REPORT

ON

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

Project Site: Kerala State Electricity Board, 220kV Substation Kalamassery, Kerala

Period: 04.06.2023 to 04.09.2023

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

Work Order No: 09/23-24, Dt. 24.05.2023

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Report on PCB De-Chlorination Activity at KSEB, 220kV Substation Kalamassery

1. 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 196 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. Background:

CPRI has sent letters to M/s, KSEB 220kV Substation Kalamassery for undertaking the PCB de-chlorination activity. Letter enclosed. (A**nnexure 1**)

Dr. P. Thomas, Additional Director/ HOD, Dielectric Materials Division, Central Power Research Institute, visited M/s, KSEB 220kV Substation Kalamassery on 08.12.2017 to have detailed technical discussions for undertaking the PCB de-chlorination activity at M/s, KSEB 220kV Substation Kalamassery, and a MOM was signed between M/s, KSEB and M/s, CPRI. Copy enclosed. (**Annexure 2**)

CPRI had received an email request from M/s, KSEB 220 kV Substation Kalamassery, to take up this PCB de-chlorination activity as soon as possible. Copy enclosed. (**Annexure 3)**

A budgetary offer along with site requirement has been sent to office of the Assistant Executive Engineer, 220 kV Substation, Kerala State Electricity Board Ltd. Kalamassery. Copy enclosed. **(Annexure 4)**

CPRI has received a letter from M/s, KSEB that 50% advance payment could not be initiated and requested CPRI to waive off 50% advance. Copy enclosed. **(Annexure 5)**

After approval from CPRI management, CPRI agreed to undertake PCB de-chlorination work at 220 kV Substation , Kerala State Electricity Board Ltd. Kalamassery, without any advance with the condition that full amount to be paid immediately, (within15days) after the completion of work.

Finally, CPRI has received work order from M/s, KSEB Kalamassery for the dechlorination of around 117.72KL of PCB contaminated oil**,** Work Oder No: 09/23-24, Dt. 24.05.2023. Copy enclosed. **(Annexure 6)**

3. PCB De-chlorination Activities Carried out at KSEB, 220 kV Substation Kalamassery from 04.06.2023 to 04.09.2023.

Based on the confirmation received from KSEB,220 kV Substation Kalamassery, CPRI team visited the site on 04 June 2023 to take up the PCB de-chlorination activity.

The following team members were involved in the PCB de-chlorination activity:

Shri. Dr. P. Thomas, Additional Director, Head-DMD & PCB Project Leader,

Shri. P. Sadasiva Murthy, Joint Director, DMD

Mr. Thilak A, Project Engineer, PCB Project.

Mr. Anil Chavan, Project Engineer, PCB Project.

Mr. Tom Jose, Project Engineer, PCB Project.

Mr. M.Senthamilarasan, Project Engineer, PCB Project.

Mr. Vinay A Revankar, Project Engineer, PCB Project.

Mr. Nagaraju C B, Technician, PCB Project.

Mr. Santhana Kumar G, Driver, PCB Project.

Mr. Sathish Kumar M, Driver, PCB Project.

PCB team inspected the preparedness at 220kV Substation Kalamassery, and found that the following arrangements were made ready by M/s. KSEB.

- Area of sodium dispersion barrels storage (Given instruction to keep sodium dispersion free from moisture).
- Tanks for storing the de-chlorinated oil was provided.
- PCB team made necessary arrangement, such as powering the stepdown transformer, checking the power connection, made connection from PCB contaminated transformer to PCB unit, water supply connection and nitrogen cylinders, etc.

4. Sodium Dispersion Preparation Process:

Around 680 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 1.

Table 1: Details of Sodium Dispersed in oil.

Batch No.	Date	Batchsize inKg.	Sodium metal in Kg.	Oil inKg.	Sodium dispersion preparation in Hrs.	Particle size in microns
1.	16.05.2023 to 19.05.2023	340	136	204	22	10-15
2.	22.05.2023 to 24.05.2023	340	136	204	21	10-15
Total: 680 Kg						

Optical microscope image analysis is carried out to measure the particle size for the sodium-dispersed oil (Fig. 1&2) is given below:

Fig.(1)

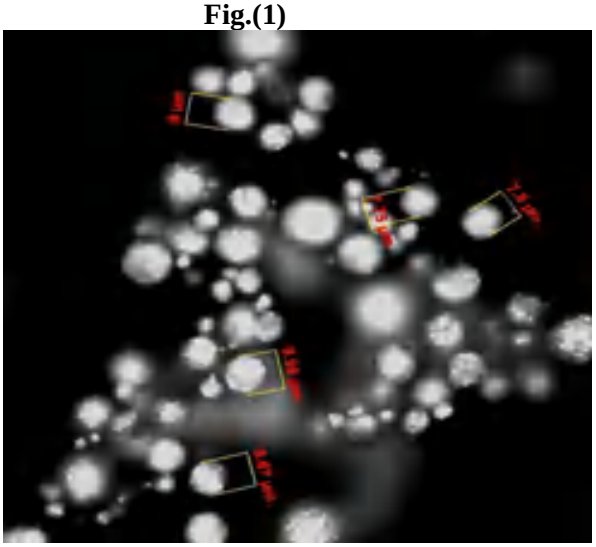


Fig.(2)

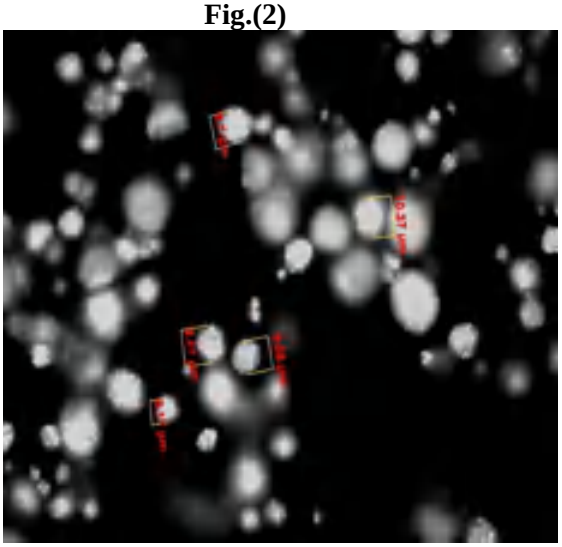


Fig. (1)& (2) : Particle size in the range 10-15 µm

5.Preparation works undertaken for de-chlorination activity:-

CPRI received work order (No.09/23-24,Dt:24.05.2023) Copy enclosed. **(Annexure 6)** from M/s. KSEB, Kalamassery for undertaking PCB dechlorination activity of PCB contaminated oil of 117.72 KL at 220 kV substation KSEB,Kalamassery, Kochi.PCB staff reached the site on 04.06.2023.

The details of preparation activities are as follows:

1. *Parking of Volvo PCB De-chlorination plant*
2. *Plant erection and power supply connections*
3. *Setting up of laboratory for PCB extraction*
4. *Sodium mixer area covered with tarpaulin sheets*
5. *Nitrogen cylinder connectors repair*
6. *Replace new Battery*
7. *UPS service and repair*
8. *DCS command response rectification*
9. *Oil loading*

Volvo truck bearing Reg. No-KA04MU6886 and the Prakash parcel services vehicle bearing Reg.No-MH04FJ9844 has reached KSEB, 220 kV Substation Kalamassery premises on 06.06.2023. The PCB unit has parked at the appropriate location and all the PCB accessories such as step down transformer, sodium dispersion drums, ladders etc. were unloaded.

Figure 3 :Unloading of PCB accessories such as step down transformer, sodium dispersion drums etc.

The exhaust and chain pulley rod connections were attached to PCB-unit.The tank for storage of dechlorinated oil were placed in appropriate locations.

Figure 4: Chain pulley connection to PCB unit

Figure 5: Tank for storage of PCB dechlorinated oil is kept near the PCB unit

The step down transformer was connected to the PCB unit from the main power supply provided by M/s. KSEB. The control panel and nitrogen line were checked. Sodium dispersion mixer, ladders, and other items were arranged near the PCB unit.

Figure 6: Power supply connections to control panel

Figure 7: Earthing connections and step down transformer connection

All the panel connections were checked and found short-circuited connection, which is suspected to be happened during transportation which has rectified and put back to use.

Figure 8: Step down transformer connection to PCB unit

Figure 9: Checking the electrical connection for main control panel

The loading and unloading pipeline connections were delivered between PCB contaminated transformer to PCB de-chlorination Plant and PCB de-chlorination Plant to PCB dechlorinated oil storage tank.

Figure 10: Transferring sodium dispersion drum

Figure 11: PCB oil loading line connection

After the power connection and setting up of the PCB plant, leakage in pipelines were checked before the commencement of operation.

The laboratory setup was made for the PCB extraction in the space provided in KSEB.
GC-ECD used for the PCB testing was switched on and the same was calibrated using PCB standard 1242, 1254 &1260 Aroclor.
GC fixed on the table, GC gas regulator connections were done, and the nitrogen gas line control panel was checked. After the connections, GC was started and checked for working condition.

Figure 12: Chemical lab setup for PCB oil extraction

Figure 13: GC-ECD instrument used for PCB analysis

PCB plant sodium mixture area has been covered with tarpaulin sheets as the preventive measure for unexpected rain, since water and sodium are vigorously reactive.

The nitrogen cylinder connectors to the manifold was found to be in broken condition suspected to broken during the transportation, it was welded and put back to use.

Figure 14: Sodium mixer area covered with tarpaulin sheets

Figure 15:Nitrogen cylinder connection

The UPS was not providing proper power backup. It was observed that battery was swelled, the swelled battery were replaced with new ones.

The internal transformer component of UPS was not working and the same was rectified and put back to use.

Figure 16: Battery replacement

Figure 17:UPS service

During loading operation of sodium dispersion from the drum to the sodium tank it was found the DCS command in PCB main unit was not working, the same was checked and rectified.

The first batch oil loading was done from the first transformer (Sl.No-D577147) having around 30KL PCB contaminated oil.

Figure 18:Oil drain connection from PCB contaminated transformer

Figure 19: Sample is collected for PCB analysis

Presentation on the PCB De-chlorination activity

Dr. P. Thomas, Additional Director/ HOD, Dielectric Materials Division, Central Power Research Institute, Bengaluru visited KSEB, 220 kV Kalamassery on 09.06.2023, and made presentation on "A Management service on treatment of transformer mineral oil containing PCB's using mobile dechlorination system"

A MOM was signed on 09.06.2023 between M/s. KSEB and M/s. CPRI. Copy enclosed. **(Annexure 7)**

Figure 20: Dr. P. Thomas, Additional Director/ HOD, Dielectric Materials Division, CPRI, giving presentation about PCB management and made visit to the site

6. PCB de-chlorination Process:

PCB de-chlorination process was carried out by loading a known volume of PCB contaminated oil into the reactor. The oil was passed through pre heaters and degasified,where water and volatile compounds were removed. This PCB contaminated oil is heated to a temperature of 120ºC and a sample was drawn from the reactor to check the initial concentration of PCB content. Depending upon the initial concentration of PCB content in the oil, calculated amount ofsodium 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 inthe 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 theatmosphere. 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.

The batch wise details are given in Table 2. The PCB analysis was carried out on all batches before and after the dechlorination.

The PCB analysis chromatograph reports of each Batch 1 to 27 are enclosed. **(Annexure 8)**

Table 2: Details of PCB de-chlorination activity at KSEB Kalamassery

Transformer. Sl.No	Batch No	Date		Qty. ofoil (Ltr)	Qty of NaD (Ltr)	Initial PCB conc.(ppm)	Final PCB conc. (ppm)	Unloading in 200ltrsDrums	
		FROM	TO					Water	Sludge
D577147	1	14.06.23	16.06.23	4308	40	8.92	0.28	1.5	0.25
	2	19.06.23	20.06.23	4306	40		0.13	1.5	0.25
	3	21.06.23	22.06.23	4315	40		0.23	1.5	0.25
	4	23.06.23	24.06.23	4306	40		0.22	1.5	0.25
	5	26.06.23	27.06.23	4306	40		0.26	1.5	0.25
	6	30.06.23	01.07.23	4310	40		0.15	1.5	0.25
	7	03.07.23	04.07.23	4325	40		0.24	1.5	0.25
Oil after flushing from D577147	8	05.07.23	07.07.23	3627	40	2.9	0.26	1.5	0.25
	9	10.07.23	11.07.23	3606	40	2.4	0.16	1.5	0.25
D577146	10	12.07.23	13.07.23	4306	40	8.2	0.29	1.5	0.25
	11	14.07.23	15.07.23	4306	40		0.23	1.5	0.25
	12	17.07.23	18.07.23	4308	40		0.14	1.5	0.25
	13	19.07.23	20.07.23	4307	40		0.16	1.5	0.25
	14	21.07.23	22.07.23	4325	40		0.18	1.5	0.25
	15	24.07.23	25.07.23	4306	40		0.22	1.5	0.25
	16	26.07.23	27.07.23	4501	40		0.16	1.5	0.25
Oil after flushing from D577146	17	28.07.23	29.07.23	3622	40	2.85	0.09	1.5	0.25
	18	31.07.23	01.08.23	3622	40	2.07	0.05	1.5	0.25
D577148	19	02.08.23	03.08.23	4306	40	7.06	0.12	1.5	0.25
	20	04.08.23	05.08.23	4306	40		0.08	1.5	0.25
	21	07.08.23	08.08.23	4306	40		0.06	1.5	0.25
	22	09.08.23	10.08.23	4306	40		0.07	1.5	0.25
	23	11.08.23	12.08.23	4334	40		0.15	1.5	0.25
	24	16.08.23	17.08.23	4376	40		0.25	1.5	0.25
	25	18.08.23	21.08.23	4371	40		0.25	1.5	0.25
Oil after flushing from D577148	26	22.08.23	24.08.23	4129	40	2.89	0.39	1.5	0.25
	27	25.08.23	25.08.23	4315	40	2.89	0.40	1.5	0.25
	Total quantity of Oil Dechlorinated			113761					

PCB contaminated oil from three Transformers (Make: GE, 220/110 kV, 40 MVA scrap transformers) Sl.No-D577147, Sl.No-D577146, Sl.No-D577148,was de-chlorinated in twenty seven batches with various batch sizes of around 4.2 kl and each transformers is having around 30 KL PCB contaminated oil.

After draining all PCB contaminated oil from the transformers around 18529 litres of oil used for flushing the transformers

Total 113761 litres of PCB contaminated oil was dechlorinated, which includes 18529 litres of flushing oil.

It is to be noted that after dechlorination of 113.761 KL of PCB contaminated oil, around 7 barrels of sludge, 41 drums of water has been generated. These sludge generated is hazardous in nature needs to be disposed of to the recyclers authorized by State Pollution Control Board. This responsibility lies with M/s.KSEB.

The sludge (i.e.7drums of sludge and 41drums of water) generated during the dechlorination process was handed over to M/s. KSEB for further necessary action.

The minutes of meeting was signed between M/s. CPRI & M/s. KSEB officials, the same is enclosed in the **(Annexure 9)**

After completion of the PCB dechlorination activity at M/s. KSEB 220kV Substation Kalamassery site, the Volvo truckwith PCB de-chlorination unit left the site on 04.09.2023, and remaining accessories were taken out on 04.09.2023.

