REPORT

ON

On-site Dechlorination of PCB contaminated oil of XO5 transformer using CPRI mobile de-chlorination unit

Project Site : Nuclear Power Corporation of India Ltd., TAPS 1 & 2, TMS Site

Period : 02.12.2021 to 27.12.2021

Dielectric Materials Division
Central Power Research Institute
Bengaluru-560 080, India.

Work Oder No. TAPS/EM/PCB/XO5/2021-1, Dt. 16.10.2021

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Report on PCB de-chlorination activity of XO5 transformer of M/s NPCIL, TMS,TAPS 1 &2

1.0 Introduction

Polychlorinated Biphenyls (PCBs) are materials that were used as a liquid dielectrics in Power Transformers and capacitors prior 1980s. Due to their high chemical stability , hazardous properties and ability to persist in the environment, these materials have serious pollution potential. These chemicals are classified under Persistent Organic Pollutants (POPs). Such materials, if left untraced or identified, will continue contaminating food, water, soil and bio-accumulating for very long periods. Therefore, if proper care is not taken in the collection and safe disposal of these materials, the cost incurred to correct the consequences will be very high.

Awareness about pollution and toxicity of PCBs had resulted in the international treaty, "Stockholm Convention on Persistent Organic Pollutants". Under this convention more than 160 countries have resolved to eliminate such polluting materials from their countries. India is also a signatory to this convention and is obliged to eliminate these types of materials. Under the guidelines of MoEFCC (Ministry of Environment, Forest and Climate Change) and UNIDO (United Nations Industrial Development Organization), the project " Reduction and Elimination of PCBs, prioritizing the Power sector in India" has been taken up. Central Power Research Institute (CPRI) has been identified as the nodal organization for coordinating the disposal activity in the country.

2.0 Background :

CPRI has sent letters to M/s NPCIL, TMS for undertaking the PCB de-chlorination activity. Letter enclosed. (A**nnexure 1**)

CPRI team visited M/s NPCIL, TMS on 09.05.2017 to have detailed technical discussions for undertaking the PCB de-chlorination activity at M/s NPCIL, TAPS 1 & 2. (**Annexure 2**).Submitted Budgetary offer for treating 161.0 kL of PCB contaminated oil. Copy enclosed. (**Annexure 3**)

Work Order (No: **TAPS/EM/PCB/X05/2021-1, Dt. 16.10.2021)** was received from M/s NPCIL for undertaking the PCB de-chlorination activity of XO5 transformer of 26.4 KL in first phase. Copy enclosed (**Annexure 4**)

3.0 Work done :

On 29.11.2021 : The Volvo truck with PCB de-chlorination unit left CPRI, Bengaluru to M/s Nuclear Power Corporation Ltd., TAPS 1 & 2, TMS, Boisar, Maharashtra.

On 02.12.2021 : The truck reached Tarapur and after necessary gate entry arrangements, the mobile unit was taken inside the M/s NPCIL premises. (Fig. 1)

On 04.12.2021 and 06.12.2021 : M/s NPCIL had organized training on ***"Industrial safety and Height Pass"*** for the PCB staff and PCB staffs are well informed about the safety aspects.

0n 06.12.2021 : PCB accessories truck (19 ft. truck) reached the site and unloaded the following items (Fig.1). With the instructions of M/s NPCIL, all sodium dispersion barrels were kept in safe custody

and necessary safety precautions were kept in place near the plant.

Organized a training program on "Condition Monitoring of Transformers using Oil Analysis and Safe Handling of PCB Contaminated Oils in Transformers" for the staff of TAPS 1 & 2 at NPCIL, TMS.

1.	Step Down transformer-1 No.	7.	Chain Pulley – 1 No
2.	New transformer oil- 400 lts.	8.	Air Stack – 1 No
3.	Sodium dispersion – 250 kg. (4 drums of 100 ltr capacity)	9.	Gas Cylinder Manifold – 1 No
4.	Connecting hose pipes for de-chlorination unit : 11 Nos.	10.	Mixer – 1 No
5.	Ladders – 5 Nos.	11.	Hand Pump – 1 No
6.	Distribution Box – 1 No.	12.	Spare parts of de-chlorination unit

Fig. 1: Accessories such as step down transformer, ladders, mixer, chain pulley, air stack, nitrogen gas manifold for the PCB dechlorination activity was transported to M/s NPCIL by hiring a 19 ft. truck.

M/s NPCIL officials, Shri. Tapas Kumar Dey, SME(E), Shri Nirjhar Basu, SO/E, Shri P.R.Jundhare, SO/E and Shri D.B.Gupta, SO/D, had coordinated the activity.

The following team members were involved in the PCB de-chlorination activity and the team reached site on 06.12.2021. (Fig.2)

1. Shri. Sadasiva Murthy P., Joint Director, DMD, CPRI.
2. Shri. Thilak A, Project Engineer, PCB Project.
3. Shri. Anil Chavan , Project Engineer, PCB Project.
4. Shri. Tom Jose , Project Engineer, PCB Project.
5. Shri. Chethan Kumar B, Technician, PCB project.
6. Shri. Santhana Kumar, Driver, PCB project.
7. Shri Satheesh Kumar, Driver, PCB project

केन्द्रीय विद्युत अनुसंधान संस्थान
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)
प्रो.सर.सी.वी. रमन रोड, सदाशिवनगर डाक घर, पो.बा.सं. 8066, बेंगलूरु – 560 080
CENTRAL POWER RESEARCH INSTITUTE
(A.Govt.of India Society, Ministry of Power)
Prof. Sir C.V. Raman Road, Sadashivanagar Post Office, P.B. No. 8066, Bengaluru - 560 080 India
वेबसाइट / website :http://www.cpri.in

DIELECTRIC MATERIALS DIVISION

Ref. No. CPRI/DMD/2021/NPCIL - GP

Date: 26.11.2021.

Dr.P. Thomas,
Additional Director

The Station Director
NPCIL,TAPS
Boisar Dist.Palghar
Maharashtra -401504

Dear Sir,

Subject: Issue of Gate Pass

This is to bring to your notice that the following personals with designation and other details are given below in the table are currently working in CPRI. Presently they are engaged in the PCB project titled as "Reduction and Elimination of PCBs, prioritizing the power sector in India" sponsored by United Nations Industrial Development Organization (UNIDO) & Ministry of Environment Forest and Climate Change (MoEFCC). These staff are visiting M/s.NPCIL,TAPS for undertaking PCB dechlorination work as per W.O.No: TAPS/EM/PCB/XO5/2021-1,Dt.16.10.2021.The whole team will be working at M/s.NPCIL,TAPS from 02.12.2021 to 27.12.2021.It is requested that the team may please be allowed to carry out PCB dechlorination activity. After completing the work, the report needs to be submitted to Secretary/Joint Secretary, Ministry of Environment Forest and Climate Change (MoEFCC), New Delhi.

STAFF DETAILLS

Sl. No.	NAME	DESIGNATION	S/O	AADHAAR NO	AGE
1	P. SADASIVA MURTHY	JOINT DIRECTOR	P.V.SUBRAHMANYAM	549653320194	57
2	ANIL CHAVAN	PROJECT ENGINNER	HARISHCHANDRA	606223565659	26
3	TOM JOSE	PROJECT ENGINNER	T K JOSE	279411502232	26
4	TILAK A	PROJECT ENGINNER	ANANDHAN	670767571259	31
5	CHETHAN KUMAR	TECHNICIAN	BYRAPPA	320659504055	30
6	SANTHANA KUMAR	DRIVER	GOMATHI	374488334224	31
7	SATISH KUMAR	DRIVER	MUTHUPANDIAN	798894183135	32

And also we confirm that authenticity with respect to security is guaranteed by us.

In view of this, it is requested that to issue regular gate pass for the above staff for the above period without police verification certificate.

Thanking you,

Yours Sincerely,

(Dr. P.Thomas)
Additional Director

Fig.2: CPRI team members deputed to M/s.NPCIL, TAPS 1 &2

3.1 Setting up of the PCB de-chlroination plant :

On 07.12.2021 : Volvo puller of the mobile unit was dismantled from the PCB de-chlorination unit and the PCB de-chlorination unit was stationed near XO5 transformer, at M/s.NPCIL. The unit was levelled with support of jack system. (Fig. 3)

The accessories such as step down transformer, ladders, mixer, chain pulley, air stack, nitrogen gas manifold was assembled and made ready for the operation.

After the power connection and setting up of the plant, the mobile PCB de-chlorination unit was checked for leakage of pipe lines, and electrical connections in control panel before the commencement of operation. Everything was found to be ok.

On 08.12.2021 : Loaded 3.75 Kl of PCB contaminated oil to the reactor.

On 09.12.2021 : While heating the PCB contaminated oil, leakage has been observed near the gasket of the reactor and action has been taken to replace with new rubber gasket.

Fig. 3 : Placement of PCB mobile de-chlorination unit

3.2 Storage of PCB contaminated oil:

The total quantity of PCB oil to be treated is 23.54 KL. The XO5 transformer (out of service) that was not in operation containing around 19.62 KL of PCB contaminated oil & around 3.92 KL flushing of PCB contaminated transformer with new oil was transferred & stored in 3 Nos. of plastic storage tanks of each 5000 ltrs .

The 23.54 KL of PCB contaminated oil from the plastic tanks were transferred into the reactor under vacuum. As the capacity of the plant is 4.5 KL per batch, the oil from the tank was drawn to the reactor for carrying out each batch of de-chlorination work.

3.3 Sodium Dispersion Preparation Process:

Around 250 kg of Sodium dispersed in oil was prepared using sodium dispersion unit stationed at CPRI, Bengaluru. The details of the sodium dispersion prepared is given in the below Table.

Table 1: Details of Sodium Dispersed in oil

Batch No.	Date.	Batch size in Kg.	Sodium metal in Kg.	Oil in Kg.	Sodium dispersion preparation in Hrs.	Particle size in microns
1.	16.11.2021 to 20.11.2021	250	100	150	24	10-15
Total: 250 Kg						

Optical microscope image analysis is carried out to measure the particle size for the sodium dispersed oil and optical image of the size of the particle (Fig. 4) is given below:

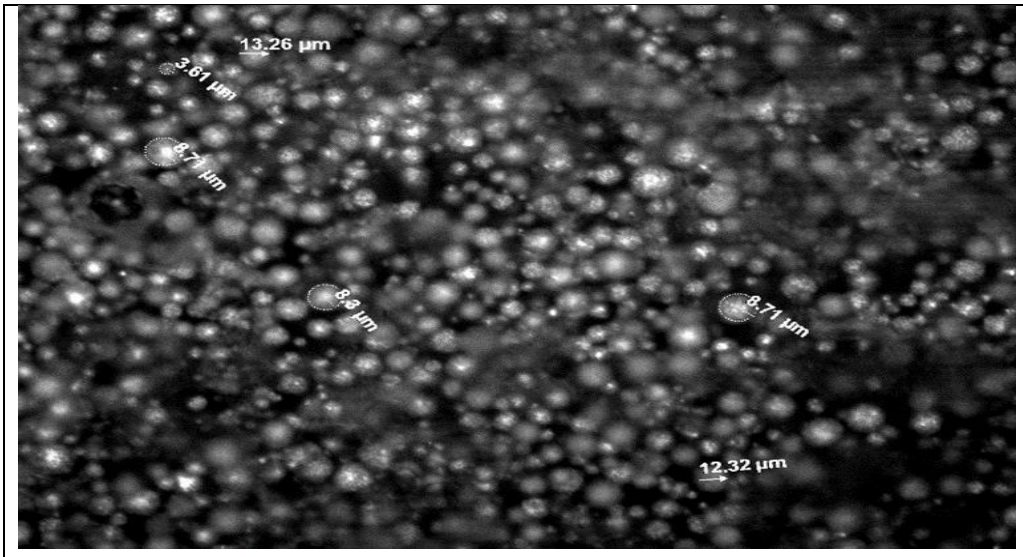


Fig. 4 : Particle size of Sodium Dispersed (NaD) oil

3.4 PCB de-chlorination Process :

23.54 KL of PCB contaminated oil of XO5 transformer was de-chlorinated in six batches with various batch sizes from 3700 to 4500 KL.

