment	<ul style="list-style-type: none"> Erection of equipment done. Alignment work done. Pipeline work completed. 	<ul style="list-style-type: none"> Testing to be done.
4	Erection of MEE and Utilities	<ul style="list-style-type: none"> All the work completed except erection of chimney which can be done after getting building permission by BSP. 	<ul style="list-style-type: none"> Electrical testing. Commissioning depends upon completion of overhead tank by BSP.
6	Peripheral work	<ul style="list-style-type: none"> Erection of Oxygen and Argon tank has been done. Pipeline work completed. 	<ul style="list-style-type: none"> Testing to be done.
7	Instrumentation Work	<ul style="list-style-type: none"> Cable laying is completed. Testing completed. 	

- Mobile de-chlorination unit at CPRI, Bangalore has a capacity of 4 MT per batch run over 2 days, hence providing a yearly destruction capacity up to 600 MT/year

(assuming some non-operational days as the mobile facility is being moved between different locations).

As detailed below, the treatment and destruction capacity created by the project would be sufficient to destruct all inventories PCB wastes in 6.5 years – assuming continuous operation and uninterrupted supply of PCB wastes.

PCB Category	Inventory (as per updated NIP)	Destruction Capacity	Projected destruction time
Pure/ concentrated	1,972 MT	Plascon: 330 MT/yr	6.0 years
PCB contaminated oils	7,867 MT	Mobile: 600 MT/yr Static: 620 MT/yr	6.5 years

At present, it is foreseen that all technical installations will be fully commissioned, stabilized and operational at design capacity by the end of 2021 – which will leave 7 years for achieving the 2028 PCB elimination target under the Stockholm convention. It will still be doable to achieve the target, yet with little remaining margin for delays, including through late supply of PCBs and PCB wastes for disposal.

PCB Management Rules

The Government of India Gazette notification No. 835 and S.O. 1327(E)., dated 06 April, 2016 states: .

- a. The use of Polychlorinated Biphenyls in any form shall be completely prohibited by 31st December 2025.
- b. The waste Polychlorinated Biphenyls or Polychlorinated Biphenyls contaminated equipment shall be disposed of as per the provisions of the Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2008 by 31st December, 2028. Stockpiles of Polychlorinated Biphenyls, if any, shall be destroyed in environment beneficial manner by 31st December, 2028.

Owners of PCBs /organizations/utilities are not coming forward for de-chlorination of PCB oils as they have time to use PCBs up to 31st December 2025 as per the provision under the Gazette Notification on PCBs of the Ministry of Environment, Forests and Climate Change, Government of India.

In order to fulfill the target set by the Stockholm Convention on POPs to dispose of PCBs by 2028, the time left is not enough to treat and destroy PCBs inventory

Therefore, it is urged that Government of India may consider to amend the existing Gazette Notification No. 835, S.O. 1327(E), for usage of PCBs containing oil till e.g.

January 2022, and transfer of PCB and PCB contaminated oil, equipment and wastes immediately thereafter, to ensure all PCB wastes can be destructed before end of 2028.

Action Plan

Based on statistical analysis on the total number of transformers within the country’s electrical system, it is estimated that India has about 45,000 transformers of different sizes contaminated with PCBs. The large number of transformers from the generating, transmission and distribution system result in an estimated volume of 51,000 MT of PCBs contaminated mineral oil and about 102,000 MT of PCBs contaminated transformer carcasses. In order to implement the provision under Article 6 of the Stockholm Convention and Annex A, part II, the deadline for eliminating usage and decontamination of PCB-containing equipment is planned as follows:

Year	Phase-out followed by dechlorination treatment of existing PCB-containing equipment (%)
2021	10%
2023	30%
2025	50%
2026	70%
2027	80%
2028	100%

To meet above deadlines and to encourage PCBs owners to come forward early to declare their stocks and wastes, the Govt. of India may consider making provisions of financial incentive for early action on part of PCBs owners either through providing a subsidy or lower charges for using PCBs destruction facility for early birds.

Central Sector Organizations that have relevance to the project

1. Ministry of Power

- Central Electricity Authority (CEA)
- Central Power Research Institute

2. Ministry of Steel

3. Ministry of Heavy Industries.

3. Ministry of Chemical and Fertilizers.
4. Ministry of Shipping.
5. Ministry of Industries and commerce.
6. Central and State Pollution Control Boards.

The above-mentioned ministries may guide and issue necessary instructions to their subordinate offices, public sector organizations, industry, etc. to adhere to the provisions made under the PCB Gazette notification issued by the Ministry of Environment, Forests and Climate Change, Govt. of India for timely declaration of the stocks of PCBs these organizations possess and the provide a clear timelines for treatment and disposal of PCBs in environmentally sound manner using the facilities created under the project.

The Government of India may make provision for regulations to ban the PCB compounds used as additives for the manufacture of materials like paints, adhesives, varnishes, inks, electrical accessories like ballast and chokes. The inventory should be prepared for this PCB additive compounds.