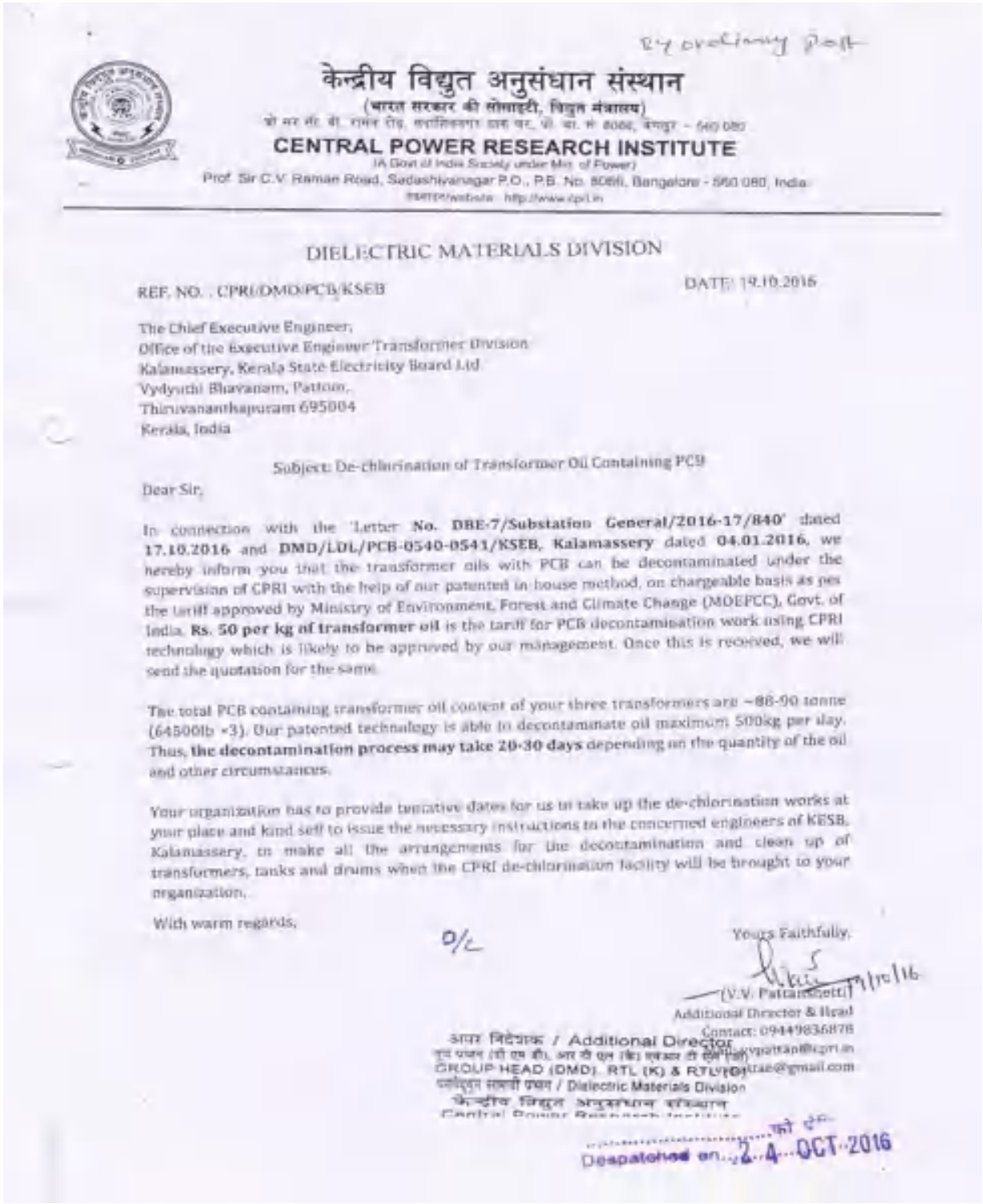
7. Conclusion:

CPRI has been successfully completed de-chlorination of around 113.761 KL of PCB contaminated oil from three Transformers (Make: GE, 220/110 kV, 40 MVA scrap transformers) Sl.No-D577147, Sl.No-D577146, Sl.No-D577148, against Work Order No: 09/23-24, Dt. 24.05.2023

Final PCB concentration de-chlorinated oil is having around 0.05 to 0.4 ppm of pcb's which is within the permissible limit(<2 ppm)

The sludge (i.e.7 drums of sludge and 41 drums of water) generated during the dechlorination process was handed over to M/s. KSEB and t is the responsibility of M/s. KSEB to dispose the sludge as per Pollution Control Board norms and produce disposable certificate to M/s. CPRI.

Annexure 1



केन्द्रीय विद्युत अनुसंधान संस्थान
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)
प्रो सर सी. वी. रामन रोड, सदाशिवनगर डाक घर, पी. बा. नं 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
Phone/website: http://www.cpri.in

DIELECTRIC MATERIALS DIVISION

REF. NO. : CPRI/DMD/PCB/KSEB

DATE: 19.10.2016

The Chief Executive Engineer,
Office of the Executive Engineer Transformer Division
Kalamassery, Kerala State Electricity Board Ltd
Vydyuthi Bhavanam, Pattom,
Thiruvananthapuram 695004
Kerala, India

Subject: De-chlorination of Transformer Oil Containing PCB

Dear Sir,

In connection with the 'Letter **No. DBE-7/Substation General/2016-17/840**' dated **17.10.2016** and **DMD/LDL/PCB-0540-0541/KSEB, Kalamassery** dated **04.01.2016**, we hereby inform you that the transformer oils with PCB can be decontaminated under the supervision of CPRI with the help of our patented in house method, on chargeable basis as per the tariff approved by Ministry of Environment, Forest and Climate Change (MOEFCC), Govt. of India. **Rs. 50 per kg of transformer oil** is the tariff for PCB decontamination work using CPRI technology which is likely to be approved by our management. Once this is received, we will send the quotation for the same.

The total PCB containing transformer oil content of your three transformers are ~88-90 tonne (64500lb ×3). Our patented technology is able to decontaminate oil maximum 500kg per day. Thus, **the decontamination process may take 20-30 days** depending on the quantity of the oil and other circumstances.

Your organization has to provide tentative dates for us to take up the de-chlorination works at your place and kind self to issue the necessary instructions to the concerned engineers of KESB, Kalamassery, to make all the arrangements for the decontamination and clean up of transformers, tanks and drums when the CPRI de-chlorination facility will be brought to your organization.

With warm regards,

Yours Faithfully,

(V.V. Pattanshetti)
Additional Director & Head
Contact: 09449836878
vvpattan@cpri.in
vvpattae@gmail.com

अपर निदेशक / Additional Director
GROUP HEAD (DMD), RTL (K) & RTL(TC)
परावैद्युत सामग्री प्रभाग / Dielectric Materials Division
केन्द्रीय विद्युत अनुसंधान संस्थान
Central Power Research Institute

Despatched on 24 OCT 2016

CPRI has sent letters to M/s, KSEB 220Kv Substation Kalamassery for undertaking the PCB de-chlorination activity

Annexure 2

Minutes of meeting held on 08/12/2017 between CPRI officials and KSEBL regarding the PCB dechlorination of 2 Nos. of 120MVA transformers at 220kV Substation, Kalamassery.

The members present:

1. Dr. P. Thomas, Joint Director, CPRI, Bangalore
2. Sri. Sreelal S, Project Engineer, CPRI Bangalore
3. Sri. George V James, Dy. Chief Engineer, Transmission Circle, Kalamassery
4. Sri. M.E. Varghese, Executive Engineer, Transmission Division, Kalamassery
5. Sri. Riyas E.A., Asst. Executive Engineer, 220kV Substation, Kalamassery

The meeting was arranged to discuss and to finalize the modalities to undertake the PCB Dechlorination of 2 Nos. of 120MVA(3 Nos. of 40MVA single phase) transformers, one is faulty and one is in service.
Previously, the proposal was submitted to K.S.E.B Limited, but certain clarifications were required. The CPRI team made a power point presentation on inventory and the various methods of PCB treatment methods and also visited the substation yard to take stock of the situation.

After due deliberation and discussions, and analyzing all possible options available, the following conclusions were arrived:

1. For the 120 MVA faulty transformer, the oil with PCB will be drained, the core and winding will be flushed with PCB free transformer oil and the oil will be transported to CPRI for PCB dechlorination. The oil after treatment will be handed over to CPRI for disposal. The core, winding and tank will be disposed by KSEBL if the PCB content is less than 2ppm.
2. The 120 MVA transformer which is in service having the PCB contamination, oil will be drained, the core and winding will be flushed with fresh oil. The contaminated oil would be handed over to CPRI for the PCB dechlorination and further disposal. The transformer will be filled with the new mineral oil and put back to service.

The CPRI team suggested that even though there are many methods of PCB dechlorination, the most cost effective and environment friendly process for huge quantity of oil is the Sodium de-chlorination technology. Hence this technology is adopted under this Project in India. This facility is available with CPRI which is the authorized nodal agency in India for PCB de-chlorination.
The CPRI team has indicated the charges towards the de-chlorination at the rate of Rs.20/- per kg and informed that it is the responsibility of KSEBL to transport the oil to CPRI, Bangalore, for the PCB treatment. The draining, flushing etc. would be carried out by KSEBL under the supervision of CPRI personnel.

For CPRI

Dr. P. Thomas

Sri. Sreelal S

For KSEBL

Sri. George V James

Sri. M.E. Varghese

Sri. Riyas E.A

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Minutes of Meeting Held Between M/s. CPRI and M/s. KSEB on 08.12.2017

Annexure 3

Re: Onsite de-chlorination of PCB contaminated oil at 220kV Substation, Kalamassery

From : aee220klsy@gmail.com Mon, Aug 01, 2022 04:07 PM

Subject : Re: Onsite de-chlorination of PCB contaminated oil at 220kV Substation, Kalamassery

To : Sadasiva Murthy <ssmurthy@cpri.in>, tomas@cpri.in, PCB GROUP <pcbgroup@cpri.in>

Sir,
The details are as follows.

(1) For scrap transformer bank (3 Nos.) of 120MVA, 220/110kV,
the test report No. is DMD/LDL/PCB-0540-0541/KSEB, Kalamassery dated 04.01.2016
quantity of oil is 8640 Gallon in each units (98107 liters in total)

(2) For transformer bank No.4 (3 Nos.) of 120MVA, 220/110kV,
the test report No. is DMD/LDL/PCB-1592-1593/KSEB, Kalamassery dated 31.03.2017
quantity of oil is 8640 Gallon in each units (98107 liters in total)

Please give your offer for the onsite-dechlorination of PCB contaminated transformer oil at 220kV Substation, Kalamassery.
Since the transformer bank No.4 is in service, it is planning to do the dechlorination of the scrap transformer bank first. Please give your offer for carrying out the dechlorination of transformer oils in the above two transformer banks separately. Also want to know your remarks on the cost effectiveness of the work if
(a) the two works are executed one by one with some time duration in between
and
(b) if both the works are carried out at a time.
Regards....

Assistant Executive Engineer
220 kV Substation Subdivision Kalamassery
220kV Substation Compound, HMT Colony.P.O
Kalamassery-683503
aee220klsy@gmail.com / 9496009191

CPRI had received an email request from KSEB 220kV Substation Kalamassery

Annexure 4

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

Budgetary Offer

CPRI

No. DMD/PCB/2022/KSEB-KALAMASSERY Date : 03.08.2022

To,
The Assistant Executive Engineer
Kerala State Electricity Board Ltd.
220 kV Substation Subdivision Kalamassery
220 kV Substation Compound, HMT Colony P.O.,
Kalamassery - 683 503.

Sub : De-chlorination of PCB contaminated oil of transformer bank at M/s KSEB Limited,Kalmassery
Ref. E-mail, Dt. 01.08.2022

Sl. No.	Description	Quantity, ltrs	Unit Rate /ltr (Rs.)	Total Amount (Rs.)
1	Onsite dechlorination of PCB contaminated oil using CPRI Mobile PCB dechlorination unit (scrap transformer)	1,96,214	20.00	39,24,280.00
2	Flushing of PCB contaminated Transformer with new oil (20% of 196214L= 39243 L)	39,243	20.00	7,84,856.00
			Total	47,09,136.00
			IGST (18%)	8,47,644.48
			Grand Total	55,56,780.48

Terms & Conditions :

1. General site requirements 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 998393.
5. Please provide your GSTIN, HSN and SAC No.
6. Validity of offer : 3 months
7. GST/IGST : 18% (presently) (as applicable at the time of billing)
8. Final bill/Invoice:As per actual quantity treated

Dr. P. Thomas
Additional Director

Budgetary offer for carrying out PCB de-chlorination activity

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 15 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 7 Nos. (1 executives, 3 project engineers, 1 technicians and 2 drivers officers)
14) **Local conveyance :** Pickup and drop facility for PCB project team from Guest house to place of work
15) **Nitrogen cylinders :** 110 Nos. for whole operation (120kg/cm^2 capacity of commercial grade nitrogen)
16) **Contract Labors :** 2 Nos.

****

1

General site requirement for carrying out PCB de-chlorination activity.

Annexure 5

HMT Colony P O, Kalamassery - 683 503
Phone 0484 2988682 FCT : 9496009118
E- mail dcetklsy@gmail.com
CIN: U40100KL2011SGC027424
GST : 32AAECK2277NBZ1

No. TCK/ DB1/220kV KLSY /2022-23/ 1342 Date : 31.12.2022

To

Dr. P.Thomas
Additional Director/HOD
Dielectric Material Division
Central Power Research Institute
Bengaluru

Sir,

Sub - PCB de-chlorination work at 220kV Substation Kalamassery – reg.
Ref.- 1) Your email and offer No: DMD/PCB/2022/KSEB KALAMASSERY dated 03.08.2022
2) Order No. CETS-SE1/2022/3085(2)/1387 Tvm dated 22.12.2022 of the CE TS

Kind attention is invited to the following.

Referring to your Budgetary Offer vide reference (1) above, for the work 'Onsite de-chlorination of PCB contaminated transformer oil at 220kV Substation Kalamassery', please note that even though we have 2 Nos. 120MVA, 220/110kV GE make transformers having PCB contaminated transformer oil at 220kV Substation Kalamassery, Sanction has been obtained for executing the onsite de-chlorination of the PCB contaminated transformer oil in the 'Scrap transformer only' at present. The de-chlorination work of the transformer in service will be carried out as another work later. 100 KL

As per your offer vide ref (1), a requirement of 50% advance payment is specified. Since it is against the prevailing rules of KSEBL, it is requested to kindly waive this condition so as to issue Work Order for executing the work at the earliest.

Payment will be effected as per the conditions mentioned in our work order at the earliest, subsequent to the completion of the work.

Awaiting a favorable order at the earliest.

Yours faithfully,

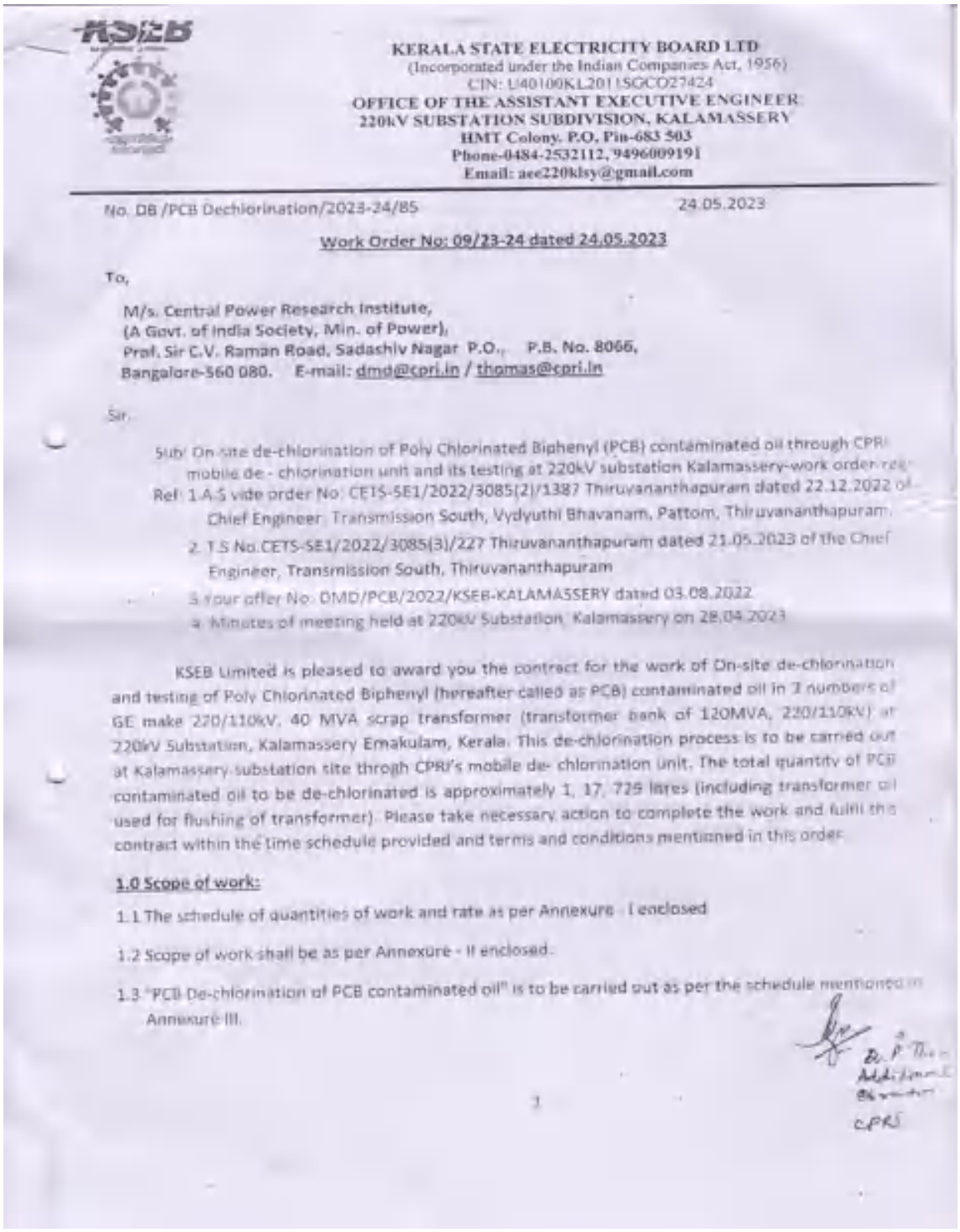
Deputy Chief Engineer

Copy to: The Executive Engineer, Transmission Division, Kalamassery.
Copy to : The Assistant Executive Engineer, 220kV Substation Subdivision, Kalamassery

1 | 2 Pages

Communication between M/s. CPRI and M/s. KSEB

Annexure 6



KERALA STATE ELECTRICITY BOARD LTD
(Incorporated under the Indian Companies Act, 1956)
CIN: U40100KL2011SGC027424
OFFICE OF THE ASSISTANT EXECUTIVE ENGINEER
220kV SUBSTATION SUBDIVISION, KALAMASSERY
HMT Colony. P.O. Pin-683 503
Phone-0484-2532112, 9496009191
Email: aee220klsy@gmail.com

No. DB /PCB Dechlorination/2023-24/85 24.05.2023

Work Order No: 09/23-24 dated 24.05.2023

To,

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

Sir,

Sub: On-site de-chlorination of Poly Chlorinated Biphenyl (PCB) contaminated oil through CPRI mobile de - chlorination unit and its testing at 220kV substation Kalamassery-work order reg.