PCB de-chlorination process was carried out by loading a known volume of PCB contaminated oil into the reactor. The oil was passed through two heaters and degasifier, where water and volatile compounds were removed. This PCB contaminated oil was stirred for one hour at a temperature of 120ºC and a sample was drawn from the reactor to check the initial concentration of PCB content. 300 kgs of Sodium dispersed oil (NaD) was loaded to sodium storage tank. (Fig. 5) Depending upon the initial concentration of PCB content in the oil, calculated amount of sodium dispersed in oil (NaD) was added from sodium storage tank to the reactor.

The PCB de-chlorination reaction was carried out at a temperature of 120 ºC under nitrogen purging in the reactor. The samples were drawn at every hour and analyzed using GC-ECD to check the level of PCB content as per IEC 61619. The reaction was continued till the PCB content less than 2 ppm is achieved.

After the completion of reaction, excess of sodium in the reaction vessel was neutralized by adding water and the hydrogen gas released during the neutralization is purged with nitrogen and vented to the atmosphere. Then the treated oil containing sludge in the reaction vessel is transferred to the settling tank.

The treated oil containing sludge, was kept for one day to separate sludge by gravity and it was settled at the bottom of the settling tank. The sludge generated in the PCB de-chlorination contains sodium chloride, sodium hydroxide, water and biphenyls and this was drained into barrels and kept in safe custody for disposal. The treated oil from the settling tank also drained to the barrels .

Fig. 5: Loading of Sodium dispersed oil (NaD) to storage tank

From 10.12.2021 to 23.12.2021 : The PCB de-chlorination activity was commenced on 10.12.2021 and completed on 23.12.2021 . The Batch wise details are given in Table 2. The PCB analysis was carried out on all batches before and after the de-chlorination. The PCB analysis reports of each Batch 1 to 6 are enclosed. (**Annexure 5**) Around 23.49 KL oil was treated.

Table 2: Details of PCB de-chlorination activity

Batch No.	PCB contaminated oil (liters)	Date of De-chlorination		PCB concentration (ppm)	
		Start	End	Before Treatment	After Treatment
#1	3750	10.12.2021	13.12.2021	53	0.26
#2	4000	14.12.2021	15.12.2021	43	0.55
#3	4018	15.12.2021	18.12.2021	41	1.10
#4	3711	18.12.2021	20.12.2021	46	0.31
#5	3618	20.12.2021	22.12.2021	43	0.45
#6	4442	21.12.2021	23.12.2021	36	0.26
Total	23539				

After removal of PCB contaminated oil, the XO5 transformer and storage tanks, were flushed using fresh oil for cleaning trapped contaminations. After flushing, the flushed oil PCB content was checked and found 0.27 ppm. Hence the transformer internals are free from PCB contaminations.

It is to be noted that after de-chlorination of 23.49 KL of PCB contaminated oil around 14 barrels of sludge with water has been generated. These sludge generated is hazardous in nature needs to be disposed off to the recyclers authorized by State Pollution Control Board. This responsibility lies with M/s NPCIL.

On 24.12.2021 : After completion of the PCB dechlorination activity at TAPS 1 & 2 site, the Volvo truck with PCB de-chlorination unit and accessories vehicle were left the site.

3.5 Awareness Program

The PCB team led by Shri P.Sadasiva Murthy conducted training program on "Condition Monitoring of Transformers using Oil Analysis and Safe Handling of PCB Contaminated Oils in Transformers" for the staff of TAPS 1 & 2 at NPCIL, TMS on 06.12.2021.

In the awareness program the following points were came under discussion and the booklet titled as "Reduction and Elimination of PCB's prioritizing the Power Sector in India" were distributed.

- safe handling of PCB contaminated oil in transformers, risks involved, health aspects,
- Basel convention and Stockholm convention regarding,
- Initiatives taken by our country in this regards.
- PCB inventories in the country the necessity to continue the inventorisation in the country, safety guidelines in PCB management,
- PCB destruction technologies and suitability of adoption into the country,
- PCB regulatory frame work in the country,
- The need for the working engineers to facilitate the PCB management and the final disposal of PCB's in the country.

After the successful completion of PCB de-chlorination activity of 23.49 KL of PCB contaminated oil of XO5 transformer of NPCIL, TAPS 1 & 2 site, a meeting was held between CPRI officials and M/s NPCIL officials. The minutes of meeting was signed by CPRI & M/s NPCIL officials. The same is enclosed . (**Annexure 6)**

On 27.12.2021 : After completing the necessary formalities at M/s. NPCIL, TAPS 1 &2 , the CPRI team left the site .

4.0 Conclusion

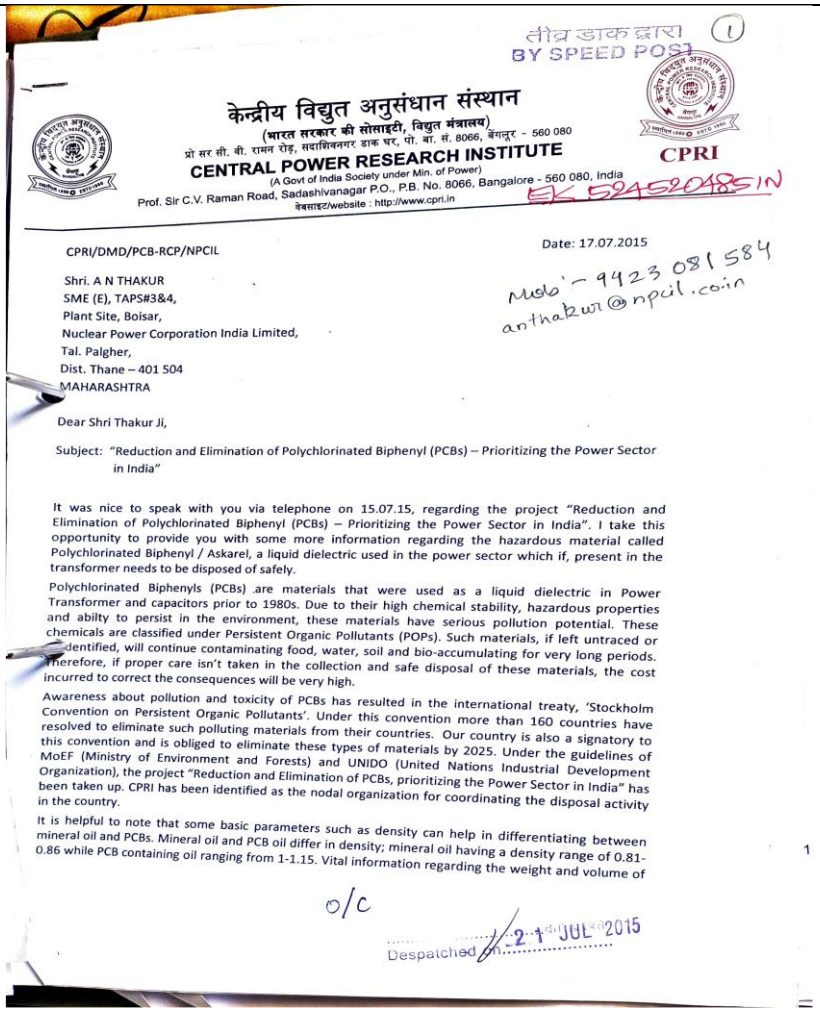
CPRI has been successfully completed 23.49 KL of PCB contaminated of XO5 transformer (Make : GE, Sl. No.D577809) against work order No. TAPS/EM/PCB/XO5/2021-1, Dt. 16.10.2021 using onsite PCB mobile dechlorination plant at M/s. NPCIL, TAPS 1 & 2 campus.

PCB content of the flushed oil of the XO5 transformer was 0.27 ppm and the transformer internals are free from PCB contaminations.

The sludge (i.e.14 drums of sludge with water) generated during the de-chlorination process was submitted to NPCIL. NPCIL is the responsibility to dispose the sludge as per pollution control board norms and produce disposable certificate to CPRI .

xxxxxxxx

Annexure 1 (Letter)



तीव्र डाक द्वारा (1)
BY SPEED POST

केन्द्रीय विद्युत अनुसंधान संस्थान
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)
प्रो सर सी. वी. रामन रोड़, सदाशिवनगर डाक घर, पो. बा. सं. 8066, बेंगलूर - 560 080
CENTRAL POWER RESEARCH INSTITUTE
(A Govt of India Society under Min. of Power)
Prof. Sir C.V. Raman Road, Sadashivanagar P.O., P.B. No. 8066, Bangalore - 560 080, India
वेबसाइट/website : http://www.cpri.in
CPRI
EK 594204 85 IN

CPRI/DMD/PCB-RCP/NPCIL

Date: 17.07.2015

Shri. A N THAKUR
SME (E), TAPS#3&4,
Plant Site, Boisar,
Nuclear Power Corporation India Limited,
Tal. Palgher,
Dist. Thane – 401 504
MAHARASHTRA

Mob – 9423 081 584
anthakur@npcil.coin

Dear Shri Thakur Ji,

Subject: "Reduction and Elimination of Polychlorinated Biphenyl (PCBs) – Prioritizing the Power Sector in India"

It was nice to speak with you via telephone on 15.07.15, regarding the project "Reduction and Elimination of Polychlorinated Biphenyl (PCBs) – Prioritizing the Power Sector in India". I take this opportunity to provide you with some more information regarding the hazardous material called Polychlorinated Biphenyl / Askarel, a liquid dielectric used in the power sector which if, present in the transformer needs to be disposed of safely.

Polychlorinated Biphenyls (PCBs) are materials that were used as a liquid dielectric in Power Transformer and capacitors prior to 1980s. Due to their high chemical stability, hazardous properties and abilty to persist in the environment, these materials have serious pollution potential. These chemicals are classified under Persistent Organic Pollutants (POPs). Such materials, if left untraced or unidentified, will continue contaminating food, water, soil and bio-accumulating for very long periods. Therefore, if proper care isn't taken in the collection and safe disposal of these materials, the cost incurred to correct the consequences will be very high.