Ref: 1.A.S vide order No: CETS-SE1/2022/3085(2)/1387 Thiruvananthapuram dated 22.12.2022 of Chief Engineer, Transmission South, Vydyuthi Bhavanam, Pattom, Thiruvananthapuram.

2. T.S No.CETS-SE1/2022/3085(3)/227 Thiruvananthapuram dated 21.05.2023 of the Chief Engineer, Transmission South, Thiruvananthapuram

3.Your offer No: DMD/PCB/2022/KSEB-KALAMASSERY dated 03.08.2022

4. Minutes of meeting held at 220kV Substation, Kalamassery on 28.04.2023

KSEB Limited is pleased to award you the contract for the work of On-site de-chlorination and testing of Poly Chlorinated Biphenyl (hereafter called as PCB) contaminated oil in 3 numbers of GE make 220/110kV, 40 MVA scrap transformer (transformer bank of 120MVA, 220/110kV) at 220kV Substation, Kalamassery Ernakulam, Kerala. This de-chlorination process is to be carried out at Kalamassery substation site through CPRI's mobile de- chlorination unit. The total quantity of PCB contaminated oil to be de-chlorinated is approximately 1, 17, 729 litres (including transformer oil used for flushing of transformer). Please take necessary action to complete the work and fulfil the contract within the time schedule provided and terms and conditions mentioned in this order.

1.0 Scope of work:

1.1 The schedule of quantities of work and rate as per Annexure - I enclosed

1.2 Scope of work shall be as per Annexure - II enclosed.

1.3 "PCB De-chlorination of PCB contaminated oil" is to be carried out as per the schedule mentioned in Annexure-III.

Dr. P. Thomas
Additional General Manager
CPRI

1

CPRI has received Work Oder No: 09/23-24, Dt. 24.05.2023.

Annexure 7

KERALA STATE ELECTRICITY BOARD LTD
(Incorporated under the Indian Companies Act, 1956)
CIN: U40100KL2011SGC027424
OFFICE OF THE ASSISTANT EXECUTIVE ENGINEER
220kV SUBSTATION SUBDIVISION, KALAMASSERY
HMT Colony. P.O, Pin-683 503
Phone- 9496009191, Email: aee220klsv@gmail.com

MINUTES OF MEETING CONVENED ON 09.06.2023 AT 220kV SUBSTATION SUB DIVISION, KALAMASSERY REGARDING ONSITE DECHLORINATION OF PCB CONTAMINATED OIL IN 120MVA SCRAP TRANSFORMERS BANK AT 220kV SUBSTATION, KALAMASSERY

Meeting commenced at 12:30Hrs with Assistant Executive Engineer, 220kV Substation Subdivision, Kalamassery in the Chair. The Chair welcomed all the participants to the meeting. Dr. P.Thomas, Additional Director/HOD, Dielectric Material Division, CPRI visited 220 KV Substation Kalamassery on 09.06.2023 and made a presentation about "the PCB de-chlorinated activity" at the Conference Hall of Transmission Circle, Kalamassery. He then inspect the site for the arrangements done to undertake the PCB de-chlorination work- "Onsite dechlorination of PCB contaminated oil in 120 MVA scrap Transformer Bank at 220kV Substation, Kalamassery" which is scheduled to be commenced by 12.06.2023.

The following points were discussed.

1. The onsite de-chlorination plant and four Project Engineers from CPRI have already arrived at site on 05.06.2023 and arrangements are being done for the de-chlorination work. The work is expected to be commenced by the next week.
2. PCB dechlorination work will be carried out in a batch process and in one batch around 4000 litres of PCB oil will be dechlorinated and this process will take 2 days.
3. To complete the de-chlorination work of whole quantity of PCB contaminated oil available at Kalamassery, it may take about 90 days taking into account the rainy season. No dechlorination work wil be done on Sundays and important Holidays.
4. KSEBL agreed to support all the site requirements as per the terms and conditions given in the quotation. Accordingly the site preparation works are being carried out by KSEBL.
5. The mixer unit is placed between the scrap transformers and the onsite de-chlorination plant and a suitable covering will be provided by KSEBL over the mixer unit in order to avoid occurance of accidents when Sodium Dispersed Oil come in contact with water when it rains.
6. A separate store room is provided to store the Sodium dispersion drums with some space for setting up of the testing of PCBs.
7. The treated oil and sludge generated contains Sodium chloride, Sodium hydroxide, Water, Biphenyl etc. which is free from PCB are required to be disposed as per the norms of Kerala State Pollution Control Board.
8. KSEBL will identify suitable agency who is authorized by the Kerala State Pollution Control Board to dispose the sludge and treated oil
9. For each batch (4000 litres) of PCB dechlorination oil, around ¾ drums of sludge (contains Sodium Chloride, Sodium Hydroxide, Water and Biphenyl) and 1.5 drum of water with little oil will be collected, which required to be disposed as per the norms of State Pollution Control Board
11. The De-chlorination work is planned to be taken up in a phased manner as given in the below table.

Regd. Office: Vydyuthi Bhavanam, Pattom, Thiruvananthapuram – 695 004. website: www.kseb.in

Minutes of Meeting Held Between M/s. CPRI and M/s. KSEB on 09.06.2023

	Unit No	Quantity in Litres	Duration
1	GE make, 220/110kV , 40 MVA ,Unit no:1	32702+20% flushing(6540)= 39,242	From June 12 to July 4th
2	GE make , 220/110kV, 40 MVA ,Unit no:2	32702+20% flushing(6540)= 39,242	From July 5th to July 27th
3	GE make , 220/110kV, 40 MVA,Unit no:3	32702+20% flushing(6540)= 39,242	From July 28th to Aug 19th

Participants

Sl.no	Name and Designation	Signature
1	Smt.A.A. Ruksana, Assistant Executive Engineer, 220kV Substation Subdivision, Kalamassery	
2	Dr. P. Thomas, Additional Director/HOD, Dielectric Material Division, CPRI Bangalore	
3.	Sri. Akhinkumar S, Assistant Engineer, Maintenance Section I, 220kV Substation Kalamassery	
4.	Sri. Anilkumar G, Assistant Engineer, Maintenance Section II, 220kV Substation Kalamassery	
5	Sri. Tom Jose, Project Engineer, CPRI Bangalore	

Meeting concluded at 13:15Hrs.

Assistant Executive Engineer

Copy submitted to: 1. The Deputy Chief Engineer, Transmission Circle, Kalamassery

2. The Executive Engineer, Transmission Division, Kalamassery

Copy to: All Participants

Endt on: DB10/PCB/2023-24/122 dated 09.06.2023

Assistant Executive Engineer

Minutes of Meeting Held Between M/s. CPRI and M/s. KSEB on 09.06.2023

Annexure 8 (PCB Analysis Chromatographs)

Batch 1 - PCB Chromatograph – Before Dechlorination (Transformer Sl.No.D57147)

Software Version	: 6.3.2.0646	Date	: 16-06-2023 15:26:47
Operator	: manager	Sample Name	: BATCH-1-BD-SLNO-D577147-PCB
Sample Number	: 002	Study	: PCB ANALYSIS
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 16-06-2023 14:47:06	Dilution Factor	: 1.00
		Cycle	: 1

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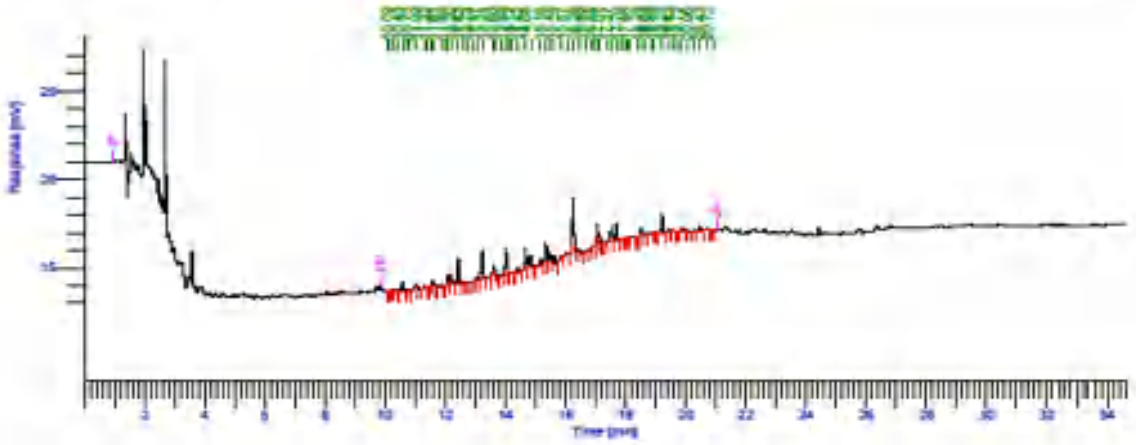

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	89053.18	21772.18	100.00	8.9290
			89053.18	21772.18	100.00	8.9290

Batch 1 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 16-06-2023 17:31:13
Operator	: manager	Sample Name	: BATCH-1-AD-SLNO-D577147-PCB
Sample Number	: 004	Study	: PCB ANALYSIS
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
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		Cycle	: 1

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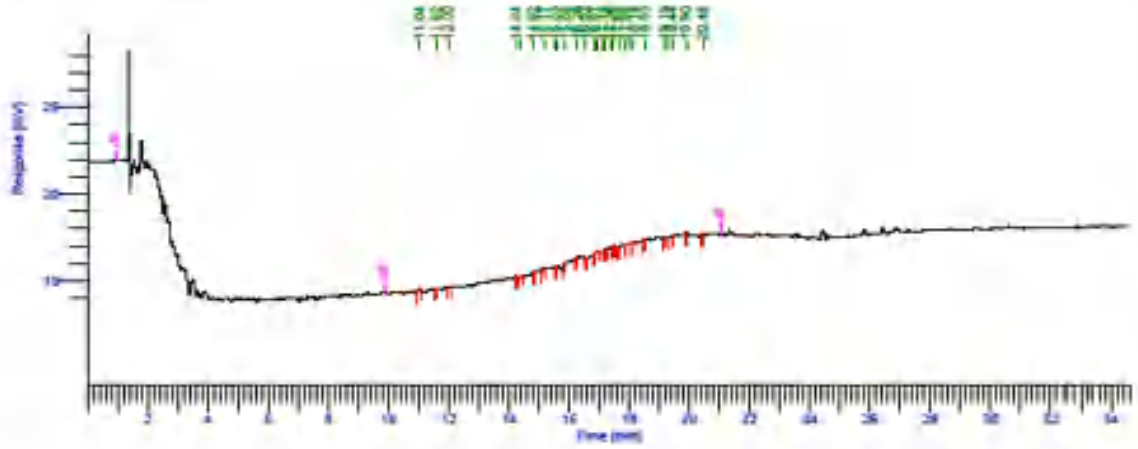

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2885.79	924.11	100.00	0.2893
			2885.79	924.11	100.00	0.2893

Batch 2 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 20-06-2023 13:58:49
Operator	: manager	Sample Name	: BATCH-2-AD-SLNO-D577147-PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 20-06-2023 12:56:33	Dilution Factor	: 1.00
		Cycle	: 1

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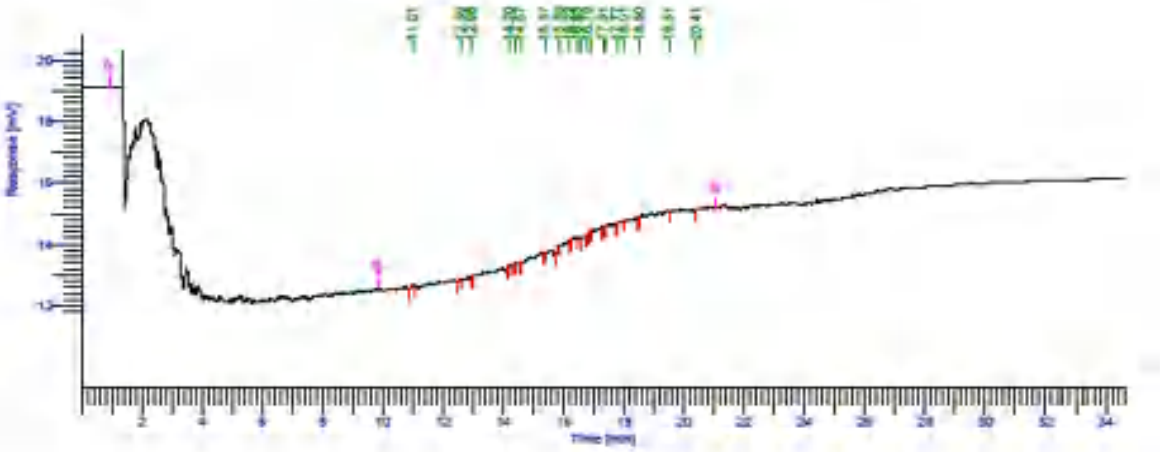

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1384.53	354.85	100.00	0.1388
			1384.53	354.85	100.00	0.1388

Batch 3 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 22-06-2023 14:13:29
Operator	: manager	Sample Name	: BATCH-3-AD-SLNO-D577147-PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 22-06-2023 13:08:27	Dilution Factor	: 1.00
		Cycle	: 1

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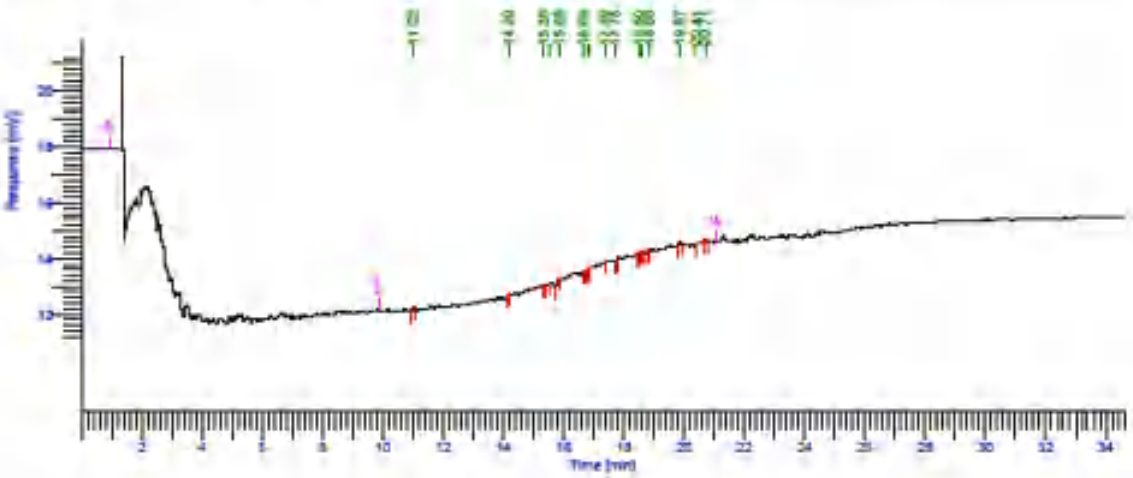

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2320.77	548.31	100.00	0.2327
			2320.77	548.31	100.00	0.2327

Batch 4 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 24-06-2023 15:23:47
Operator	: manager	Sample Name	: BATCH-4-AD-SLNO-D577147 PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: 680S16090202	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 24-06-2023 14:47:54	Dilution Factor	: 1.00
		Cycle	: 1

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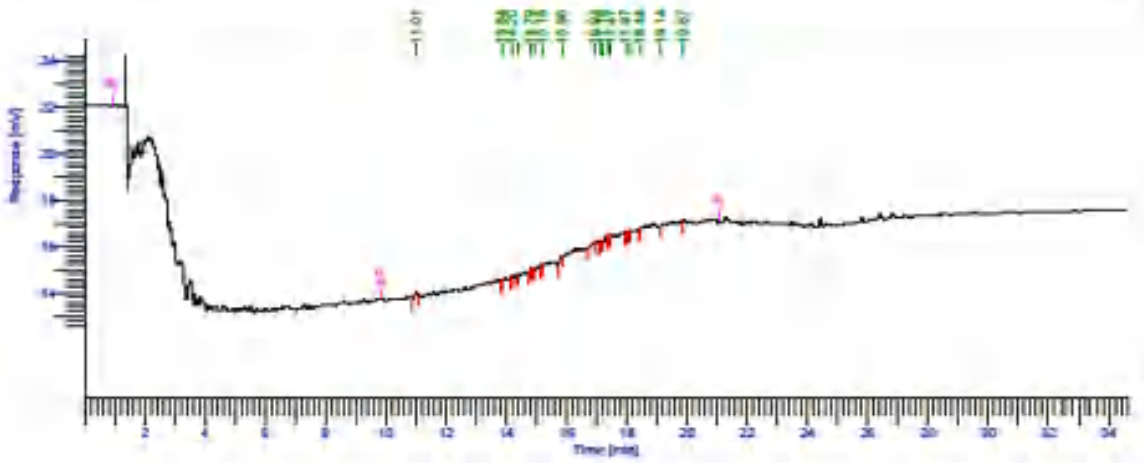

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2290.08	560.11	100.00	0.2296
			2290.08	560.11	100.00	0.2296

Batch 5 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 27-06-2023 13:44:25
Operator	: manager	Sample Name	: BATCH-5-AD-SLNO-D577147 PCB
Sample Number	: 002	Study	: pcb
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 27-06-2023 13:08:10	Dilution Factor	: 1.00
		Cycle	: 1

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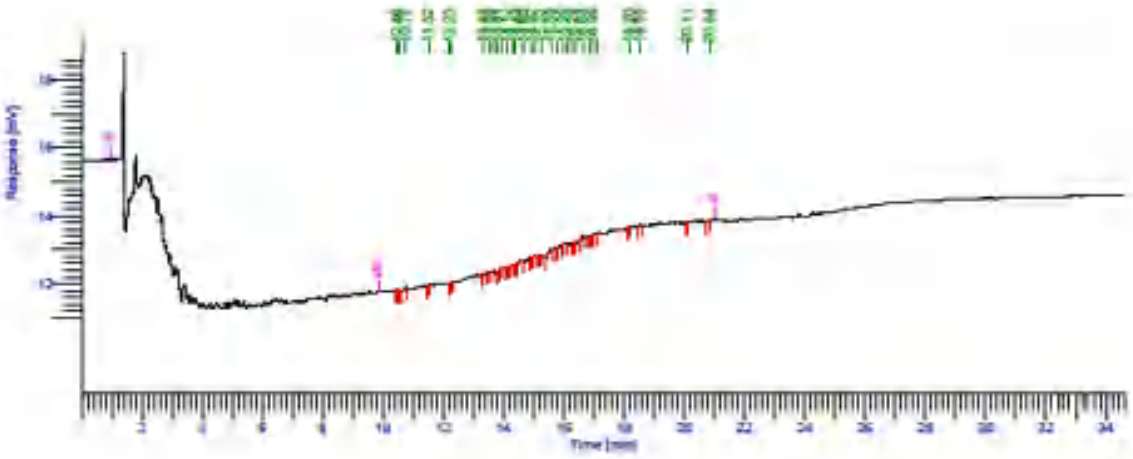

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2617.49	561.01	100.00	0.2624
			2617.49	561.01	100.00	0.2624

Batch 6 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 01-07-2023 15:05:22
Operator	: manager	Sample Name	: BATCH-6-AD-SLNO-D577147-PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 01-07-2023 13:32:04	Cycle	: 1

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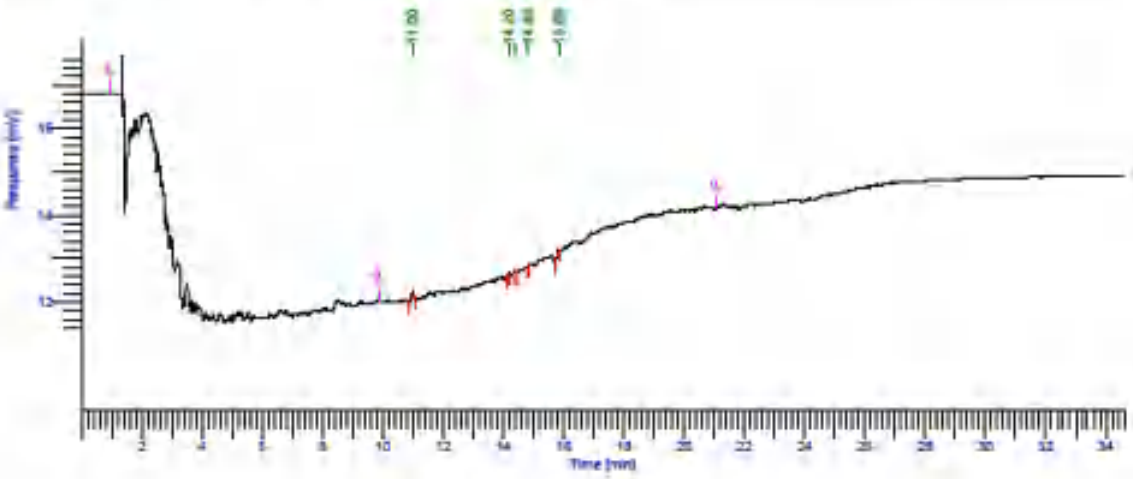

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1569.62	317.95	100.00	0.1574
			1569.62	317.95	100.00	0.1574

Batch 7 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 04-07-2023 16:26:09
Operator	: manager	Sample Name	: BATCH-7-AD-SLNO-D577147-PCB
Sample Number	: 004	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 04-07-2023 15:03:11	Dilution Factor	: 1.00
		Cycle	: 1

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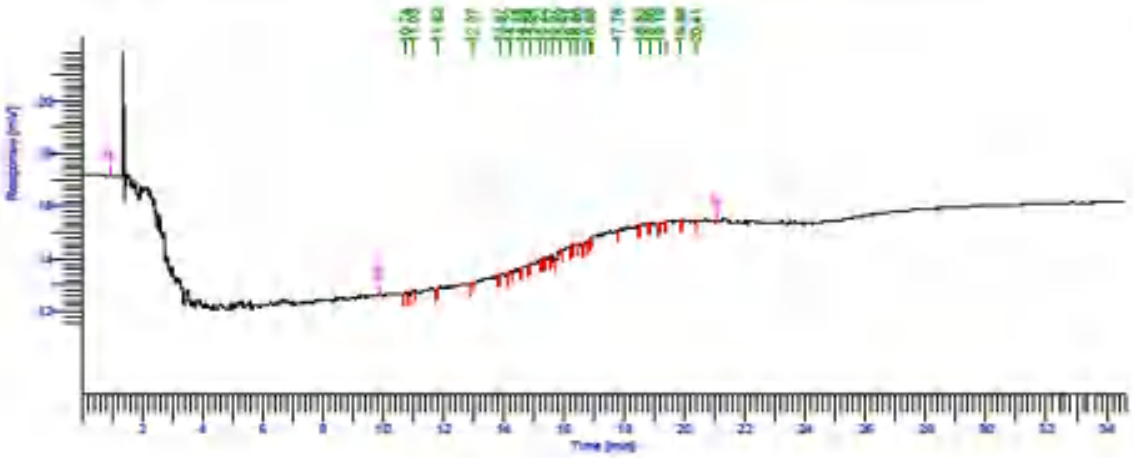
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\04.07.23.seq



PCB ANALYSIS REPORT

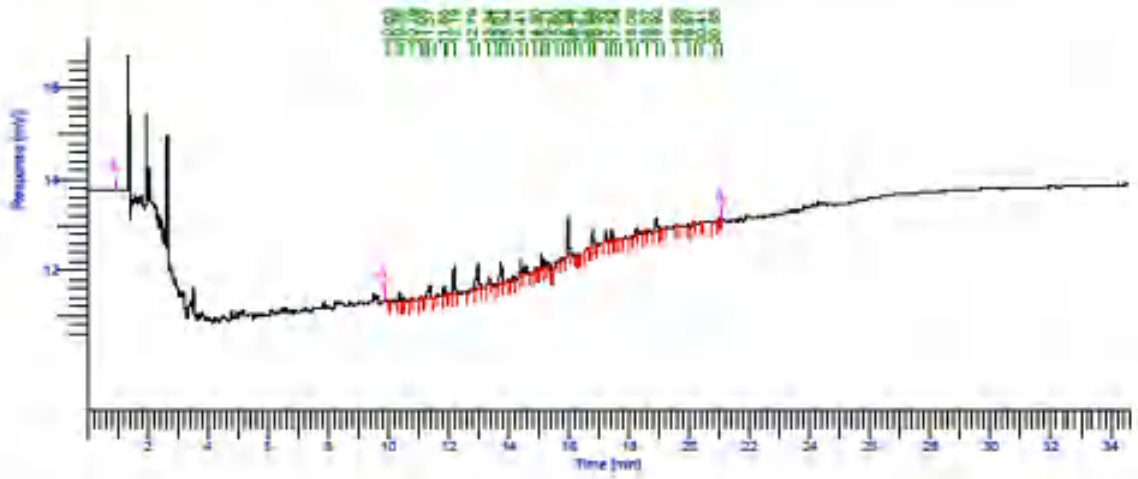
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2490.66	596.41	100.00	0.2497
			2490.66	596.41	100.00	0.2497

Batch 8 - PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 07-07-2023 12:37:24
Operator	: manager	Sample Name	: BATCH-8-BD-SLNO-D577147 PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 07-07-2023 11:48:30	Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\07.07.23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\07.07.23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\07.07.23.seq



PCB ANALYSIS REPORT

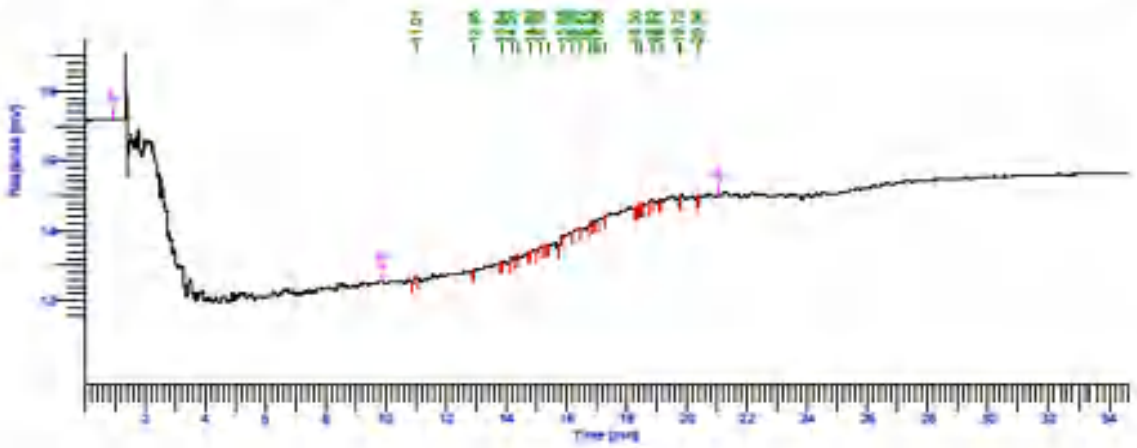
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	28947.97	6992.24	100.00	2.9025
			28947.97	6992.24	100.00	2.9025

Batch 8 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 07-07-2023 15:46:35
Operator	: manager	Sample Name	: BATCH-8-AD-SLNO-D577147 PCB
Sample Number	: 004	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 07-07-2023 13:55:49	Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\07.07.23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\07.07.23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\07.07.23.seq



PCB ANALYSIS REPORT

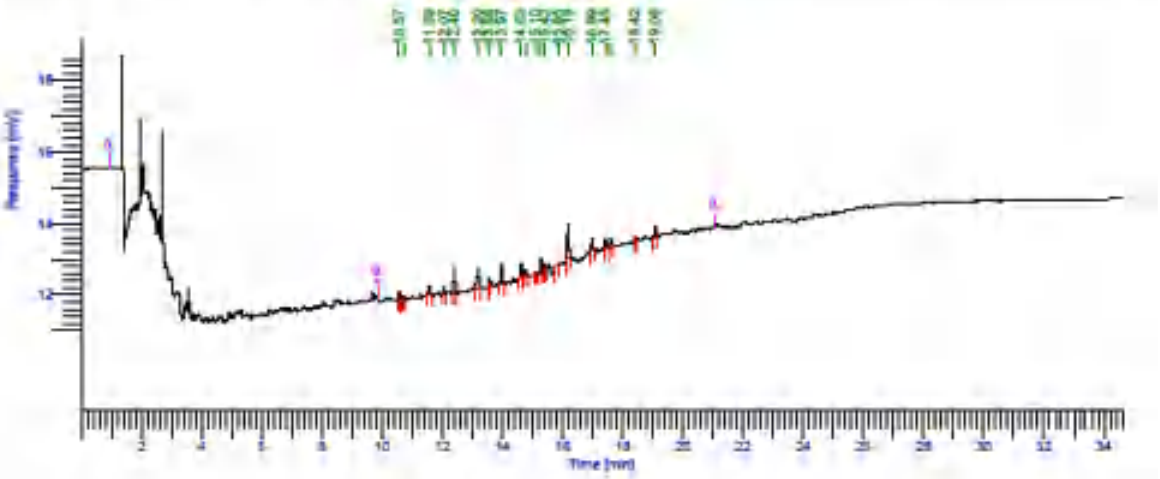
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2689.48	643.50	100.00	0.2697
			2689.48	643.50	100.00	0.2697

Batch 9- PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 11-07-2023 13:44:03
Operator	: manager	Sample Name	: BATCH-9-BD-SLNO-D577147 PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 11-07-2023 12:54:20	Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\11-07-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\11-07-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\11-07-23.seq



PCB ANALYSIS REPORT

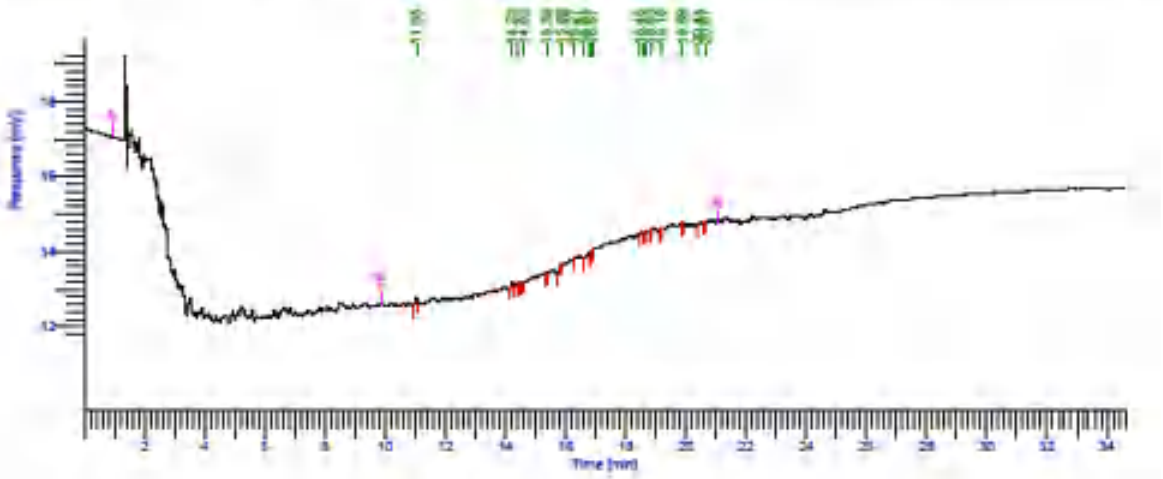
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	24076.80	6216.55	100.00	2.4141
			24076.80	6216.55	100.00	2.4141

Batch 9 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 11-07-2023 15:06:08
Operator	: manager	Sample Name	: BATCH-9-AD-SLNO-D577147 PCB
Sample Number	: 004	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 11-07-2023 14:18:23	Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\11-07-23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\11-07-23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\11-07-23.seq



PCB ANALYSIS REPORT

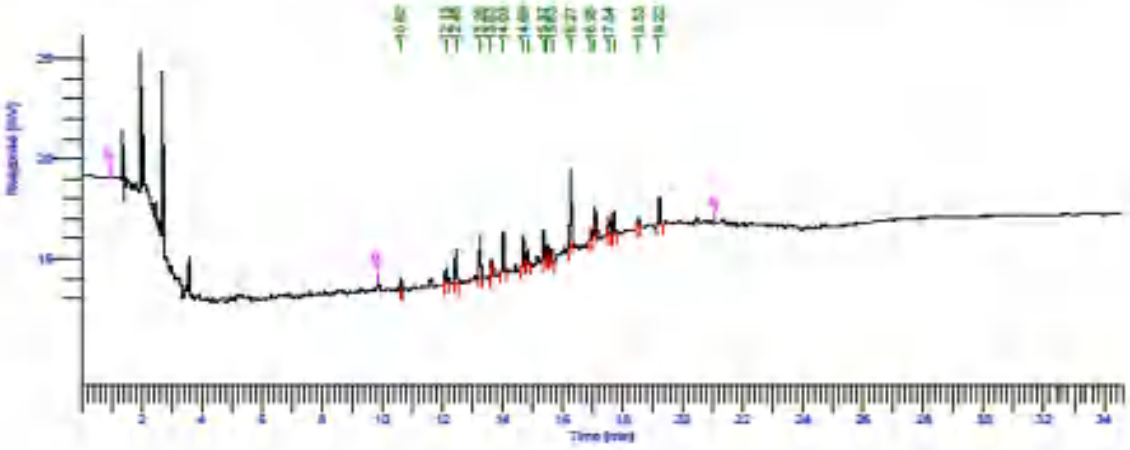
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1668.63	487.79	100.00	0.1673
			1668.63	487.79	100.00	0.1673

Batch 10 - PCB Chromatograph – Before Dechlorination (Transformer Sl.No.D57146)

Software Version	: 6.3.2.0646	Date	: 13-07-2023 12:47:05
Operator	: manager	Sample Name	: BATCH-10-BD-D577146 PCB
Sample Number	: 004	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 13-07-2023 12:07:07	Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\13.07.2023\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\13.07.2023\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\13.07.2023.seq