Awareness about pollution and toxicity of PCBs has resulted in the international treaty, 'Stockholm Convention on Persistent Organic Pollutants'. Under this convention more than 160 countries have resolved to eliminate such polluting materials from their countries. Our country is also a signatory to this convention and is obliged to eliminate these types of materials by 2025. Under the guidelines of MoEF (Ministry of Environment and Forests) and UNIDO (United Nations Industrial Development Organization), the project "Reduction and Elimination of PCBs, prioritizing the Power Sector in India" has been taken up. CPRI has been identified as the nodal organization for coordinating the disposal activity in the country.

It is helpful to note that some basic parameters such as density can help in differentiating between mineral oil and PCBs. Mineral oil and PCB oil differ in density; mineral oil having a density range of 0.81-0.86 while PCB containing oil ranging from 1-1.15. Vital information regarding the weight and volume of

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o/c

Despatched on 21 JUL 2015

oil can be obtained from the name plate. Further, these oils are known by their brand names such as Aroclor, Clophen, Sovtol, Sovol, Asbestol, Delor, Samtotherm, Phenoclor, Pyralene, Pyroclor, Apirolio, Fenclor, Bakola131, Hydol, Inerteen, Noflamol, Saf-T-Kuhl, Chlorextol-Alis-Chalmers, Therminol, Pyranol, Pyrenol, Chlorinol, Askarel, Ascarel, Kanechlor.

Right now we are nearing the completion of inventory of PCBs contaminated oil in the country and we are in the final phase of the disposal of the oil in an environmentally friendly manner. We now need to prepare a complete inventory of the PCBs contaminated oils at NPCIL as well as make an assessment of the accessibility of the mobile decontamination facility (to be brought to site for cleaning the affected transformers) to the PCBs filled oil transformers.

Therefore, we request you to kindly get each batch of such waste oils tested for possible contamination by PCBs. Any information regarding the same and if possible along with a sample (about 100 ml removed from the suspected equipment) is all that is needed to analyse for PCB. As already discussed, our PCB team has proposed to visit your organization on 28th July 2015 for the inspection of transformer which are older than 1980's and to collect about 150 ml oil from suspected transformers, later to be analyzed for the presence of PCBs in CPRI laboratory (analysis costs charged to UNIDO).

You are requested to confirm acceptance of the proposed visit of the PCB team (Project Staff namely, Ms. Bhagyashree A Fulzele and Ms. Rajeshwari C P) from CPRI. They will be bringing the sampling bottles and other protective items such as gloves, masks etc. They would also like to have a discussion with yourself and your staff involved with electrical equipment maintenance and give brief PCB Awareness programme presentation (power point).

In this regard, we request you to kindly provide us with the list of all the transformers in your organization that was manufactured prior to the 1980s. We also request you to enclose the list with the following details regarding the listed transformers: (1) Name of the manufacturer (2) Year of manufacture (3) Brand and weight of the transformer oil and (4) Volume of the transformer oil. Most of the information would be available on the nameplate of the transformer or in your records.

Your help and support will go a long way for us to meet with this noble cause and goal. We sincerely appreciate your involvement and cooperation in the management of such hazardous materials in our country

I look forward to hear from you. You are most welcome to contact me if you need additional information.

Thanking You

Yours Sincerely

(V V Pattanshetti)
(Joint Director and HOD)
Dielectric Materials Division
Mobile: 09449836878
Email: vvpattan@cpri.in, vvpattan@gmail.com

Letter to M/s NPCIL- reg. PCB dechlorination activity.

Annexure 2 (Minutes of Meeting -09.05.2017)

NUCLEAR POWER CORPORATION OF INDIA LTD
(भारत सरकार का उद्यम A Government of India Enterprise)
तारापुर महाराष्ट्र स्थल Tarapur Maharashtra Site
तारापुर परमाणु बिजलीघर-1 2
TARAPUR ATOMIC POWER STATION 1-2
डाक: टीएपीपी, बोईसर (प.रे.), ता. पालघर, जिला: पालघर (महाराष्ट्र)-401504
PO: TAPP, Boisar (WR), Tal. Palghar, Dist. Palghar, Maharashtra – 401 504
CIN:U40104MH1987GOI149458

May 9, 2017

Sub: Decontamination of PCBs from Transformer Oil at TAPS 1&2.

The meeting was held with M/s. CPRI, Bangalore at TAPS 1&2, Conference Room regarding decontamination of PCBs from Transformer oil at TAPS 1&2. Following members from NPCIL & CPRI were present:

From NPCIL	From CPRI, Bangalore
1. Shri V.S. Daniel, SD, TAPS 1&2	1. Shri V. V. Pattanshetti , Addl. Director
2. Shri Manoj Joshi, CS, TAPS 1&2	2. Dr. P. Thomas, Jt. Director
3. Shri N.S. Gulavani, MS, TAPS 1&2	
4. Shri K.P. Singh, CE (E&T), NPCIL-HQ	
5. Shri A.K.Mittal, SME(E), TAPS 1&2	

Following are the gist of discussions:

1. CPRI informed that transformer oil containing PCB > 50 ppm is to be treated by the year 2025 and oil having PCB below 50 ppm may continue in service till decommissioning of the transformer.
2. Re-sampling of transformer oil including spare GT for testing at CPRI, Bangalore. (May 2017).
3. Visit to CPRI by TAPS representative to witness the testing of oil.
4. Work order documents of de-chlorination activity to be taken up in July 2017, at Bhadravati steel plant will be shared with TAPS.
5. Visit to Bhadravati steel plant by TAPS Engineer to get familiarize with the decontamination activity.
6. The road map for decontamination of oil was presented to CPRI & HQ representative. The activity will be completed by 2023.
7. Procurement of oil storage tanks, fresh oil, valves to be done by TAPS.
8. Necessary co-ordination for storage and decontamination activity from pollution control boards, central and state statutory bodies will be taken care by CPRI as required.
9. CPRI agreed to share specifications for oil storage tanks.

9.5.17
(K.P. Singh)
CE (E&T), NPCIL-HQ

9.5.17
(N.S. Gulavani)
MS, TAPS 1&2

9/5/17
(V.V. Pattanshetti)
Addl.Director, CPRI

9/5/17
(Dr. P. Thomas)
Jt. Director, CPRI

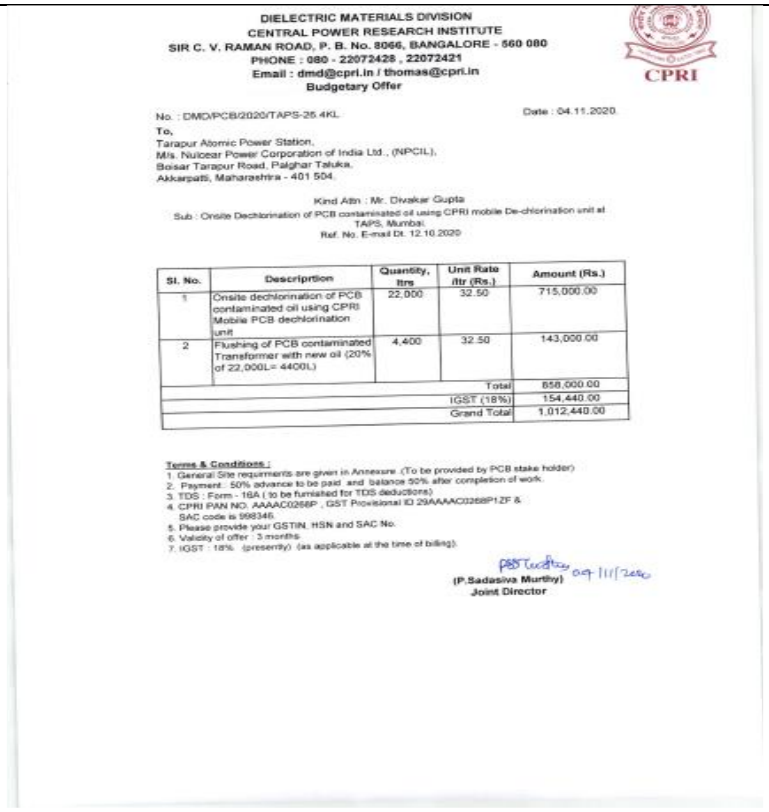
SME(E) for inf. 11/5/2017

back to AKM/PCB (PCB)

c.c. CS/SD for inf. & back to SME(E)'s office.

Technical Discussions on 09.05.2017 on PCB de-chlorination activity with NPCIL officials

Annexure 3 (Budgetary Offer)



DIELECTRIC MATERIALS DIVISION
CENTRAL POWER RESEARCH INSTITUTE
SIR C. V. RAMAN ROAD, P. B. No. 8066, BANGALORE - 560 080
PHONE : 080 - 22072428 , 22072421
Email : dmd@cpri.in / thomas@cpri.in
Budgetary Offer

CPRI

No. : DMD/PCB/2020/TAPS-25.4KL Date : 04.11.2020.

To,
Tarapur Atomic Power Station,
M/s. Nulcear Power Corporation of India Ltd., (NPCIL),
Boisar Tarapur Road, Palghar Taluka,
Akkarpatti, Maharashtra - 401 504.

Kind Attn : Mr. Divakar Gupta
Sub : Onsite Dechlorination of PCB contaminated oil using CPRI mobile De-chlorination unit at TAPS, Mumbai.
Ref. No. E-mail Dt. 12.10.2020

Sl. No.	Descriprtion	Quantity, ltrs	Unit Rate /ltr (Rs.)	Amount (Rs.)
1	Onsite dechlorination of PCB contaminated oil using CPRI Mobile PCB dechlorination unit	22,000	32.50	715,000.00
2	Flushing of PCB contaminated Transformer with new oil (20% of 22,000L= 4400L)	4,400	32.50	143,000.00
			Total	858,000.00
			IGST (18%)	154,440.00
			Grand Total	1,012,440.00

Terms & Conditions :
1. General Site requirments are given in Annexure. (To be provided by PCB stake holder)
2. Payment : 50% advance to be paid and balance 50% after completion of work.
3. TDS : Form - 16A (to be furnished for TDS deductions)
4. CPRI PAN NO. AAAAC0268P , GST Provisional ID 29AAAAC0268P1ZF & SAC code is 998346.
5. Please provide your GSTIN, HSN and SAC No.
6. Validity of offer : 3 months
7. IGST : 18% (presently) (as applicable at the time of billing).

04/11/2020
(P.Sadasiva Murthy)
Joint Director

DIELECTRIC MATERIALS DIVISION
CENTRAL POWER RESEARCH INSTITUTE
SIR C. V. RAMAN ROAD, P. B. No. 8066, BANGALORE - 560 080
PHONE : 080 - 22072428 , 22072421
Email : dmd@cpri.in / thomas@cpri.in
Budgetary Offer

CPRI

No. : DMD/PCB/2020/TAPS-166.8 Date : 04.11.2020.

To,
Tarapur Atomic Power Station,
M/s. Nulcear Power Corporation of India Ltd., (NPCIL),
Boisar Tarapur Road, Palghar Taluka,
Akkarpatti, Maharashtra - 401 504.