PCB ANALYSIS REPORT

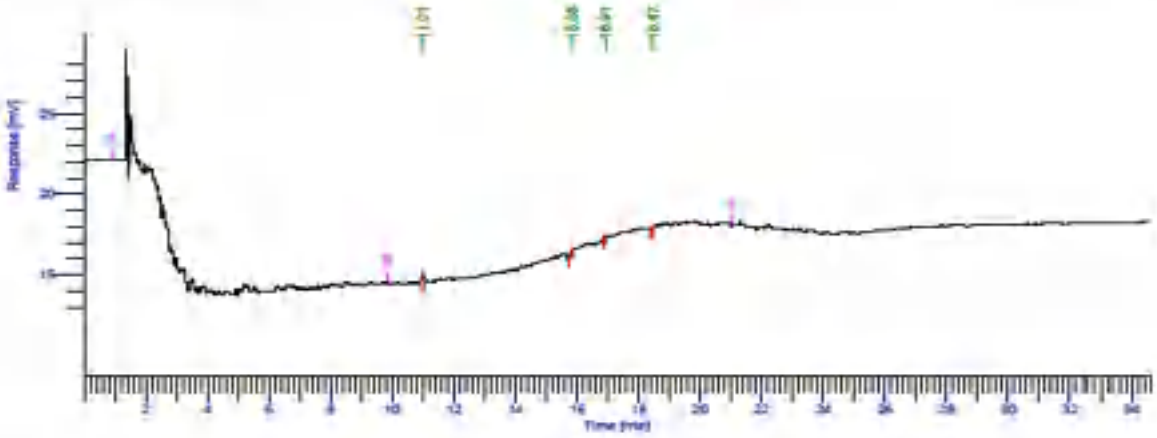
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	82120.65	21626.29	100.00	8.2339
			82120.65	21626.29	100.00	8.2339

Batch 10 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 13-07-2023 16:40:33
Operator	: manager	Sample Name	: BATCH-10-AD-D577146 PCB
Sample Number	: 006	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 13-07-2023 14:52:15	Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\13.07.2023\1006.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\13.07.2023\1006.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\13.07.2023.seq



PCB ANALYSIS REPORT

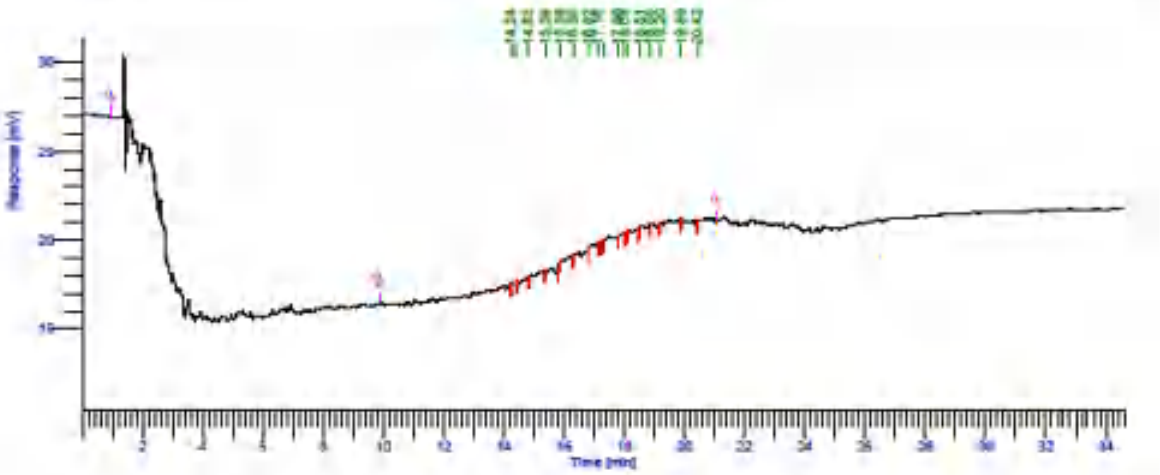
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2893.49	752.73	100.00	0.2901
			2893.49	752.73	100.00	0.2901

Batch 11 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 15-07-2023 16:14:53
Operator	: manager	Sample Name	: BATCH-11-AD-SLNO-D577146 PCB
Sample Number	: 006		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 15-07-2023 15:38:39	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\15.07.2023\1006.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\15.07.2023\1006.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\15.07.23 N.seq



PCB ANALYSIS REPORT

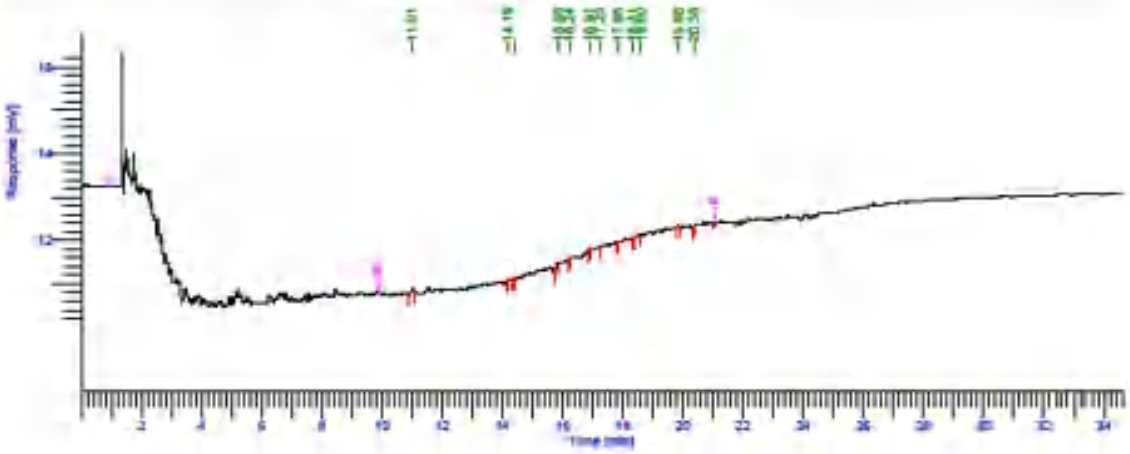
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2358.66	695.68	100.00	0.2365
			2358.66	695.68	100.00	0.2365

Batch 12 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 18-07-2023 14:50:41
Operator	: manager	Sample Name	: BATCH-12-AD-SLNO-D577146 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 18-07-2023 14:05:10	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\18.07.2023\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\18.07.2023\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\18.07.2023.seq



PCB ANALYSIS REPORT

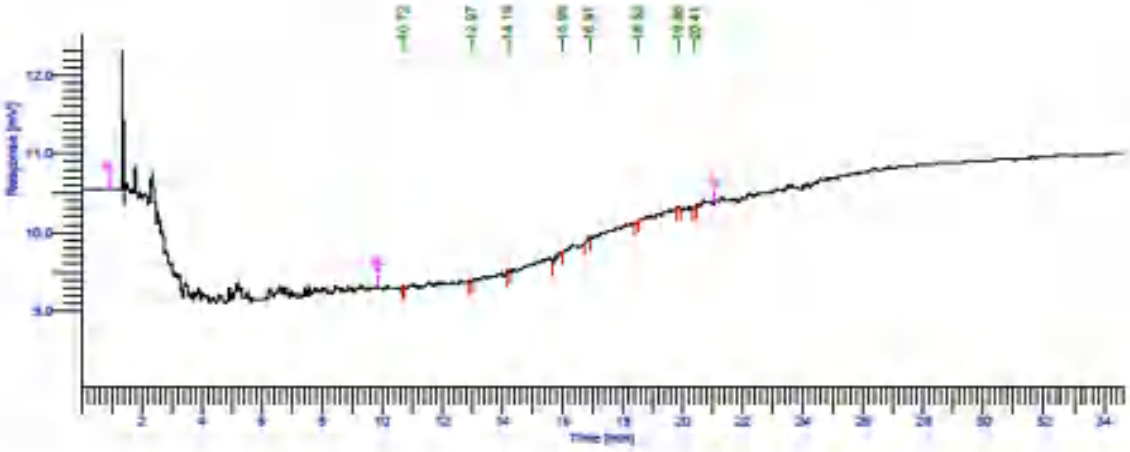
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1436.71	263.91	100.00	0.1441
			1436.71	263.91	100.00	0.1441

Batch 13 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 20-07-2023 14:45:36
Operator	: manager	Sample Name	: BATCH-13-AD-SLNO-577146 PCB
Sample Number	: 004	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 20-07-2023 14:07:13	Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\20.07.2023\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\20.07.2023\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\20.07.2023.seq



PCB ANALYSIS REPORT

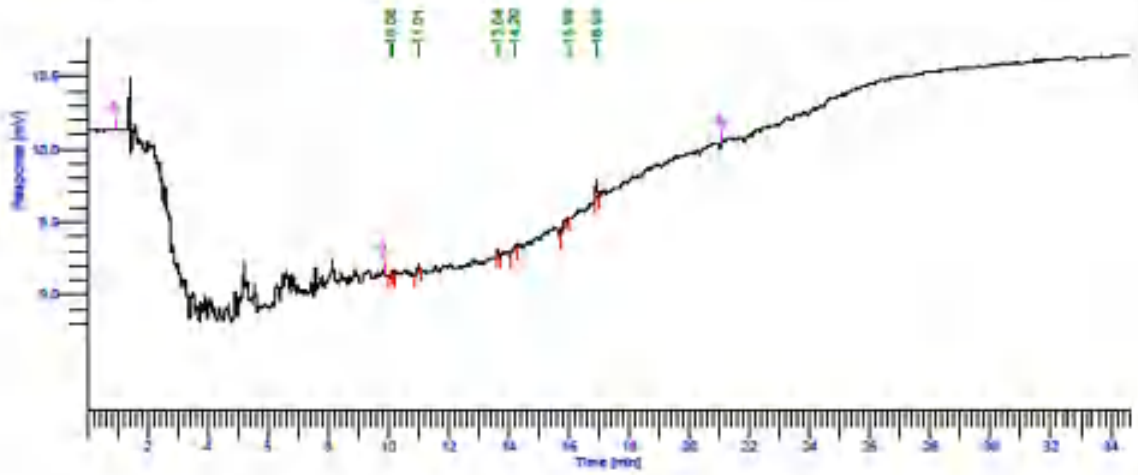
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1644.28	199.41	100.00	0.1649
			1644.28	199.41	100.00	0.1649

Batch 14 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 22-07-2023 13:31:55
Operator	: manager	Sample Name	: BATCH-14-AD-SLNO-D577146 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB ANALYSIS
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 22-07-2023 12:48:06	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\22.07.2023\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\22.07.2023\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\22.07.23 PCB.seq



PCB ANALYSIS REPORT

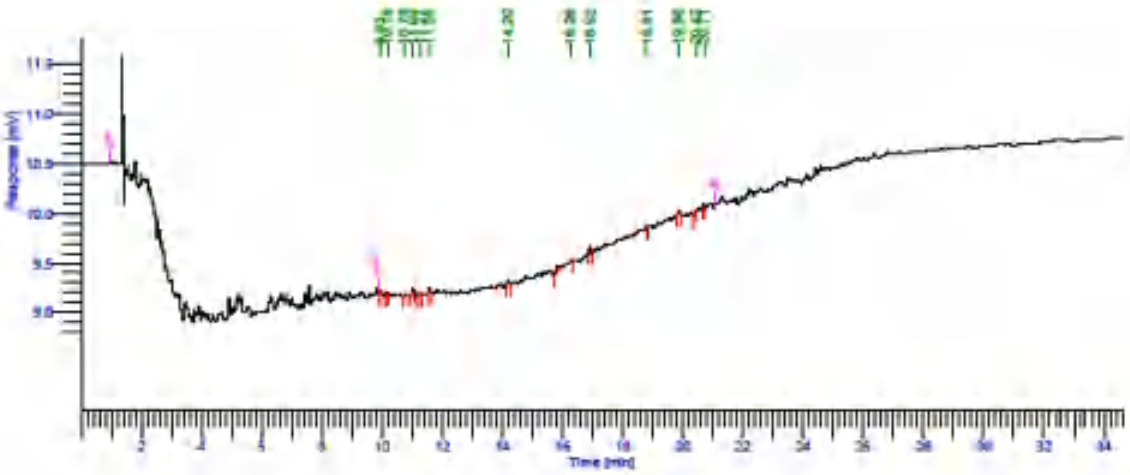
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1798.47	303.70	100.00	0.1803
			1798.47	303.70	100.00	0.1803

Batch 15 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 25-07-2023 15:45:27
Operator	: manager	Sample Name	: BATCH-15-AD-SLNO-D577146 PCB
Sample Number	: 004		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 25-07-2023 15:07:41	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25-07-23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25-07-23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\27-07-23.seq



PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2198.49	423.20	100.00	0.2204
			2198.49	423.20	100.00	0.2204

Batch 16 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 27-07-2023 15:29:42
Operator	: manager	Sample Name	: BATCH-16-AD-SLNO-D577146 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: 680S16090202	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 27-07-2023 14:53:20	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\27-07-23\1002.raw
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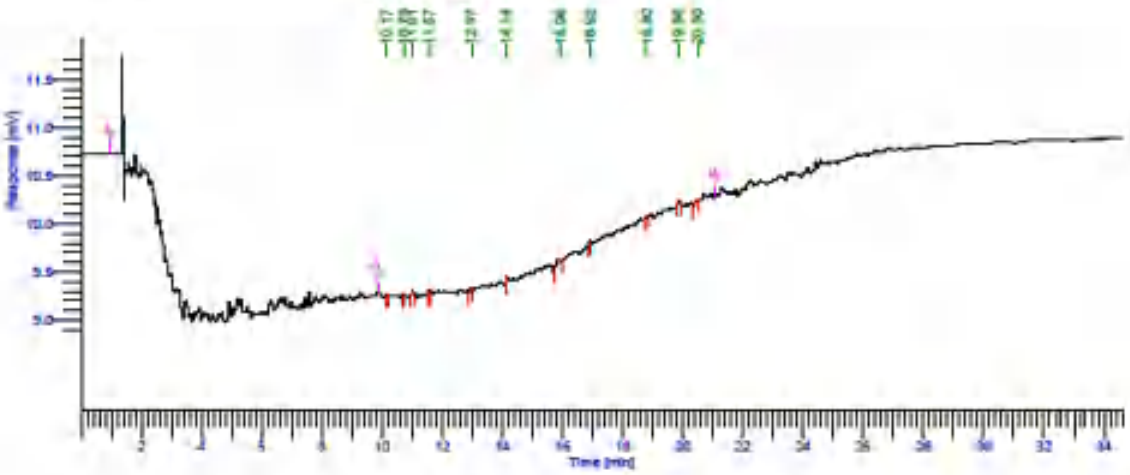
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\27-07-23 .seq



PCB ANALYSIS REPORT

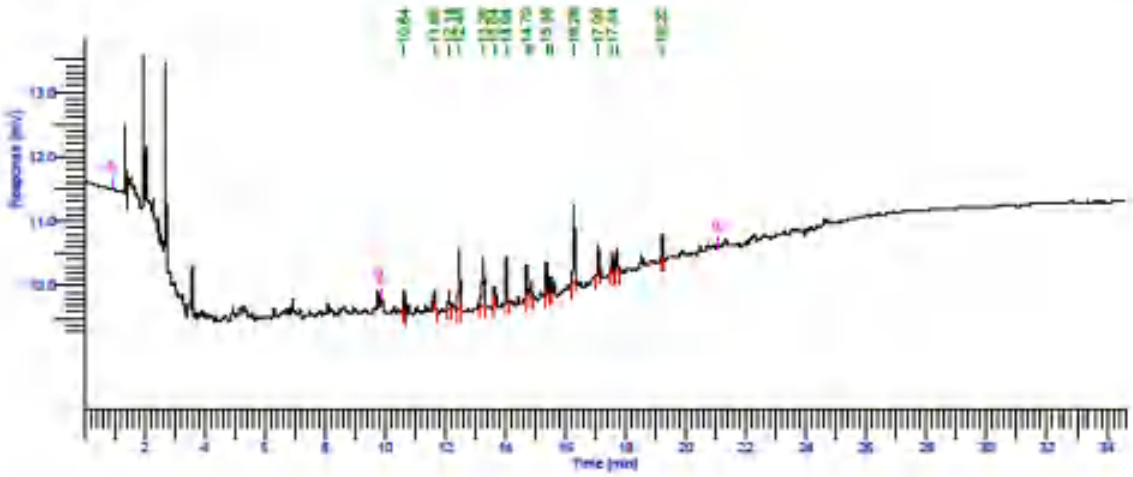
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1653.66	328.16	100.00	0.1658
			1653.66	328.16	100.00	0.1658

Batch 17 - PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 29-07-2023 12:54:33
Operator	: manager	Sample Name	: BATCH-17-BD-SLNO-D577146 PCB F
Sample Number	: 002		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: None	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 29-07-2023 10:58:12	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\29-07-23.seq



PCB ANALYSIS REPORT

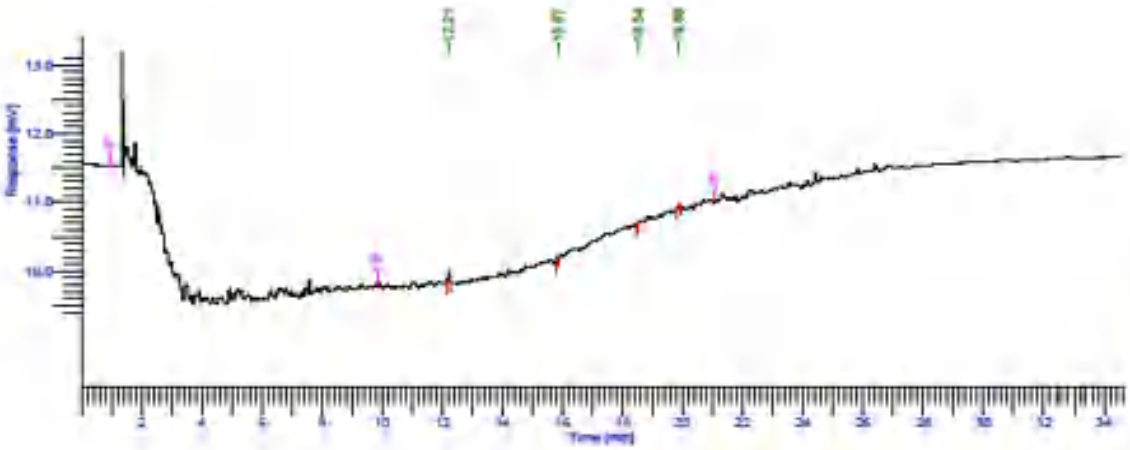
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	28483.91	7413.04	100.00	2.8560
			28483.91	7413.04	100.00	2.8560

Batch 17- PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 01-08-2023 10:08:03
Operator	: manager	Sample Name	: BATCH-17-AD-SLNO-D577146 PCB F
Sample Number	: 004		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: None	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 29-07-2023 13:47:37	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\29-07-23.seq



PCB ANALYSIS REPORT

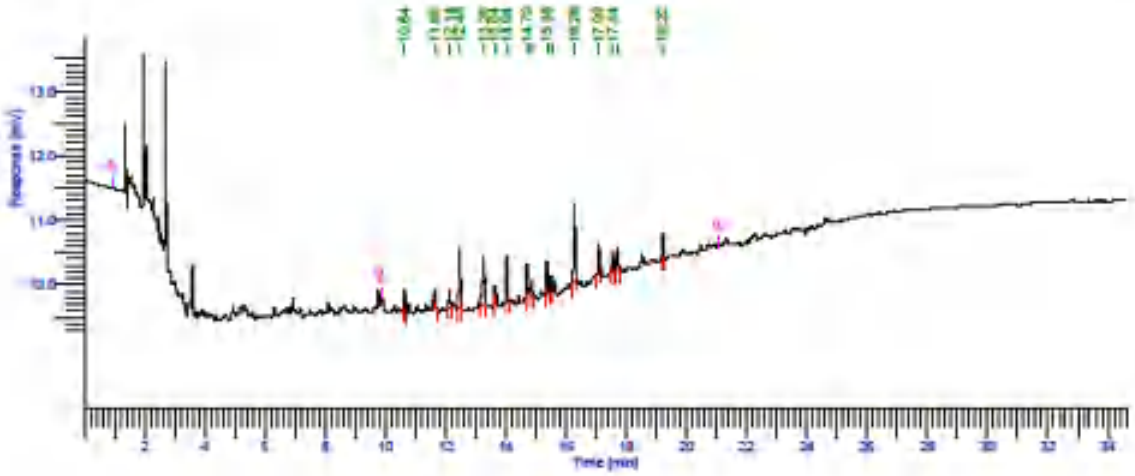
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	894.78	223.12	100.00	0.0897
			894.78	223.12	100.00	0.0897

Batch 18 - PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 29-07-2023 12:54:33
Operator	: manager	Sample Name	: BATCH-17-BD-SLNO-D577146 PCB F
Sample Number	: 002		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: None	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 29-07-2023 10:58:12	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\29-07-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\29-07-23.seq



PCB ANALYSIS REPORT

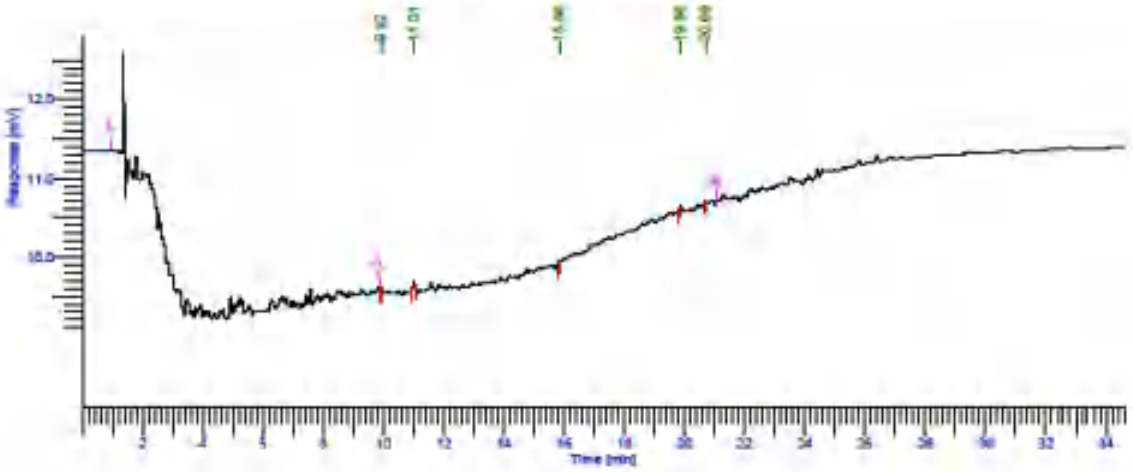
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	28483.91	7413.04	100.00	2.8560
			28483.91	7413.04	100.00	2.8560

Batch 18 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 01-08-2023 14:56:23
Operator	: manager	Sample Name	: BATCH-18-AD-SLNO-D577146 PCB
Sample Number	: 004		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 01-08-2023 14:16:47	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\01-08-23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\01-08-23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\01-08-23.seq



PCB ANALYSIS REPORT

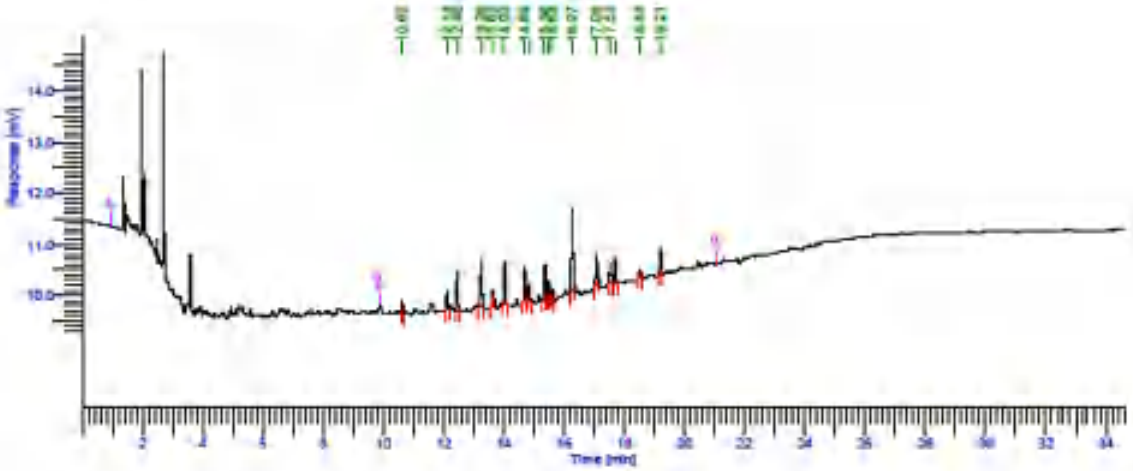
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	591.03	176.70	100.00	0.0593
			591.03	176.70	100.00	0.0593

Batch 19 - PCB Chromatograph – Before Dechlorination (Transformer Sl.No.D57148)

Software Version	: 6.3.2.0646	Date	: 03-08-2023 12:17:43
Operator	: manager	Sample Name	: BATCH-19-BD-SLNO-D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 03-08-2023 10:59:09	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\03-08-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\03-08-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 - Copy.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 - Copy.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\03-08-23.seq



PCB ANALYSIS REPORT

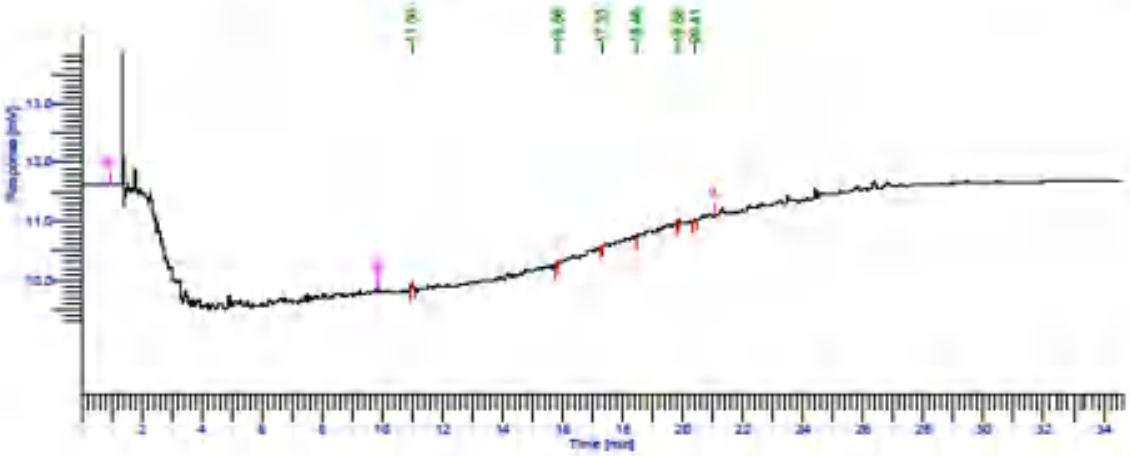
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	35224.84	9226.49	100.00	7.0637
			35224.84	9226.49	100.00	7.0637

Batch 19 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 03-08-2023 16:22:32
Operator	: manager	Sample Name	: BATCH-19-AD-SLNO-D577148 PCB
Sample Number	: 004		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 03-08-2023 15:37:36	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\03-08-23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\03-08-23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 - Copy.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 - Copy.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\03-08-23.seq



PCB ANALYSIS REPORT

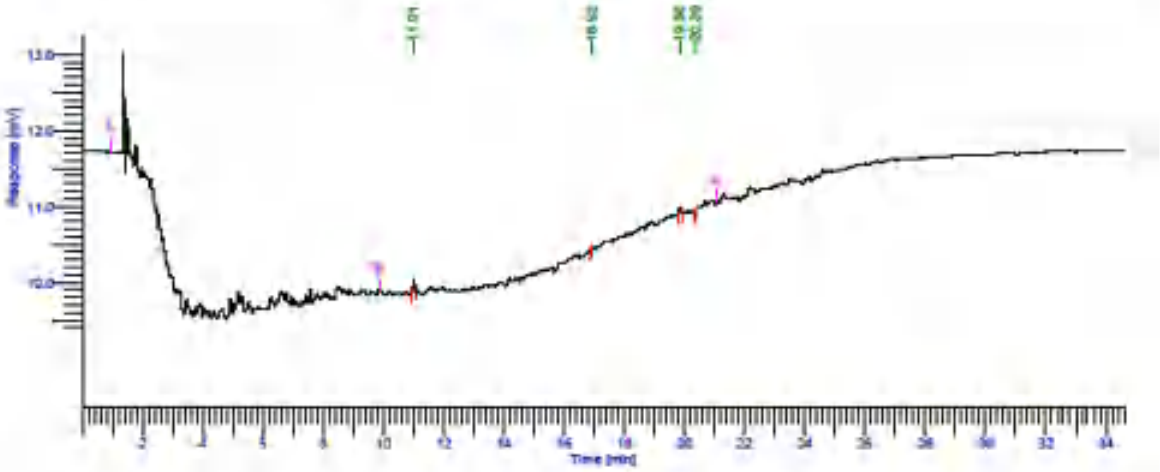
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	635.37	162.34	100.00	0.1274
			635.37	162.34	100.00	0.1274

Batch 20 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 05-08-2023 16:00:19
Operator	: manager	Sample Name	: BATCH-20-AD-SLNO-D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: 680S16090202	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 05-08-2023 15:23:09	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\05-08-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\05-08-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\05-08-23.seq



PCB ANALYSIS REPORT

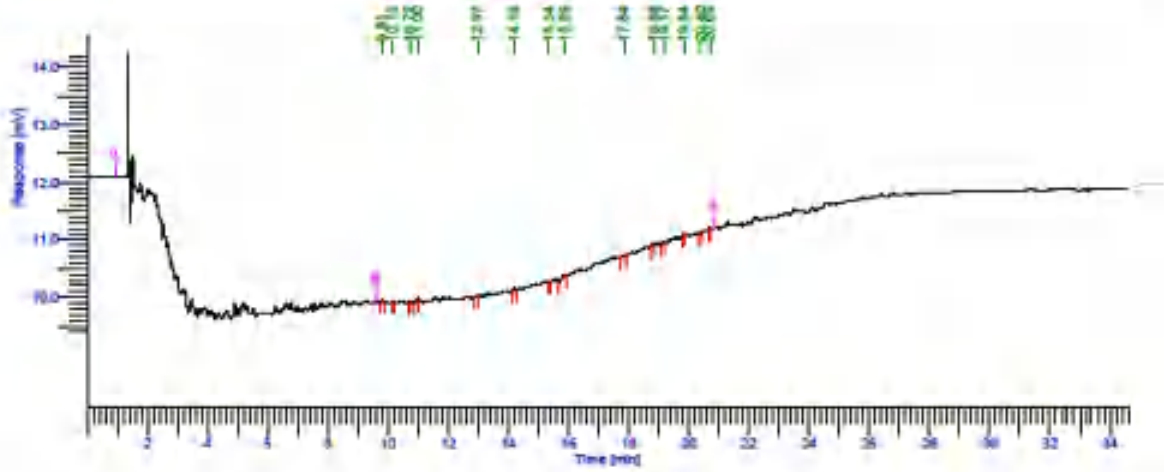
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	838.07	230.40	100.00	0.0840
			838.07	230.40	100.00	0.0840

Batch 21 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 08-08-2023 16:13:54
Operator	: manager	Sample Name	: BATCH-21-AD-SLNO-D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 08-08-2023 15:25:22	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\08.08.23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\08.08.23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\08.08.23.seq



PCB ANALYSIS REPORT

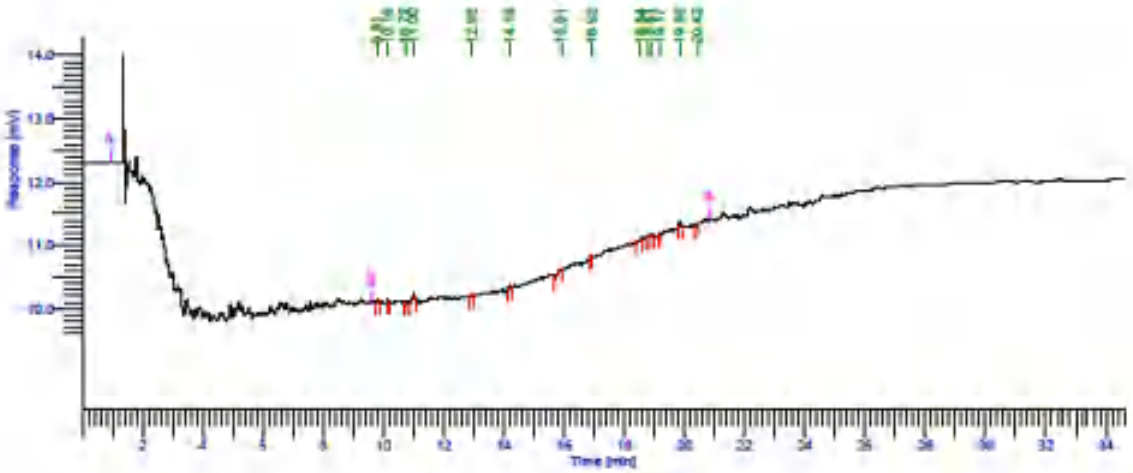
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2095.80	406.14	100.00	0.0696
			2095.80	406.14	100.00	0.0696

Batch 22 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 10-08-2023 16:45:05
Operator	: manager	Sample Name	: BATCH-22-AD-SLNO-D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 10-08-2023 15:19:42	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\10.08.2023\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\10.08.2023\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\10.08.2023 R.seq