Kind Attn : Mr. Divakar Gupta
Sub : Onsite Dechlorination of PCB contaminated oil using CPRI mobile De-chlorination unit at TAPS, Mumbai.
Ref. No. E-mail Dt. 12.10.2020

Sl. No.	Descriprtion	Quantity, ltrs	Unit Rate /ltr (Rs.)	Amount (Rs.)
1	Onsite dechlorination of PCB contaminated oil using CPRI Mobile PCB dechlorination unit	139,000	32.50	4,517,500.00
2	Flushing of PCB contaminated Transformer with new oil (20% of 139,000L= 27800L)	27,800	32.50	903,500.00
			Total	5,421,000.00
			IGST (18%)	975,780.00
			Grand Total	6,396,780.00

Terms & Conditions :
1. General Site requirments are given in Annexure. (To be provided by PCB stake holder)
2. Payment : 50% advance to be paid and balance 50% after completion of work.
3. TDS : Form - 16A (to be furnished for TDS deductions)
4. CPRI PAN NO. AAAAC0268P , GST Provisional ID 29AAAAC0268P1ZF & SAC code is 998346.
5. Please provide your GSTIN, HSN and SAC No.
6. Validity of offer : 3 months
7. IGST : 18% (presently) (as applicable at the time of billing).

04/11/2020
(P.Sadasiva Murthy)
Joint Director

Budgetary Offer submitted on 04.11.2020

Annexure

PCB Dechlorination unit : Batch Process.
Batch Capacity : 3.5 to 4.0 KL of oil per batch
Duration : 2 days per batch.

General Site Requirements for undertaking PCB de-chlorination activity.

1) **Placement of vehicle** (Size : 40 feet in length x 12 feet in height x 8 feet in width, weight : 30 MT) : Leveled concreted pad / Hard Surface platform with lightning protection
2) **Power supply**: 3-phase, 430V, 340 Amps, 260kW, frequency 50Hz, with solid earth facility.
3) **Water facility**: 200 - 300 liters per day.
4) **Safety** : Suitable firefighting system, such as Sodium bicarbonate for PCB dechlorination, additional firefighting system (Fire Hydrant) near the plant
5) **Storage Tanks** : 2 Nos. of each 5KL capacity (one for storage of PCB contaminated oil and another for PCB decontaminated oil)
6) **3 HP Motor**: 1 No. (For transferring PCB contaminated oil from drums to 5KL tank).
7) **New Mineral Insulating oil (PCB free)**: Sufficient quantity of oil for flushing of PCB transformer (at least two times flushing i.e. 20% of the total transformer capacity). (**if required**)
8) PCB contaminated oil is to be provided near to the PCB dechlorination unit is the responsible of PCB stake holder.
9) **Storage drums**: Sufficient quantity of empty drums to be provided to store treated oil and sludge generated during the process.
10) **Sludge disposal**: As per pollution control board norms by PCB stake holder.
11) **Site office/ Testing laboratory**: one room (app. 10 feet x 20 feet) with table, chair and water facility.
12) **Storage Room**: one room (App. 20 feet x 20 feet) to store sodium metal dispersed in oil drums, process chemicals and PCB unit accessories with suitable safety.
13) **Accommodation**: Free lodging facility to be provided for 6 Nos. (3 officers, 2 technicians and 1 Driver)
14) **Local conveyance** : Pickup and drop facility for PCB project team from Guest house to place of work
15) **Nitrogen cylinders** : 3 Nos per batch
16) **Contract Labors** : 2 Nos.

1

General site requirement for carrying out PCB de-chlorination activity

Annexure 4 (Work Order)

न्यूक्लियर पॉवर कॉर्पोरेशन ऑफ इंडिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम A Government of India Enterprise)
तारापुर महाराष्ट्र स्थल Tarapur Maharashtra Site
तारापुर परमाणु बिजलीघर 1व 2
TARAPUR ATOMIC POWER STATION 1&2
डाक : टीएपीपी, बोईसर (प.रे), जिला : पालघर (महाराष्ट्र) 401 504
: TAPP, Boisar (WR), Dist.Palghar, Maharashtra – 401504
CIN:U40104MH1987GOI149458
(MAINTENANCE UNIT)

KVSN Murthy,
Maintenance Superintendent
Telefax: 02525-264488, Mob. : 9423982788
Email: kvsnmurthy@npcil.co.in

No. TAPS/EM/PCB/XO5/2021-1

Date: 16.10.2021

To,
M/s. Central Power Research Institute,
(A Govt. of India Society, Min. of Power),
Prof. Sir C.V. Raman Road, Sadashivnagar P.O.,
P.B. No. 8066, Bangalore – 560 080.
e-mail: dmd@cpri.in / thomas@cpri.in

Kind attention: Dr. P Thomas / P.Sadasiva Murthy

Sub: On-site dechlorination and testing of PCB contaminated oil using CPRI mobile de-chlorination unit at TAPS 1&2, TMS, NPCIL.

Ref: i) TAPS email dt. 03.02.2021 and 12.10.2020
ii) CPRI budgetary offer no. DMD/PCB/2021/TAPS26.4 dt. 08.02.2021
iii) CPRI e-mail dated

.....

Dear Sir,

Please refer to your offer No. DMD/PCB/2021/TAPS26.4 dt. 08.02.2021 for On-site dechlorination of PCB contaminated oil using CPRI mobile de-chlorination unit at TAPS 1&2, TMS, NPCIL for 26.4kL (22kL+4.4kL) oil. Your offer for the above testing has been accepted by competent authority at a total cost of ₹10,12,440 (Rupees Ten Lakhs Twelve Thousand Four Hundred and Forty Only) including GST as per Annexure-I on behalf of Nuclear Power Corporation of India Ltd. As per the terms and conditions as given below:

1.0 Scope of work:
1.1 The schedule of quantities as per Annexure-I & scope of work shall be as per Annexure-II enclosed.

NPCIL Work Order No. : **TAPS/EM/PCB/X05/2021-1, Dt. 16.10.2021**

1.2 "PCB Dechlorination of PCB contaminated oil" is to be started within a month from the date of draining of transformer oil, as communicated by Engineer In Charge.

1.3 Transformer oil draining is planned tentatively in the month of Novenmer-2021. However exact date of oil draining will be informed to you at least two weeks in advance.

1.4 Your persons have to report at TAPS 1&2 site as per the date decided later, along with test instruments and Dechlorination equipments.

1.5 The draining of PCB contaminated oil and flushing of transformer has to be guided by CPRI. Also clearance for filling new mineral insulating oil after transformer flushing, has to be provided by CPRI through e-mail / letter. After de-contamination work, CPRI has to issue contamination free certificates batchwise, so that the oil can be disposed without attracting any PCB related statutory restriction.

1.6 During and after dechlorination activity, CPRI has to return de-chlorinated oil and generated sludge under the custody of TAPS 1&2, NPCIL. Batchwise PCB free certificate has to be issued to TAPS 1&2, NPCIL so that the oil can be disposed without attracting any PCB related statutory restriction.

2.0 Duration of work:

2.1 The De-chlorination activity should be completed within 90 days from the date of commencement. The tentative date for start of work is during 3rd week of November-2021. However actual date will be intimated to you at least 2 weeks prior.

2.2 The Final activity reports should be submitted within 30 days after completion of the work.

3.0 Payment Terms:

3.1 100% payment shall be released within 30 days after completion of work, issue of PCB contamination free certificate and receipt of your final reports. You are required to submit your bill in triplicate along with final test reports.

3.2 There will not be any deduction towards Security Deposit for this work.

3.3 Final payment will be done on production of NOCs from CISF and Guest House.

3.4 You shall submit your RTGS details along with Bank Account details along with your valid E-mail ID for E-transfer of payment to you.

3.5 GST@18% shall be reimbursed against submission of GST invoice.

4.0 Provision of following facilities / activities are under the scope of TAPS 1&2, NPCIL without any additional charges:

4.1 **Transformer overhaul:** The transformer overhaul, dehydration, oil draining and filling are under the scope of NPCIL.

4.2 **Procurement and supply of New Mineral Insulating oil (PCB free):** After transformer flushing and overhaul, new mineral insulating oil (PCB free) will be filled in transformer by TAPS-1&2, NPCIL, after getting clearance from CPRI. Also the transformer flushing activity will be carried out by TAPS-1&2 NPCIL, with the guidance from CPRI. Arrangement of new oil for filling inside the transformer and flushing is under the scope of TAPS-1&2 NPCIL.

4.3 **Providing place for keeping de-chlorination mobile facility** (Size: 40 feet in length x 12 feet in height x 8 feet in width, weight : 30 MT).

4.4 **Provision of Power Supply:** 3 phase, 430V, 340 Amps, 26 W, frequency 50Hz, with solid earth facility will be provided by TAPS-1&2 NPCIL.

4.5 **Provision of Water facility:** 200-300 liters per day will be provided by TAPS-1&2 NPCIL.

4.6 **Provision of Safety:** Suitable firefighting system, such as sodium bicarbonate for PCB de-chlorination, additional firefighting system (Fire Hydrant) near the plant will be provided by TAPS-1&2 NPCIL.

4.7 **Provision of Storage Tanks:** for storage of PCB de-chlorinated oil will be provided by TAPS-1&2 NPCIL.

4.8 **Provision of Storage drums:** Sufficient quantity of empty drums to be provided by TAPS-1&2 NPCIL to store de-chlorinated oil and sludge generated during the process.

4.9 **Provision of Site Office/Testing Laboratory:** one room with table, chair facility will be provided by TAPS-1&2 NPCIL.

4.10 **Provision of Storage Room:** one room to store sodium metal dispersed in oil drums, process chemicals and PCB unit accessories with suitable safety will be provided by TAPS-1&2 NPCIL.

4.11 **Provision of Accommodation:** fee lodging facility to be provided for 6 nos. (3 officers, 2 technicians and 1 driver) will be provided by TAPS-1&2 NPCIL.

4.12 **Provision of Local conveyance:** Pickup and drop facility for PCB project team from Guest House to place of work will be provided by TAPS-1&2 NPCIL.

4.13 **Provision of Nitrogen cylinders:** 3 nos. per batch will be provided by TAPS-1&2 NPCIL.

4.14 Provision of 3 HP motor (1 No.) will be provided by TAPS-1&2 NPCIL :For transferring PCB contaminated oil from drums to 5 KL tank.

4.15 Contract labors : 2 Nos. will be provided by TAPS-1&2 NPCIL

5.0 Your Engineers/Supervisors shall report on duty wearing normal work wear which means wearing shirts, trousers and shoes.

6.0 Shri Nirjhar Basu, Scientific Officer - E will be the Engineer-in-charge to look after the PCB decontamination and testing work.

7.0 In the event of any dispute or disagreement regarding implementation of terms and conditions, the scope of work etc. the decision of the Station Director TAPS 1&2, NPCIL will be final and binding upon you.

8.0 Kindly acknowledge the receipt of this letter and make necessary arrangement for de-chlorination and testing at TAPS 1&2, NPCIL.

Yours faithfully,

16/10/21

(KVSN Murthy)
Maintenance Superintendent
For and on behalf of
Nuclear Power Corporation of India Limited

cc: SD/CS/TSS/OS/TS/Supdt.(QA) - thru e-mail.
cc: Shri S. Sarawate, ACE(T), NPCIL HQ
cc: SM(F&A) } Thru E-mail
cc: SM(HR) }
cc: CISF
cc: SME(E) / NB/PRJ/DBG/File.
cc: O/C File.

Annexure-I
Schedule of Quantity and Rate

	De-chlorination of XO5 transformer oil and flushing oil				
SN	**Description**	**Unit**	**Qty.**	**Rate (₹)**	**Amount (₹)**
1	Onsite dechlorination of PCB contaminated oil using CPRI Mobile PCB dechlorination unit	Liters	22,000	32.50	7,15,000
2	Flushing of PCB contaminated Transformer with new oil (20 % of 22,000l= 4,400l) and new oil dechlorination	Liters	4,400	32.50	1,43,000
Total					8,58,000
GST (@18%)					1,54,440
Cost of de-chlorination and testing					**₹10,12,440**

(KVSN Murthy)
Maintenance Superintendent
For and on behalf of
Nuclear Power Corporation of India Limited

ANNEXURE – II
Scope of work

De-chlorination and testing of PCB contaminated oil and flushing oil of transformer XO5.

9.0 Following are the brief scope of work for CPRI:

1. To shift CPRI Mobile PCB dechlorination unit to TAPS-1&2, NPCIL premises before the work and removal after completion of the work.
2. To arrange all the test equipments, chemical regents, consumables etc to TAPS-1&2, NPCIL premises before the work and removal after completion of the work.
3. To ensure safety during handling of oil, chemical reagent and other accessories, to be used by CPRI.
4. To ensure safety of all personnel, test equipments and CPRI Mobile PCB dechlorination unit while those will be used.
5. To provide guidance (either by physical presence or by telephonically) for handling, draining and storing of PCB contaminated oil during transformer overhauling and flushing of transformer using new oil.
6. Provide clearance to TAPS-1&2 for filling new mineral insulating oil inside transformer after transformer flushing (by TAPS-1&2, NPCIL) with new oil.
7. De-chlorination of PCB contaminated oil.
8. De-chlorination of flushed oil.
9. De-chlorinated oil and produced sludge are to be handed over to TAPS-1&2, NPCIL for disposal.
10. After processing (de-chlorinating) each batch of oil CPRI has to test the oil for ensuring PCB decontamination.
11. For each batch of PCB de-chlorinated oil, CPRI has to submit PCB free certificate to TAPS-1&2, NPCIL; so that the oil can be disposed without attracting any PCB related statutory restriction.

10.0 Following facilities will be provided by TAPS 1&2, NPCIL without any additional charges:

1. **Transformer overhaul:** The transformer overhaul, dehydration, oil draining and filling are under the scope of NPCIL.

2. **New Mineral Insulating oil (PCB free):** After transformer flushing and overhaul, new mineral insulating oil (PCB free) will be filled in transformer by TAPS-1&2, NPCIL, after getting clearance from CPRI. Also the transformer flushing activity will be carried out by TAPS-1&2 NPCIL, with the guidance from CPRI. Arrangement of new oil for filling inside the transformer and flushing is under the scope of TAPS-1&2 NPCIL.

3. **Place for keeping de-chlorination mobile facility** (Size: 40 feet in length x 12 feet in height x 8 feet in width, weight : 30 MT).

4. **Power Supply:** 3 phase, 430V, 340 Amps, 26 W, frequency 50Hz, with solid earth facility will be provided by TAPS-1&2 NPCIL.

5. **Water facility:** 200-300 liters per day will be provided by TAPS-1&2 NPCIL.

6. **Safety:** Suitable firefighting system, such as sodium bicarbonate for PCB de-chlorination, additional firefighting system (Fire Hydrant) near the plant will be provided by TAPS-1&2 NPCIL.

7. **Storage Tanks:** for storage of PCB de-chlorinated oil will be provided by TAPS-1&2 NPCIL.

8. PCB oil will be provided near to the PCB de-chlorination unit by TAPS-1&2 NPCIL.

9. **Storage drums:** Sufficient quantity of empty drums to be provided by TAPS-1&2 NPCIL to store de-chlorinated oil and sludge generated during the process.

10. **Site Office/Testing Laboratory:** one room with table, chair facility will be provided by TAPS-1&2 NPCIL.

11. **Storage Room:** one room to store sodium metal dispersed in oil drums, process chemicals and PCB unit accessories with suitable safety will be provided by TAPS-1&2 NPCIL.

12. **Accommodation:** fee lodging facility to be provided for 6 nos. (3 officers, 2 technicians and 1 driver) will be provided by TAPS-1&2 NPCIL.

13. **Local conveyance:** Pickup and drop facility for PCB project team from Guest House to place of work will be provided by TAPS-1&2 NPCIL.

14. **Nitrogen cylinders:** 3 nos. per batch will be provided by TAPS-1&2 NPCIL.

15. **3 HP Motor:** 1 No. (For transferring PCB contaminated oil from drums to 5KL tank).

16. **Contract Labors:** 2 Nos.

16/10/21

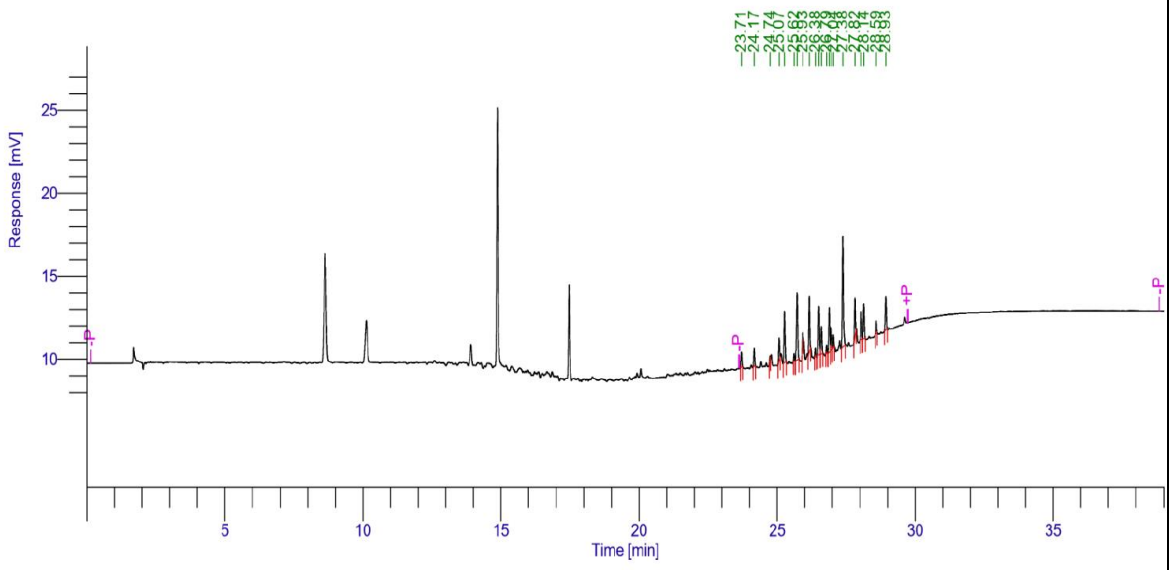
(KVSN Murthy)
Maintenance Superintendent
For and on behalf of
Nuclear Power Corporation of India Limited

Annexure 5 (PCB Chromatograms)

Software Version	: 6.3.2.0646	Date	: 13-12-2021 12:22:31
Sample Name	: BATCH-1 TAPS-BD-2	Data Acquisition Time	: 10-12-2021 14:32:36
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :

Sequence File : C:\GC PCB Analysis\Sequence\10.12.2021.seq



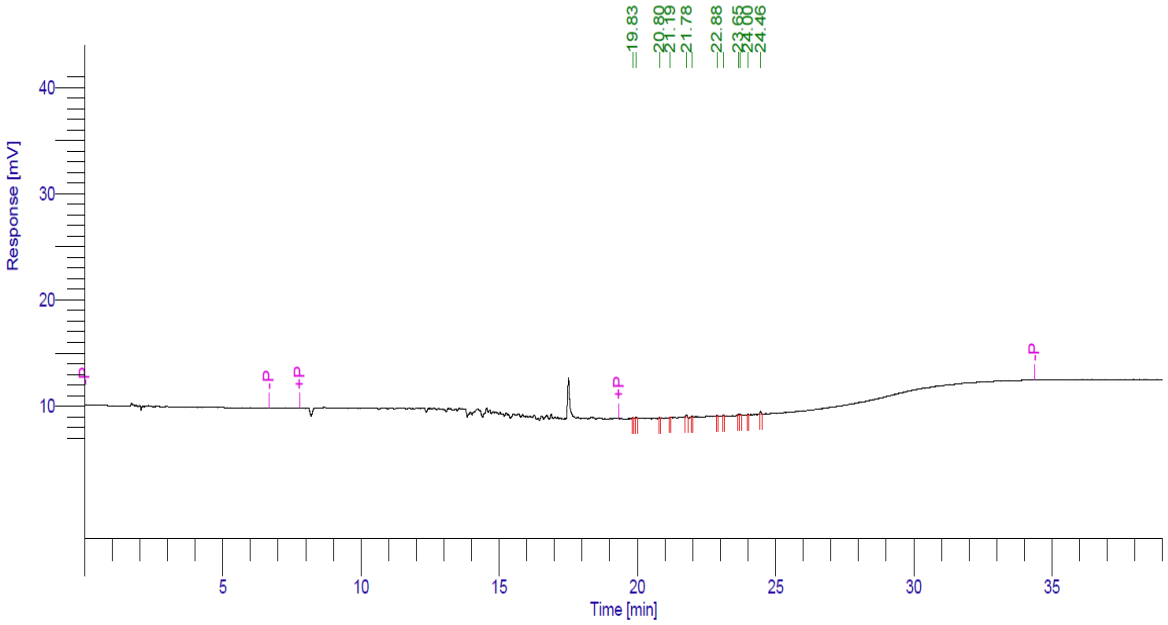
PCB Analysis

Peak	Component Name	Time [min]	Area [uV*sec]	PCB ppm # Amount
	PCB	18.550	176074.00	52.7295
			176074.00	52.7295

Batch 1 - PCB Chromatogram – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 13-12-2021 12:16:54
Sample Name	: BATCH-1 TAPS-AD-2	Data Acquisition Time	: 10-12-2021 20:20:26
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\10.12.2021.seq