PCB ANALYSIS REPORT

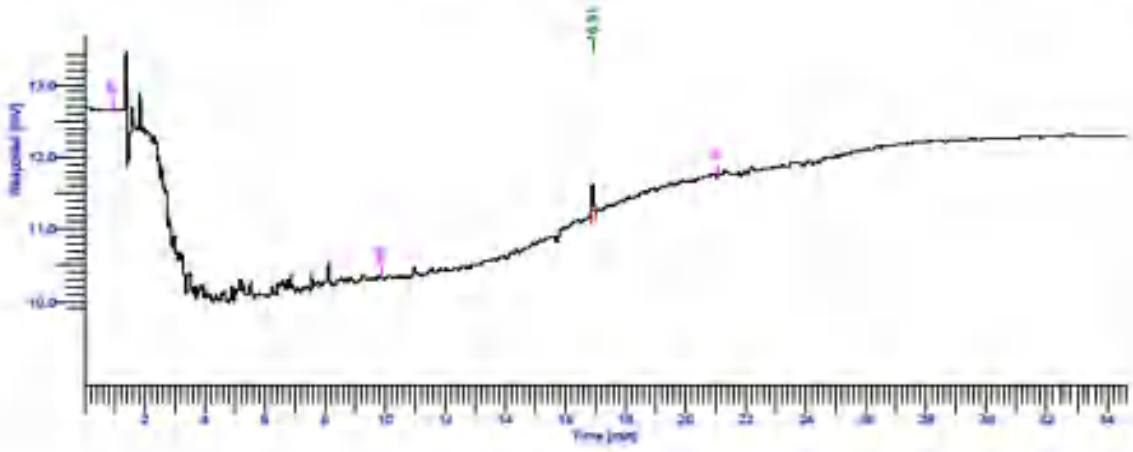
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2401.26	490.51	100.00	0.0798
			2401.26	490.51	100.00	0.0798

Batch 23 - PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 12-08-2023 16:31:40
Operator	: manager	Sample Name	: BATCH-23-SLN0-D577148 PCB
Sample Number	: 002	Study	: PCB
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Clarus 680	Channel	: A
Instrument Serial #	: None	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 34.60 min
Sampling Rate	: 12.5000 pts/s		
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000	Area Reject	: 0.000000
Data Acquisition Time	: 12-08-2023 15:50:54	Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\12.08.2023\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\12.08.2023\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\12.08.2023.seq



PCB ANALYSIS REPORT

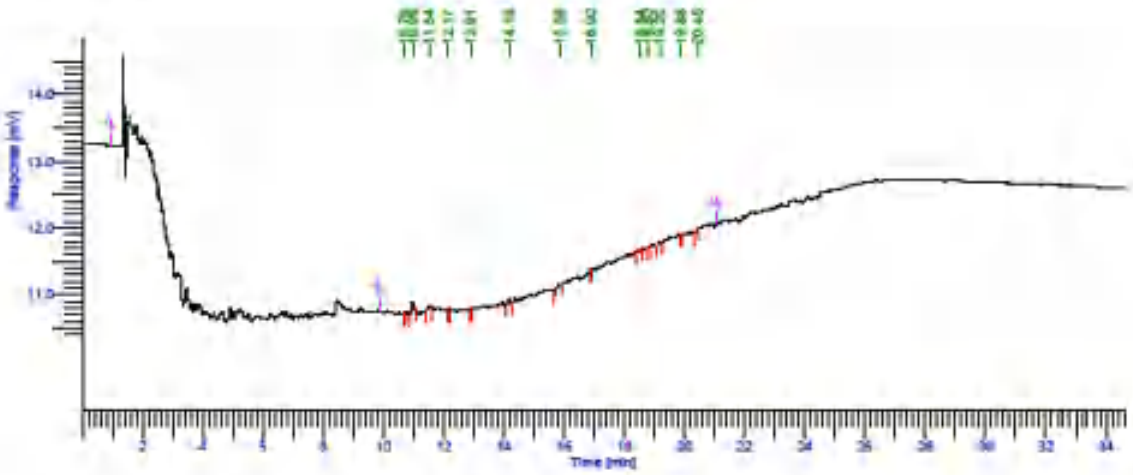
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	1537.63	381.08	100.00	0.1542
			1537.63	381.08	100.00	0.1542

Batch 24- PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 17-08-2023 19:00:06
Operator	: manager	Sample Name	: BATCH-24-AD-SLNO-D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: pcb
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 17-08-2023 17:28:24	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\17.08.2023\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\17.08.2023\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\17.08.2023.seq



PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2563.00	492.80	100.00	0.2570
			2563.00	492.80	100.00	0.2570

Batch 25- PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 21-08-2023 15:45:53
Operator	: manager	Sample Name	: BATCH-25-AD-AD-SLNO:D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: 680S16090202	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 21-08-2023 15:08:10	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\data002-20230821-150831.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\data002-20230821-150831.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.ad,15.07.2023.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
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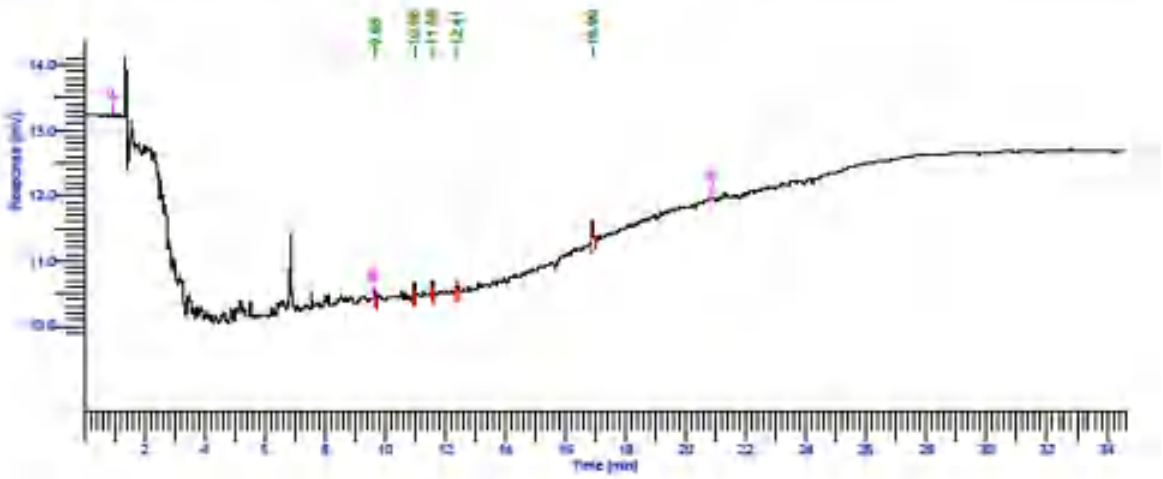

PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	2274.86	690.69	100.00	0.0756
			2274.86	690.69	100.00	0.0756

Batch 26- PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 24-08-2023 14:29:46
Operator	: manager	Sample Name	: BATCH-26 BD SLNO:D577148 PCB
Sample Number	: 002		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 24-08-2023 12:58:29	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\24.08.23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\24.08.23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
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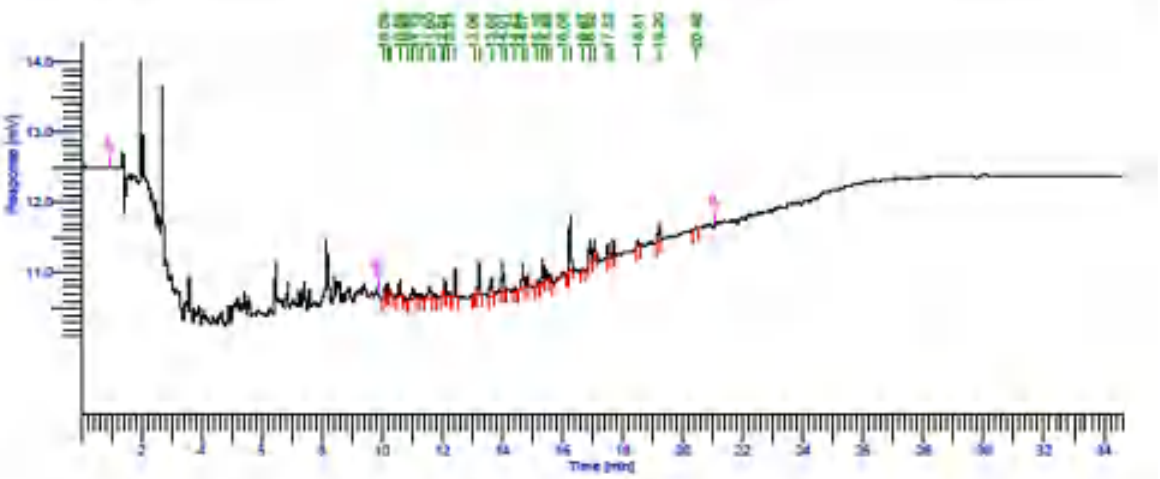


PCB ANALYSIS REPORT

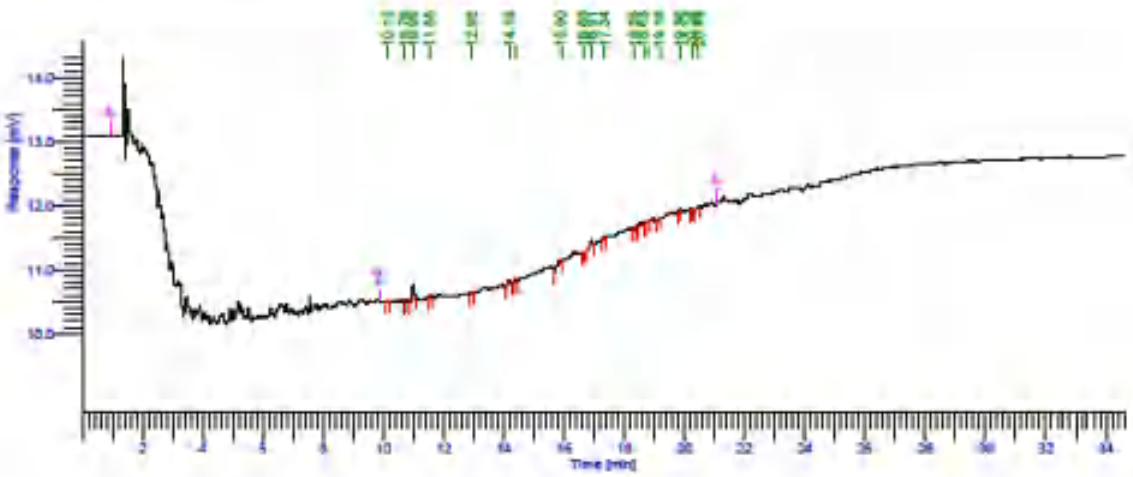
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	27953.39	6551.28	100.00	2.8928
			27953.39	6551.28	100.00	2.8928

Batch 26- PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 24-08-2023 16:48:30
Operator	: manager	Sample Name	: BATCH-26 AD SLNO:D577148 PCB
Sample Number	: 004		
AutoSampler	: NONE	Study	: PCB
Instrument Name	: Clarus 680	Rack/Vial	: 0/0
Instrument Serial #	: None	Channel	: A
Delay Time	: 0.00 min	A/D mV Range	: 1000
Sampling Rate	: 12.5000 pts/s	End Time	: 34.60 min
Sample Volume	: 1.000000 ul		
Sample Amount	: 1.0000		
Data Acquisition Time	: 24-08-2023 16:12:56	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\24.08.23\1004.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\24.08.23\1004.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\24.08.2023.seq



PCB ANALYSIS REPORT

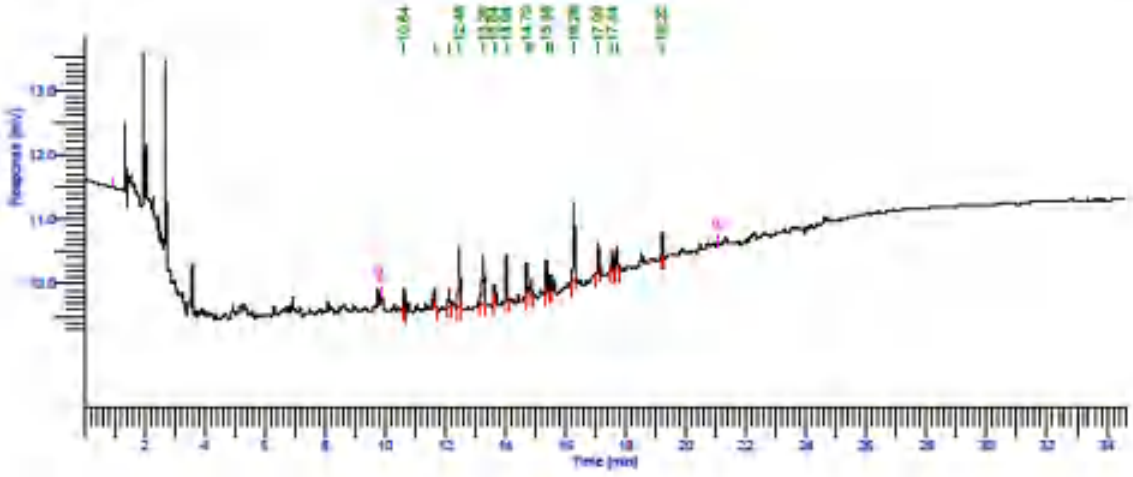
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	3913.85	768.74	100.00	0.3924
			3913.85	768.74	100.00	0.3924

Batch 27- PCB Chromatograph – Before Dechlorination

Software Version	: 6.3.2.0646	Date	: 25-08-2023 12:54:33
Operator	: manager	Sample Name	: BATCH-27-BD-SLNO-D577148 PCB F
Sample Number	: 002		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: None	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 25-08-2023 11:58:18	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25-08-23\1002.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25-08-23\1002.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\25-08-23.seq



PCB ANALYSIS REPORT

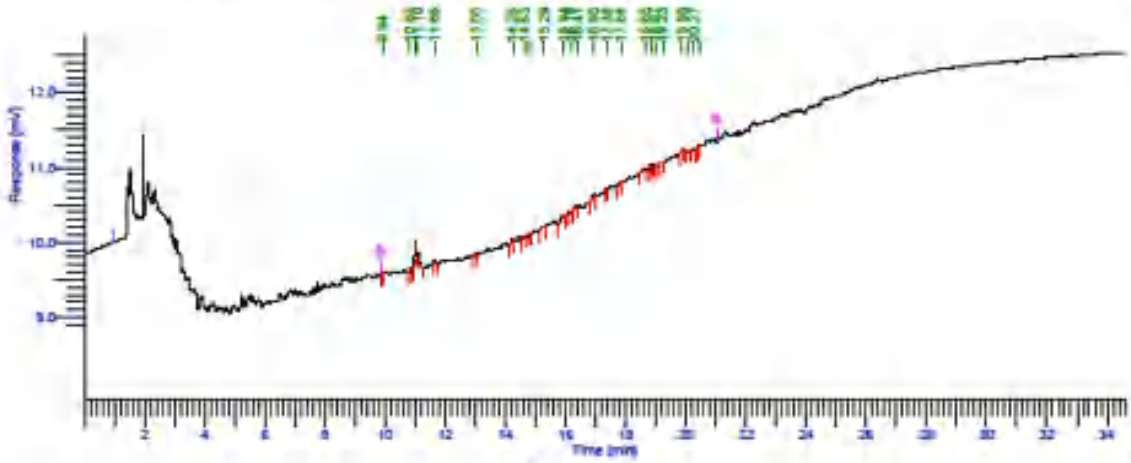
CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	28483.91	7413.04	100.00	2.8940
			28483.91	7413.04	100.00	2.8940

Batch 27- PCB Chromatograph – After Dechlorination

Software Version	: 6.3.2.0646	Date	: 25-08-2023 20:02:57
Operator	: manager	Sample Name	: BATCH-27AD SLNO:D577148 FLUSH PCB
Sample Number	: 004		
AutoSampler	: NONE		
Instrument Name	: Clarus 680	Study	: PCB
Instrument Serial #	: None	Rack/Vial	: 0/0
Delay Time	: 0.00 min	Channel	: A
Sampling Rate	: 12.5000 pts/s	A/D mV Range	: 1000
Sample Volume	: 1.000000 ul	End Time	: 34.60 min
Sample Amount	: 1.0000		
Data Acquisition Time	: 25-08-2023 19:24:56	Area Reject	: 0.000000
		Dilution Factor	: 1.00
		Cycle	: 1

Raw Data File : C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25.08.2023\1001-20230825-192504.raw
Inst Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1 from C:\GC PCB Analysis\Data\PCB KSEB KALAMESSERY\25.08.2023\1001-20230825-192504.raw
Proc Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Calib Method : C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.mth from
Report Format File: C:\GC PCB Analysis\Method\METHODS 2023\1260.16.03.2023-1.rpt
Sequence File : C:\GC PCB Analysis\Sequence\25.08.2023R.seq



PCB ANALYSIS REPORT

CPRI DMD

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	PCB PPM
	PCB 1260	15.465	4021.22	887.10	100.00	0.4032
			4021.22	887.10	100.00	0.4032

Annexure 9 (Minutes of Meeting Held between M/s. CPRI and M/s.KSEB on 26.08.2023)

MINUTES OF MEETING CONVENED ON 26.08.2023 IN CONNECTION WITH ON SITE DE CHLORINATION OF PCB IN TRANSFORMERS AT 220KV SUBSTATION KALAMASSERY

Ref: WO No. 8950003-94, Dt. 24.01.2023 of Assistant Executive Engineer, 220kV Substation Subdivision, Kalamassery

M/s. Central Power Research Institute (CPRI), Bengaluru visited M/s. KSEB Limited against above mentioned work order" On-site de-chlorination and testing of PCB contaminated oil using CPRI mobile de-chlorination unit at 220kV Substation Kalamassery " and the co-chlorination work of the PCB contaminated transformer oil in 120MVA scrap transformer bank (Sl. No: D577147, D577146 & D577148) was carried out from 14.08.2023 to 26.08.2023. During this visit, KSEBL provided site readiness for all transformers.