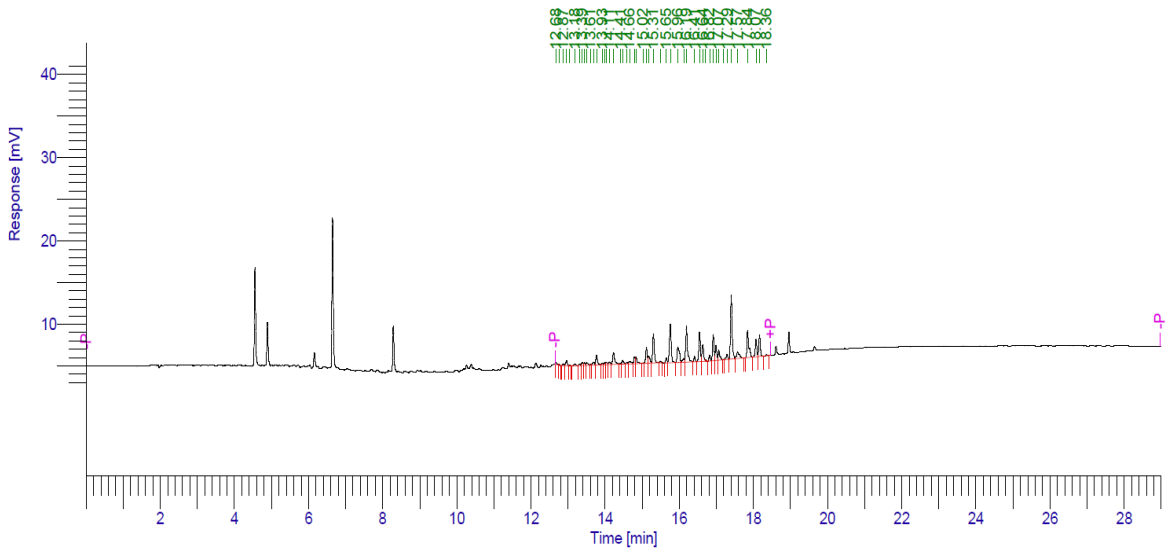
PCB Analysis

Peak #	Component Name	Time [min]	Area [uV*sec]	PCB ppm Amount
	PCB	18.550	3698.73	0.2610
			3698.73	0.2610

Batch 1 - PCB Chromatogram – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 14-12-2021 08:33:46
Sample Name	: BATCH-2 BD-TAPS-01	Data Acquisition Time	: 13-12-2021 14:59:45
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\13.12.2021.seq



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	182741.37	58223.25	100.00	43.1277
			182741.37	58223.25	100.00	

Missing Component Report

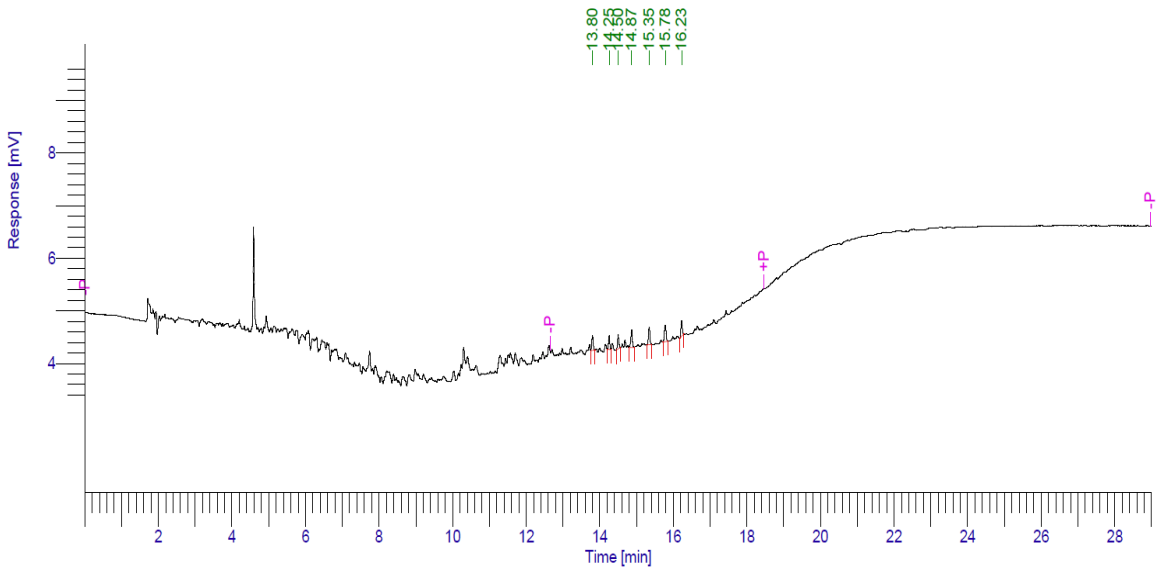
Component	Expected Retention (Calibration File)

All components were found

Batch 2 - PCB Chromatogram – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 14-12-2021 14:45:21
Sample Name	: BATCH-1 AD TAPS-01	Data Acquisition Time	: 14-12-2021 14:11:48
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\14.12.2021.seq



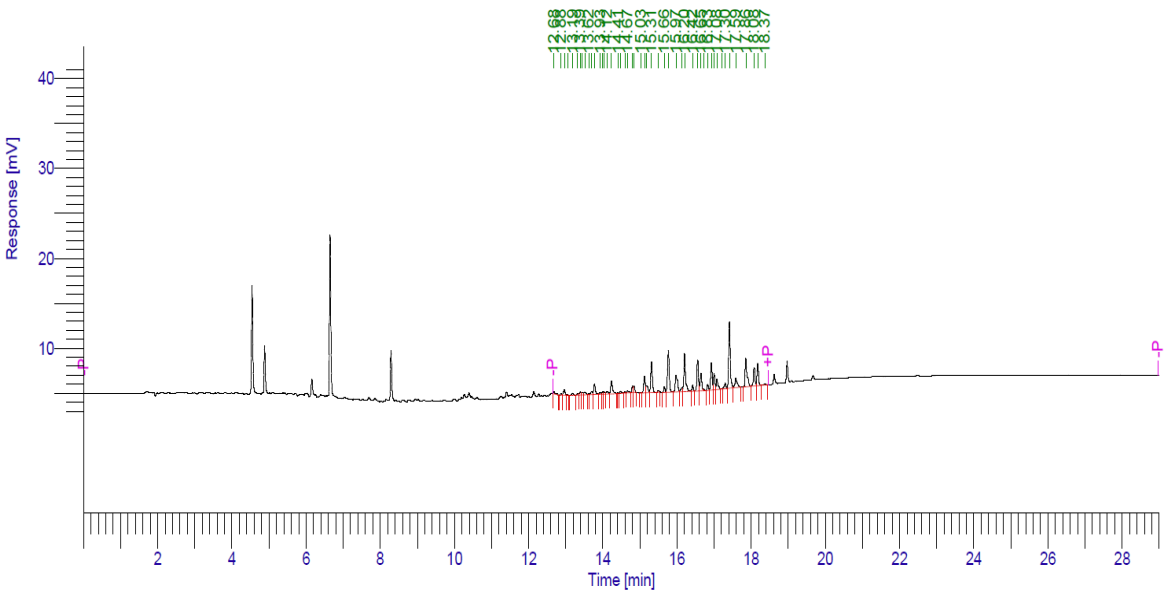
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB IN PPM
	PCB	16.000	5755.88	2075.68	100.00	0.5597
			5755.88	2075.68	100.00	0.5597

Batch 2 - PCB Chromatogram – After Dechlorination

Software Version : 6.3.2.0646		Date	: 15-12-2021 15:59:20
Sample Name	: BATCH-3 TAPS-BD-1	Data Acquisition Time	: 15-12-2021 15:22:24
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\15.12.2021.seq



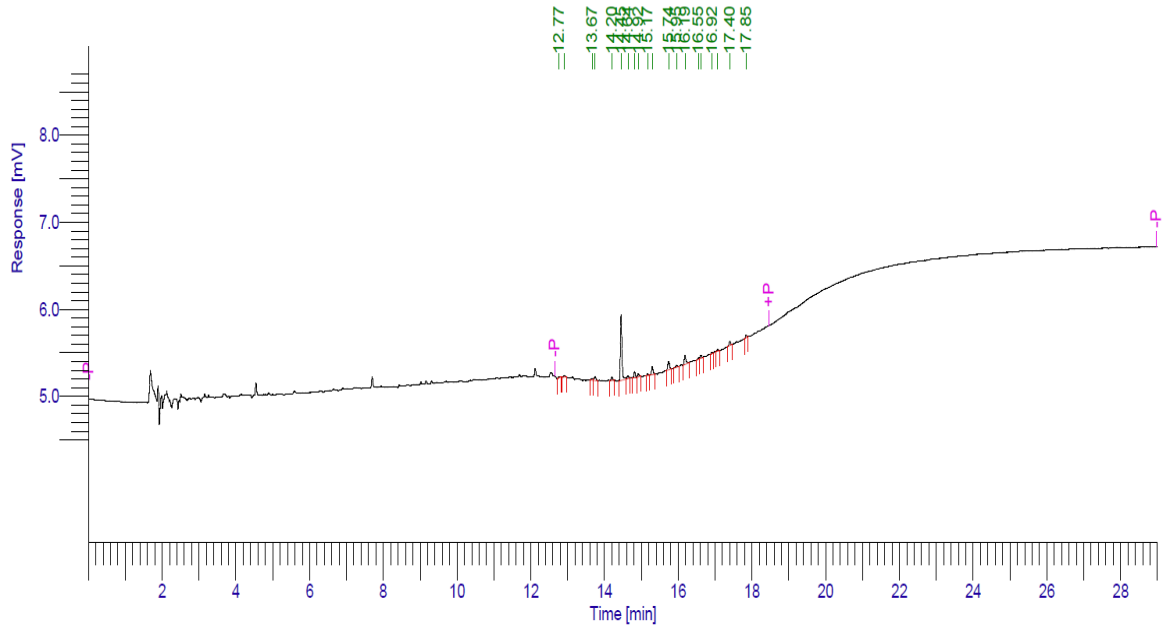
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	177117.80	56657.06	100.00	41.8005
			177117.80	56657.06	100.00	41.8005

Batch 3 - PCB Chromatogram – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 16-12-2021 17:50:31
Sample Name	: BATCH-3 TAPS-AD-2	Data Acquisition Time	: 16-12-2021 17:04:12
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\16.12.2021PCB.seq



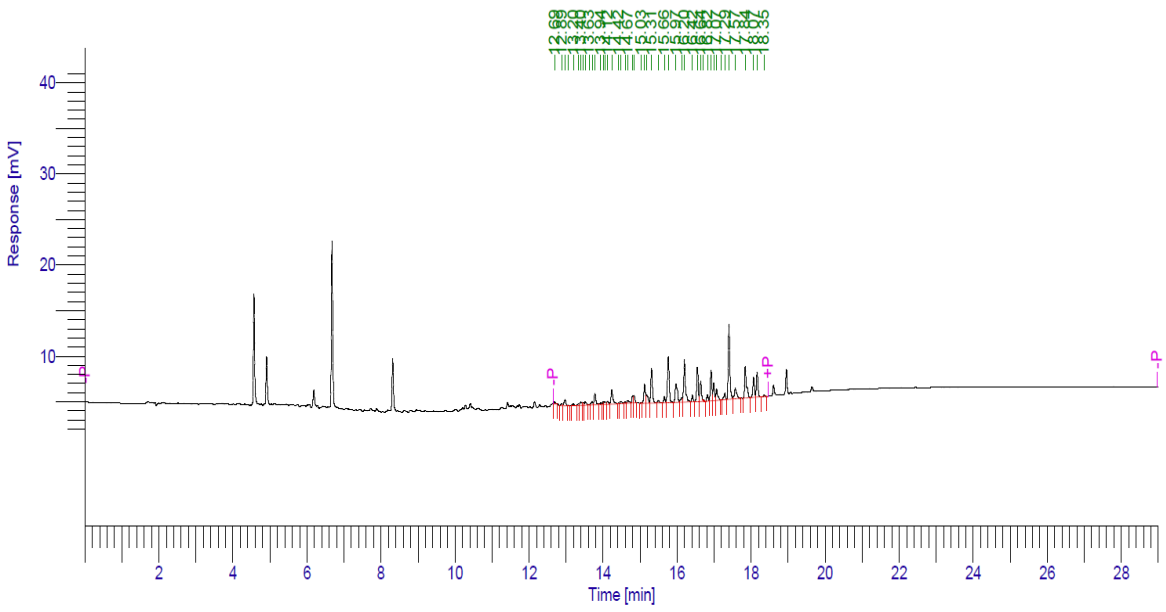
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	4410.95	1540.61	100.00	1.0410
			4410.95	1540.61	100.00	1.0410