The details of activities are as follows:

CPRI PCB staff reached the site on 04.06.2023. PCB de-chlorination unit reached the site on 01.06.2023. After setting up of the plant, the de-chlorination activity of PCB contaminated oil 113761 liters of 3Nos of GE make transformers has been done as follows:

a. 95232 litres of PCB contaminated oil

b. 18529 litres of oil used for flushing the PCB contaminated transformer.

Entire PCB contaminated oil along with flushed oil (total 113761 litres) were de chlorinated in 27 batches. The details are given below:

Trans. Serial No	Batch No	Date FROM	Date TO	Qty. at site (Ltrs)	Qty of NaOH (Ltrs)	Initial PCB conc. (ppm)	Final PCB conc. (ppm)	Unloading in 200ltrs drums: Water	Unloading in 200ltrs drums: Sludge
D577147	1	14.06.23	16.06.23	4303	80	8.92	0.28	1.5	0.25
	2	19.06.23	20.06.23	4305	80		0.13	1.5	0.25
	3	21.06.23	22.06.23	4315	40		1.74	1.5	0.25
	4	23.06.23	24.06.23	4306	40		0.22	1.5	0.25
	5	26.06.23	27.06.23	4306	40		0.26	1.5	0.25
	6	30.06.23	01.07.23	4310	40		0.15	1.5	0.25
	7	03.07.23	04.07.23	4325	40		0.24	1.5	0.25
Oil after flushing from D577147	8	05.07.23	07.07.23	3627 (3404-PCB SH=223 – flushing oil)	40	2.9	0.16	1.5	0.25

	9	10.07.23	11.07.23	3606	40	2.4	0.16	1.5	0.25
D277146	10	12.07.23	13.07.23	4066	40	0.2	0.29	1.5	0.25
	11	14.07.23	15.07.23	4066	40		0.22	1.5	0.25
	12	17.07.23	18.07.23	4308	40		0.14	1.5	0.25
	13	19.07.23	20.07.23	3507	40		0.16	1.5	0.25
	14	21.07.23	22.07.23	4025	40		0.18	1.5	0.25
	15	24.07.23	25.07.23	4306	40		0.22	1.5	0.25
	16	26.07.23	27.07.23	4501	40		0.14	1.5	0.25
Oil after flushing from D277146	17	28.07.23	29.07.23	3522 (977-PCB oil+2645-flushing oil)	40	5.85	0.09	1.5	0.25
	18	31.07.23	01.08.23	3622	40	2.07	0.05	1.5	0.25
D555118	19	02.08.23	03.08.23	4436	40	7.05	0.12	1.5	0.25
	20	04.08.23	05.08.23	4436	40		0.08	1.5	0.25
	21	07.08.23	08.08.23	4536	40		0.06	1.5	0.25
	22	09.08.23	10.08.23	4306	40		0.07	1.5	0.25
	23	11.08.23	12.08.23	4334	40		0.15	1.5	0.25
	24	16.08.23	17.08.23	4375	40		0.25	1.5	0.25
	25	18.08.23	21.08.23	4071	40		0.25	1.5	0.25
Oil after flushing from D277146	26	22.08.23	24.08.23	4129	40	2.89	0.35	1.5	0.25
	27	25.08.23	25.08.23	4315 (2011+PCB oil+2304-flushing oil)	40	7.89	0.4	1.5	0.25
	Total quantity of Oil De-chlorinated			113704				40.5	6.75

Maximum allowable PCB contamination is <2ppm.

Before and after de-chlorination, samples are tested for PCB concentration. The PCB content of the oil after de-chlorination is <2ppm of PCB.

Around 7 drums of sludge and 41 drums of water has been collected. It is the responsibility of M/s KSEBL to dispose the items as per the State Pollution Control Board norms.

After the completion of the PCB de-chlorination activity, the vehicles along with the accessories will leave the site on 01.09.2023 (tentatively), till that time CPRI engineers will be present at site.

CPRI will submit detailed report within one month. The PCB freeness certificate will be issued by M/s CPRI to KSEBL for making payment.

M/s KSEBL representatives

M/s CPRI representative

1. A.A.Ruksana
   Assistant Executive Engineer,
   220kV Substation Subdivision
   Kalamassery

Dr. P.Thomas
Additional Director
PCB Project Leader
CPRI, Bengaluru

2. Anil Kumar.G
   Assistant Engineer
   Maintenance Section I
   220kV Substation, Kalamassery

Minutes of Meeting Held Between M/s. CPRI and M/s. KSEB on 26.08.2023

Annexure 10 (Returnable &Non-Returnable Gate Pass)

केन्द्रीय विद्युत अनुसंधान संस्थान

(भारत सरकार की सोसायटी, विद्युत मंत्रालय)

प्रो. सर सी.वी. रमण रोड, सदाशिवनगर डाक घर, पी.बी.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

Dieleetric Material Division

Ref: CPRI/DMD/PCB/2023/KSEB-KLM **Date: 02.06.2023**

Returnable Items (Annexure A) – Prakash Parcel Service [MH 04 FJ 9844]

Sl. No	DESCRIPTION OF ITEMS	QUANTITY IN No's	PURCHASE COST
1	100 Ltrs Sodium Dispersion	34 No'	Accessories of PCB de-chlorination unit
2	Ladders	4 No's	
3	Step down Transformer GCW make. S. No. 017D310091	1 No	
4	Drum Mixer	1 No	
5	Drum Mixer Motor	1 No	
6	Nitrogen cylinder stand	1 No	
7	Nitrogen Manifold	1 No	
8	Vent Pipe	1 No	
9	Chain Pulley	1 No	
10	Chain Pulley rod	1 No	
11	Electrical distribution box with cables	1 No + 5 Cable's	
12	Connecting cables	8 No's	
13	Carbon hose pipes	6 No's	
14	Flood Light	1 No	
15	Extension Box	1 No	
16	Extension Box 30 m (Length)	1 No	
17	Earth wire	5 Metre	
18	Sprit level	2 No's	
19	Oil Sprayer	2 No's	
20	Sampling Holder	1 No	
21	Plastic Buckets	3 No's	
22	Steel Buckets	2 No's	
23	Barrel Pump	1 No	
24	Plastic mug	3 No's	
25	Plastic funnel	1 No	
26	Kerosene Pump	2 No's	
27	Trolley	1 No	
28	Oil Heaters with Wooden Box	2 No's	

Joint Director
DMD

AD (1&II)-DMD
PCB Project Leader

केन्द्रीय विद्युत अनुसंधान संस्थान

(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)

प्रो सर सी.वी. रामन रोड, सदाशिवनगर डाक घर, पो.बा.सं. 8066, बेंगलूरु – 560 080

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Dielectric Material Division

Ref: CPRI/DMD/PCB/2023/KSEB **Date: 02.06.2023**

Returnable Items (Annexure B) – Prakash Parcel Service [MH 04 FJ 9844]

01	Air Drier, Make : Orbit	1	Rs: 1000/-
02	Drilling Machine, (M0801B)	1	Rs: 1000/-
03	Cutting Machine (Bosch) GMS 600	1	Rs: 1500/-
04	Multimeter (M266 Mastech)	1 No	Rs: 200/-
05	Vernier Calliper scale	1 No	Rs: 200/-
06	Drill bits	2 Sets	Rs: 200/-
07	Allen Keys	2 Sets	Rs: 200/-
08	Tools Box [Taparia]	1	Rs:2500/-
09	Adjustable spanner	1 No	Rs: 500/-
10	Pipe Ringe	1 No	Rs: 50/-
11	Hammer	1 No	Rs: 50/-
12	Cutting plier	2 No's	Rs: 200/-
13	Spanners	43 No's	Rs: 500/-
14	Screw Driver	4 No's	Rs: 250/-
15	Chisel	1 No	Rs: 50/-
16	Measuring Tape	2 No's	Rs: 50/-
17	Nose Plier	1 No	Rs: 50/-
18	Brush	1 No	Rs: 50/-
19	Cylinder Key	2 No's	Rs: 50/-
20	Scissors	1 No	Rs: 20/-
21	Knife	1 No	Rs: 50/-
22	Wire Cutter	1 No	Rs: 50/-

Joint Director
DMD

AD (HOD-DMD)
PCB Project Leader

केन्द्रीय विद्युत अनुसंधान संस्थान
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)
प्रो.सर.सी.वी. रामन रोड, सदाशिवनगर डाक घर, पी.बा.सं. 8066, बैंगलूरु – 560 080
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Prof. Sir C.V. Raman Road, Sadashivanagar Post Office, P.B. No. 8066, Bangalore - 560 080 India
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Dielectric Material Division

Ref: CPRI/DMD/PCB/2023/KSEB **Date: 02.06.2023**

Returnable Items (Annexure C) – Prakash Parcel Service [MH 04 FJ 9844]

SAFETY ACCESSORIES			
01	Cartridge Mask	5 No's	Rs: 500/-
02	Yellow Safety Uniform	2 No's	RS: 1000/-
03	Yellow Front Body Cover Dress	1 No	RS: 500/-
04	Face Shield	2 No's	Rs: 200/-
05	Normal Googles	3 No's	Rs: 500/-
06	Helmets	5 No's	RS: 1000/-
07	Safety Uniform	15 No's	RS: 2000/-
08	Lab Coat	5 No's	RS: 500/-
LAB CHEMICAL ACCESSORIES			
09	Auto Dispenser	1 No	Rs: 500/-
10	Vacuum Pump	1 No	RS: 2000/-
11	Cartridge Glass filter unit	1 No	RS: 1000/-
12	Micropipette (10-100micro L)	1 No	Rs: 500/-
13	Micropipette (100 – 1000)micro L	2 No's	Rs: 500/-
14	GC kit	1 Box	RS: 1000/-

Joint Director
DMD

AD (HOD-DMD)
PCB Project Leader

केन्द्रीय विद्युत अनुसंधान संस्थान

(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)

प्रो.सर.सी.वी. रामन रोड, सदाशिवनगर डाक घर, पी.बा.सं. 8066, बेंगलूरु – 560 080

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Prof. Sir C.V. Raman Road, Sadashivanagar Post Office, P.B. No. 8066, Bangalore - 560 080 India

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Dielectric Material Division

Ref: CPRI/DMD/PCB/2023/KSEB **Date: 02.06.2023**

Non-Returnable Items [Consumables] (Annexure A) – Prakash Parcel Service [MH 04 FJ 9844]

S.No	DESCRIPTION OF ITEMS	QUANTITY IN No's
1	Strainers	1 Box (12 No's)
2	Insulation Tapes	4 No's
3	Cutting Wheel	3 No's
4	M Seal	1 No
5	Teflon Tapes	6No's
6	Air Hose Connectors	3 No's
7	Solid State Relay 100 A	2 No's
8	Solid State Relay 120 A	1 No
9	3 Phase Solid State Relay 120	1 No
10	MCB 63A	3No's
11	RCCB 100A	1 No
12	Cable Plastic Ties	2 Packets
13	Clamps & Gaskets	1 Box
14	WD -40	1 No
15	Butterfly Valve	2 No's
16	Nut & Bold	1 Box
17	Nitrogen line hose	10 Metre
18	Man hole Gaskets	8 No's
19	Hand fit Gloves	30 No's
20	Electrical Safety Gloves	1 Pair
21	Gloves Black	1 Pair
22	Vacuum Oil	5 Litres
23	Transformers Oil	60 Litres

Joint Director
DMD

AD (HGD-DMD)
PCB Project Leader

केन्द्रीय विद्युत अनुसंधान संस्थान

(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)

प्रो.सर.सी.वी. रमन रोड, सदाशिवनगर डाक घर, पी.बी.नं. 8066, बैंगलूरु – 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

फैक्स / website :http://www.cpri.in

Dielectric Material Division

Ref: CPRI/DMD/PCB/2023/KSEB **Date: 02.06.2023**

Non-Returnable Items [Consumables] (Annexure B) – Prakash Parcel Service [MH 04 FJ 9844]

SL.No	CHEMICAL LAB CONSUMABLES	QUANTITY IN No's
01	Iso octane 2.5 Ltrs	2 No's
02	Sulphuric acid 2.5 Ltrs	1 No
03	Tissue rolls	25 No's
04	Aluminium Foil	3 No
05	Micropipettes tips 1ml	3 Packets
06	Silica Cartridge (100 Units)	1 Box
07	Filter Paper (100 Units)	3 Box
08	Vials Box	2 Box
09	Laboline (5 Ltrs)	2 No's
10	Sample Bottles (HDPE60 ml)	1 Box
11	Measuring cylinder (5ml)	20 No's
12	Measuring cylinder (10ml)	38 No's
13	Volumetric Flask (20ml)	48 No's
14	50 ml Reagent Bottle	30 No's
15	Volumetric Flask (250ml)	4 No's
16	Glass Beaker (100 ml)	4 No's
17	Glass Beaker (500 ml)	2 No's
18	Glass Funnel	3 No's
19	100 ml Vacuum Conical Flask	5 No's
20	Cotton Waste	20 Kg

02/06/2023

Joint Director
DMD

AD (HOD-DMD)
PCB Project Leader

Annexure 11 (Volvo Returnable Gate Pass)

केन्द्रीय विद्युत अनुसंधान संस्थान

(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)

प्रो.सर.सी.वी. रमन रोड, सदाशिवनगर डाक घर, पी.बी.नं. 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 Material Division

RETURNABLE ITEMS [VOLVO] KA 04 MU 6886 **Date: 02.06.2023**

SLN0	DESCRIPTION OF MATERIAL	MAKE/SL. NO IF ANY	QTY
1	GC-ECD Instrument with wooden box	Make Perkin Elmer, Sl.No:680S 16090202	1 No
2	UPS	Make: Alpha	1 No
3	Exide Batteries (Sealed Lead acid)	12 V, 18Ah	10 No's
4	Fire extinguisher	Sl.No:A5827-06-16 Sl.No:A5815-06-16	2 No's
5	Nitrogen cylinder	SL.No;6022, SL.No:69034	2 No's
6	Ladder	-NA-	1 No
7	Spare wheel	-NA-	1 No
8	Road safety cones	-NA-	2 No's
9	Air gauge (for air filling of tyres)	-NA-	1 No
10	Jack lever	-NA-	1 No
11	Wall Clock	-NA-	1 No
12	Jockey	-NA-	3 No's
13	Wheel Choke	-NA-	2 No's
14	Hammer	-NA-	1 No
15	Fuse Box & Light	-NA-	1 No
16	Fire Extinguisher	-NA-	1 No
17	Air Hose	-NA-	1 Set
18	Funnel	-NA-	1 No
19	Tarpaulin	-NA-	1 No
20	Kerosene Pump	-NA-	1 No
21	T- Cycle	-NA-	1 No
22	Taparia Tools box	-NA-	1 No
23	Ratchet Belt	-NA-	2 No's

Joint Director
DMD

AD (HOD-DMD)
PCB Project Leader

Annexure 12 (PCB Freeness Certificate)

केन्द्रीय विद्युत अनुसंधान संस्थान
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)
श्री सर सी. वी. रामन रोड, 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

Dielectric Materials Division
PCB Freeness Certificate

Ref : CPRI/PCB/2023/KSEB-KLM/PFC(B 01-27) Dt: 04.10.2023

This is to certify that the following Onsite PCB de-chlorination activity has been carried out by CPRI at Kerala State Electricity Board Ltd. 220 kV Substation subdivision, Kalamassery from 14.06.2023 to 26.08.2023 against W.O. No. 09/23-24, Dt:24.05.2023

Client	KSEB, Kalamassery
PCB contaminated Transformers (Make : GE, 220/110 kV, 40 MVA, scrap transformer(Transformer bank of 120 MVA, 220/110 kV)	D 577146, D 577147 & D 577148

Transformer Serial No	Batch No	Quantity of PCB contaminated Oil Treated, ltrs.	Final PCB concentration*, ppm (mg/kg)
D577147	1	4308	0.28
	2	4306	0.13
	3	4315	0.23
	4	4306	0.22
	5	4300	0.26
	6	4310	0.15
	7	4325	0.24
	8	3627	0.26
	9	3666	0.16
D577146	10	4306	0.29
	11	4306	0.23
	12	4308	0.14
	13	4307	0.16
	14	4325	0.18
	15	4306	0.22
	16	4501	0.16
	17	3622	0.09
	18	3622	0.05
D577148	19	4306	0.12
	20	4306	0.08
	21	4306	0.06
	22	4306	0.07
	23	4334	0.15
	24	4326	0.25
	25	4171	0.25
	26	4129	0.39
	27	4315	0.48
	Total	113761	

* Accepted limit < 2 ppm (mg/kg)

Hence the above batches can be sold/disposed as per the state pollution control board norms by KSEB. It is further certified that sludge generated during the process is free from PCB contamination.

अपर निदेशक / Additional Director
परावैद्युत सामग्री प्रभाग / Dielectric Materials Division
केन्द्रीय विद्युत अनुसंधान संस्थान / Central Power Research Institute
पो. बॉ. सं. 8066 / P.B. No. 8066
सदाशिवनगर / Sadashivanagar
बेंगलूर / Bangalore - 560 080

PCB Freeness Certificate