Batch 3 - PCB Chromatogram – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 18-12-2021 13:32:38
Sample Name	: BATCH-4 TAPS-BD-1	Data Acquisition Time	: 18-12-2021 12:42:14
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\18.12.2021 TAPS.seq



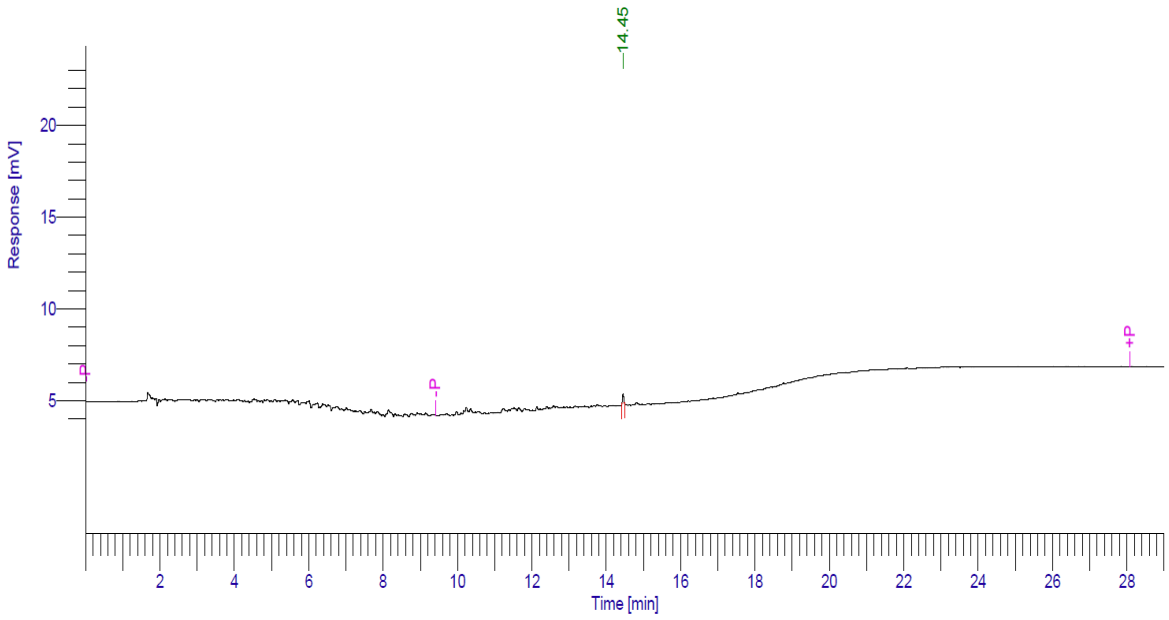
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	195302.42	62515.78	100.00	46.0921
			195302.42	62515.78	100.00	46.0921

Batch 4 - PCB Chromatogram – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 18-12-2021 16:24:19
Sample Name	: BATCH-4 TAPS-AD-1	Data Acquisition Time	: 18-12-2021 15:48:50
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\18.12.2021 TAPS.seq



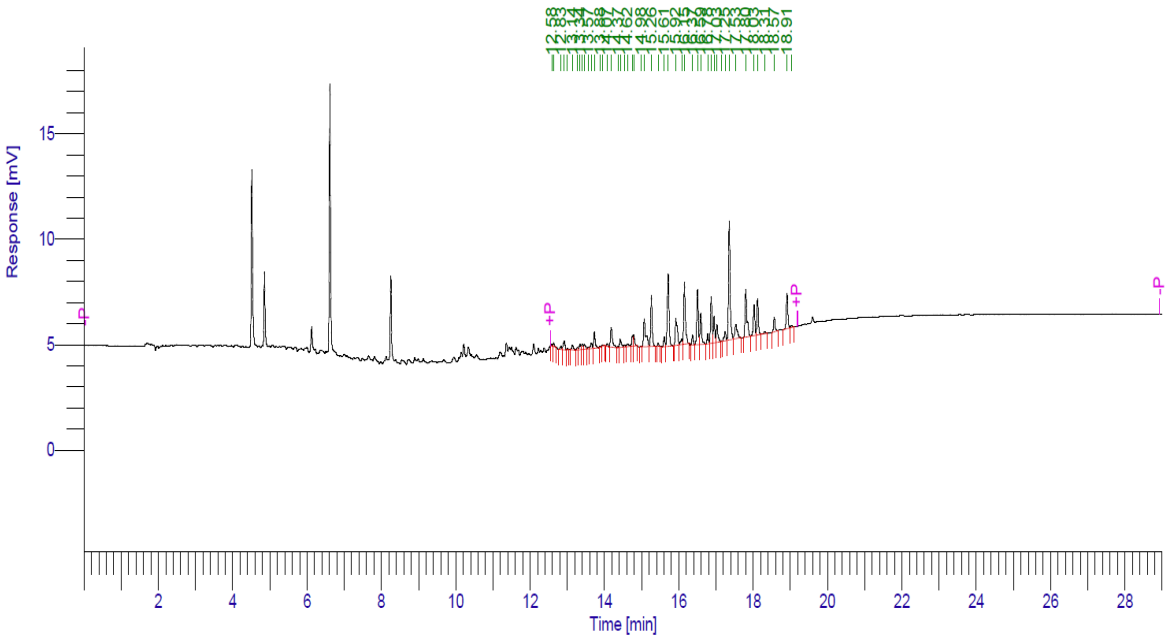
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	18.550	1068.34	504.90	100.00	0.3199
			1068.34	504.90	100.00	0.3199

Batch 4 - PCB Chromatogram – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 20-12-2021 18:16:41
Sample Name	: BATCH-5 TAPS-BD-1	Data Acquisition Time	: 20-12-2021 16:34:53
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\18.12.2021 TAPS.seq



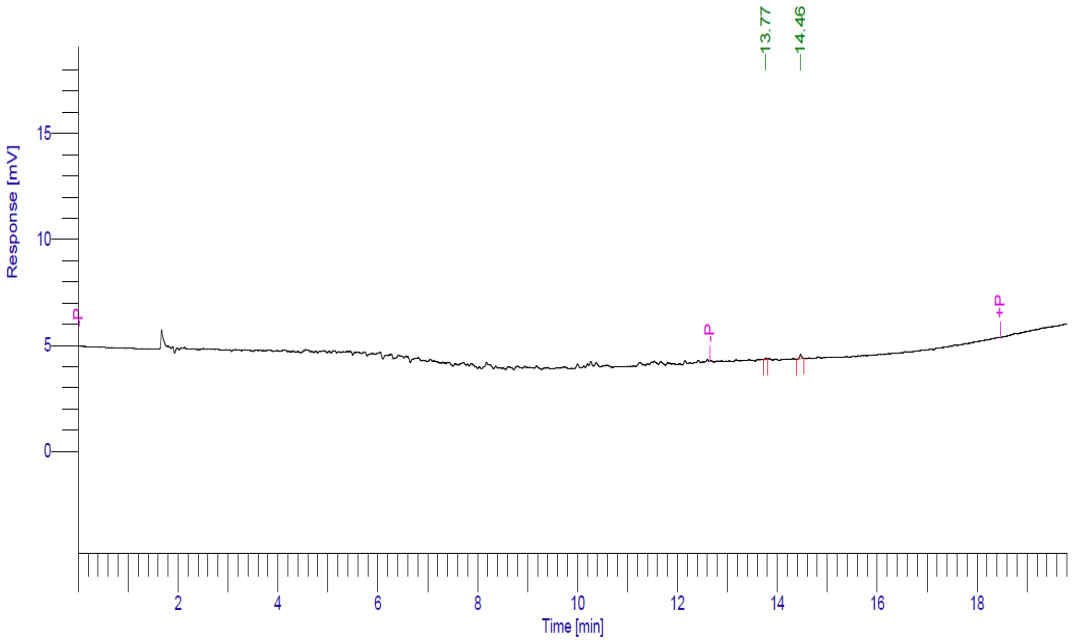
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	130010.31	42535.53	100.00	43.0909
			130010.31	42535.53	100.00	43.0909

Batch 5 – PCB Chromatogram – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 20-12-2021 19:01:01
Sample Name	: BATCH-5 TAPS-AD-2	Data Acquisition Time	: 20-12-2021 18:39:40
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\18.12.2021 TAPS.seq



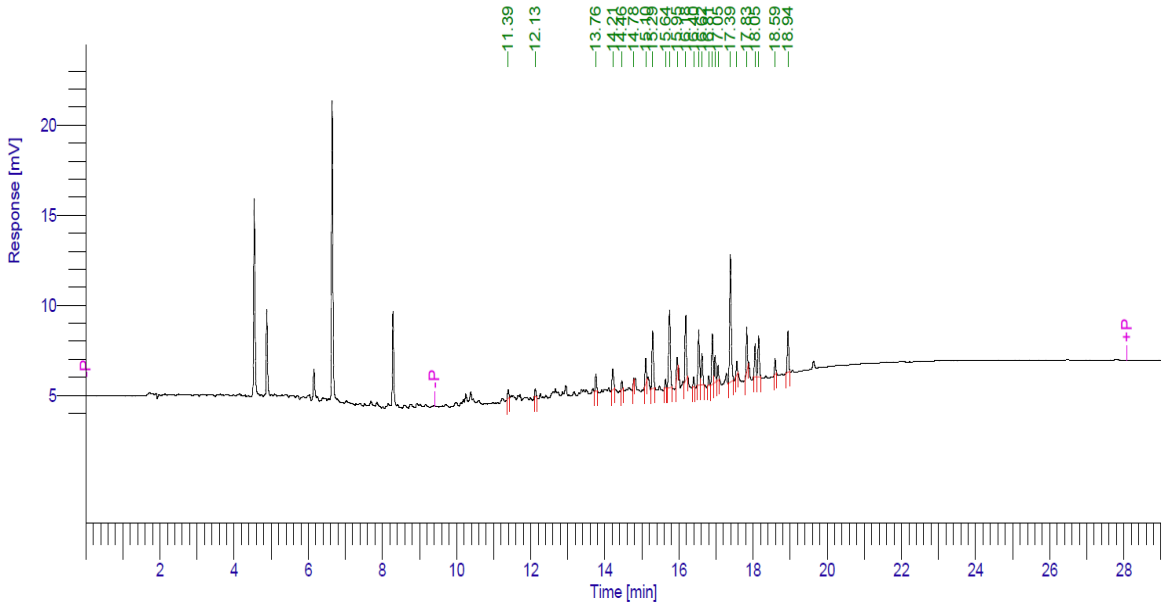
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	647.05	254.96	100.00	0.4547
			647.05	254.96	100.00	0.4547

Batch 5- PCB Chromatogram – After Dechlorination

Software Version : 6.3.2.0646		Date	: 21-12-2021 13:26:20
Sample Name	: BATCH-6 TAPS-BD-1	Data Acquisition Time	: 21-12-2021 11:46:10
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\21.12.2021.seq



PCB ANALYSIS

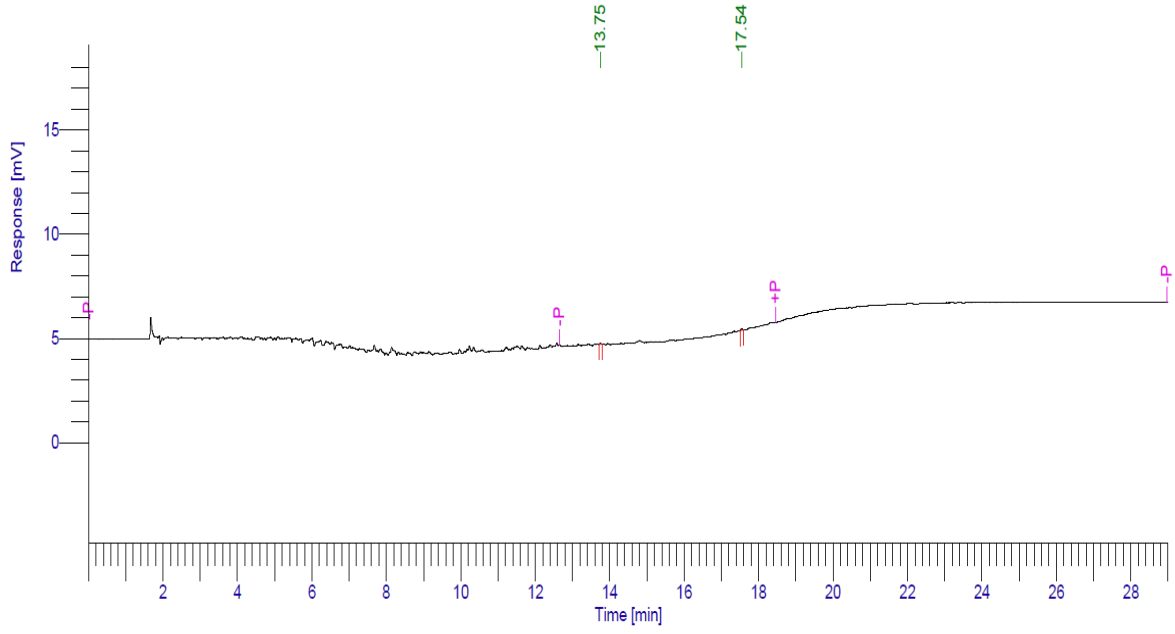
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	18.550	119945.38	46063.01	100.00	35.9205
			119945.38	46063.01	100.00	35.9205

Batch 6 – PCB Chromatogram – Before Dechlorination

Page 1 of 1

Software Version	: 6.3.2.0646	Date	: 22-12-2021 17:05:15
Sample Name	: BATCH-6 TAPS-AD-1	Data Acquisition Time	: 22-12-2021 16:17:06
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\22.12.2021TAPS.seq



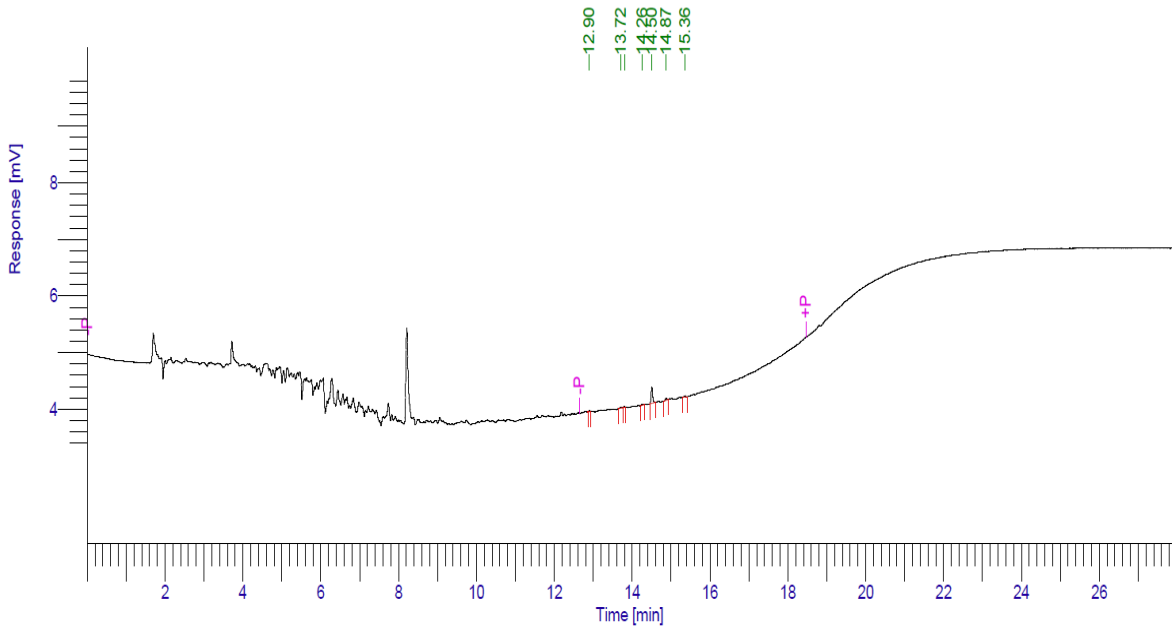
PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	373.54	148.33	100.00	0.2625
			373.54	148.33	100.00	0.2625

Batch 6- PCB Chromatogram – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 14-12-2021 16:27:25
Sample Name	: 2ND TIME FLUSHING OIL	Data Acquisition Time	: 14-12-2021 15:55:02
Instrument Name	: Clarus 680	Channel	: A
Rack/Vial	: 0/0	Operator	: manager
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Result File :
Sequence File : C:\GC PCB Analysis\Sequence\14.12.2021.seq



PCB ANALYSIS

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB	16.000	1156.11	422.01	100.00	0.2728
			1156.11	422.01	100.00	0.2728

PCB Chromatogram – Flushed oil of XO5 transformer

Annexure 6 (Minutes of Meeting)

न्यूक्लियर पॉवर कॉर्पोरेशन ऑफ इंडिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम A Government of India Enterprise)
तारापुर महाराष्ट्र स्थल Tarapur Maharashtra Site
तारापुर परमाणु बिजलीघर 1 एवं 2
TARAPUR ATOMIC POWER STATION 1&2
डाक : टीएपीपी, बोईसर (प.रे.), जिला पालघर (महाराष्ट्र) 401 504
PO : TAPP, Boisar (WR), Dist.Palghar, Maharashtra – 401504
CIN:U40104MH1987GOI149458

No. TAPS/EM/PCB/X05/2021-1 December 27, 2021

Sub: Minutes of Meeting on XO5 Transformer Oil PCB De-Chlorination Activity.

Ref: WO No. TAPS/EM/PCB/X05/2021-1, Dt. 16.10.2021

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M/s. Central Power Research Institute (CPRI), Bengaluru visited Tarapur Atomic Power Station-1&2, M/s. Nuclear Power Corporation of India Ltd. (NPCIL), Boisar against above mentioned work order : "**On-site dechlorination and testing of PCB contaminated oil using CPRI mobile de-chlorination unit at TAPS 1&2, TMS, NPCIL"** from 02.12.2021 to 27.12.2021.

The details of activities are as follows:

1. PCB dechlorination unit reached the site on 02.12.2021.
2. PCB staff reached the site 03.12.2021.
3. Training on Industrial safety and Height Pass for PCB staff has been given by NPCIL on 04.12.2021 & 06.12.2021.
4. Mr. P. Sadasiva Murthy, Joint Director, CPRI along with PCB accessories vehicle for dechlorination activity reached the site on 06.12.2021.
5. CPRI personnel delivered lectures on "Conditioning Monitoring of Transformers using oil analysis" and "Awareness Programme on PCB" on 06.12.2021.
6. After setting up of the plant, the dechlorination activity of PCB contaminated oil 23539 liters of XO5 transformer has been done as follows:-
   a. Onsite dechlorination of PCB contaminated oil using CPRI mobile PCB dechlorination of 19615 liters PCB contaminated oil of XO5 transformer.
   b. Flushing of PCB contaminated transformer with new oil of 3924 liters.
7. PCB contaminated oil of XO5 transformer was handed over to CPRI for dechlorination by NPCIL. Entire PCB contaminated oil along with flushed oil were dechlorinated in 6 batches. The details are given below:-

Minutes of Meeting Held Between CPRI and NPCIL on 27.12.2021

Batch No.	Quantity (Liters)	Date of De-chlorination		PCB concentration (ppm)	
		From	To	Before Treatment	After Treatment
#1	3750	10/12/2021	13/12/2021	53	0.26
#2	4000	14/12/2021	15/12/2021	43	0.55
#3	4018	15/12/2021	18/12/2021	41	1.10
#4	3711	18/12/2021	20/12/2021	46	0.31
#5	3618	20/12/2021	22/12/2021	43	0.45
#6	4442	21/12/2021	23/12/2021	36	0.26

*Maximum allowable PCB concentration is <2 ppm

8. After removal of PCB contaminated oil, the transformer was flushed using fresh oil for cleaning trapped contaminations. After flushing, the flushed oil PCB content was checked and found 0.27 ppm (<2ppm). Hence the transformer internals are free from PCB contaminations.

9. Around 14 drums of sludge with water of 200 kgs each has been collected in this process. This sludge comes under hazardous category and is the responsibility of M/s. NPCIL TMS to dispose as per state pollution control board norms.

10. After completion of the PCB dechlorination activity, the vehicles along with accessories left the site on 24.12.2021.

11. After completing the necessary formalities at M/s. NPCIL, TMS, the CPRI team left the site on 27.12.2021.

12. CPRI will submit final report along with invoice / bill within one month.

M/s. NPCIL, TAPS 1 &2 Representatives

27/12/21
(Tapas Kumar Dey)
SME (E)

(Nirjhar Basu)
SO/E

(P.R.Jundhare)
SO/E

27/12/2021
(D.B.Gupta)
SO/D

निर्झर बसु Nirjhar Basu
वैज्ञानिक अधिकारी 'ई' (विद्युत अनुरक्षण)
Scientific Officer 'E' (Electrical Maint...)
तारापुर परमाणु बिजली ...
Tarapur Atomic Power Station ...

M/s. CPRI Representatives

27/12/21
(P.Sadasiva Murthy)
Joint Director

27/12/21
(Tom Jose)
Engineer

संयुक्त निदेशक / Joint Director
परावैद्युत सामग्री प्रभाग
Dielectric Materials Division
केन्द्रीय विद्युत अनुसंधान संस्थान
Central Power Research Institute
पो. बा. सं. 8066 , P.B. No. 8066
बैंगलूर / Bangalore - 560 080

Minutes of Meeting Held Between CPRI and NPCIL on 27.12.2021