BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,

Principal Bench, New Delhi

In

Original Application No. 804/2017

and

M. A. No. 1302/2018

In the Matter of:

Rajiv Narayan & Anr **Applicant(S)**

Vs.

Union of India & Ors **Respondent(S)**

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(Abhey S. Soni)
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Place: Delhi
Date: 24th June, 2020

Status Report on Compliance of Recommendations of the Monitoring Committee on Management of Hazardous Waste & Contaminated Sites issues and Directions of the Hon'ble Tribunal

(in the matter of O. A. No. 804/2017 and M. A. No. 1302/2018)

CENTRAL POLLUTION CONTROL BOARD

(Ministry of Environment, Forest and Climate Change
Govt. of India)

June, 2020

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CHAPTER – 8

8.1. Status of compliance to the directions of the Hon'ble National Green Tribunal order dated 26/08/2019

A. Background

The Hon'ble National Green Tribunal, Principal Bench, New Delhi, in the matter of O. A. No. 804/2017: Rajiv Narayan & Anr. Vs Union of India & Ors has passed the following directions regarding contaminated sites vide its orders dated 26.08.2019 as reproduced below:

"…… iv. 126 sites which have already been identified as contaminated may be cleared of the hazardous waste within six months so that remediation process may start. The remediation work may start at the 55 sites for which DPRs have been completed within the timelines specified in the DPRs. For the remaining 71 sites, DPRs may be completed expeditiously but not later than one year and thereafter remediation may be done as per the timelines in the DPRs.

v. Failure to remove the waste from the 126 identified sites will result in environmental compensation to be paid at the rate of Rs. 10 lakhs per site from 01.04.2020 by the concerned SPCBs/PCCs to the CPCB. Same rate will apply in respect of such of the 195 sites as are identified as contaminated with effect from 01.01.2021.

vi. With regard to 195 probable contaminated sites, the assessment may be completed within six months and thereafter the waste may be removed within next six months form sites cleared by the CPCB to be contaminated.

vii. The clearance of site by way of disposal or transfer should be strictly as per the HOWM Rules, to be monitored by the CPCB. The cost of removal of waste may be first paid out of the environment funds/ consent funds available with the State PCBs/PCCs and thereafter recovered from the persons concerned……"

B. Action initiated by CPCB on "Assessment and Remediation of Contaminated Sites"

In compliance to the aforesaid directions of Hon'ble NGT order dated 26.08.2019, have been communicated to 21 SPCBs/PCCs vide CPCB letter dated 06.09.2019, for taking necessary action and submission of intended Action plan/Inspection reports on 'Assessment and Remediation of Contaminated Sites'. Subsequently, vide CPCB reminder letters dated 06.11.2019, 02.01.2020 & 11.03.2020 and e-mail communications dated 05.06.2020, 13.03.2020, 06.02.2020, 03.01.2020, 17.10.2019 & 26.09.2019 were also sent to 21 SPCBs/PCCs for submission of intended Action plan/ Inspection reports along with photographs & analysis reports of soil/sediment/ groundwater/surface water samples. In this regard, guidance document on

"Assessment and remediation of contaminated sites" issued by MoEF&CC contains screening/response levels/standards for confirming contamination was also communicated to SPCBs/PCCs.

Further, in this regard, an interactive meeting was also conducted by CPCB during 3rd - 4th February, 2020 with the officials of SPCBs/PCCs at CPCB Delhi to review compliance to the aforesaid directions of Hon'ble NGT.

In response to aforesaid letters and email communications of CPCB, 19 SPCBs/ PCC (namely; Andhra Pradesh, Assam, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal) have submitted their information/Status Report on Action Taken/Initiated for assessment of contaminated sites. State wise Compliance status on Action taken/initiated by SPCBs/PCCs is given below at **Section-C** and brief compliance status submitted by SPCBs/PCC is given at **Table-8.1.** Summary of state wise site distribution as per the action taken report/information submitted by SPCBs/PCC is given at **Table-8.2.**

Table-8.1 Brief compliance status submitted by SPCBs/PCC

S. No.	Name of the States/UT	No. of active sites*	Report submitted by SPCBs/PCC
1.	Andhra Pradesh	3*	Yes (Partial)
2.	Assam	4	Yes (Partial)
3.	Delhi	26	Yes (Partial)
4.	Goa	2	Yes (Partial)
5.	Gujarat	23*	Yes (Partial)
6.	Haryana	17	Yes (Partial)
7.	Himachal Pradesh	6	Yes (Partial)
8.	Jharkhand	14	Yes (Partial)
9.	Karnataka	25	Yes (Partial)
10.	Kerala	10	Yes (Partial)
11.	Madhya Pradesh	20*	Yes (Partial)
12.	Maharashtra	6*	Yes (Partial)
13.	Odisha	32*	Yes (Partial)
14.	Punjab	9	Yes (Partial)
15.	Tamil Nadu	11	Yes (Partial)
16.	Telangana	9	Yes (Partial)
17.	Uttar Pradesh	42*	Yes (Partial)
18.	Uttarakhand	9	Yes (Partial)
19.	West Bengal	7	Yes (Partial)
20.	**Chhattisgarh**	**5**	**No**
21.	**Rajasthan**	**11**	**No**
	Total	**291***	

Note: *Including new 07 sites

Table-8.1 Summary of state wise site distribution as per the action taken report/information submitted by SPCBs/PCC

S. No.	States/UTs	Status submitted before the Hon'ble NGT	Updated status as on June, 2020			Proposed De-listed sites	DPRs and Remediation completed	On-going Assessment/ Remediation works	HW still lying at the site (as per DPR prepared by CPCB)	HW not observed (as per site inspection by SPCBs)	HW removed/ lifted from the sites
		Total Sites (PCS +CS)	Total Sites*	Probable Sites (PCS)	Contaminated Sites (CS)						
1	Andhra Pradesh	3 (2+1)	3*	3	0	1	1	1			
2	Assam	4 (3+1)	4	2	2						
3	Chhattisgarh	5 (3+2)	5	3	2						
4	Delhi (NCR)	26 (22+4)	26	14	12						
5	Goa	2 (1+1)	2		2						1
6	Gujarat	23 (15+8)	23*	15	8	1		1			2
7	Haryana	17 (14+3)	17	13	4					8	
8	Himachal Pradesh	6 (5+1)	6	5	1					6	
9	Jharkhand	14 (12+2)	14	12	2			9			
10	Karnataka	25 (20+5)	25	19	6			1			
11	Kerala	13 (7+6)	10	6	4	3	4		1		
12	Madhya Pradesh	20 (14+6)	20*	16	4	1	4		1		1
13	Maharashtra	5 (3+2)	6*	3	3			1			1
14	Odisha	31 (9+22)	32*	9	23		4		4		
15	Punjab	9 (3+6)	9	3	6						
16	Rajasthan	11 (9+2)	11	9	2			1			
17	Tamil Nadu	14 (8+6)	11	5	6	3	1	2	1	3	
18	Telangana	9 (7+2)	9	7	2		1			5	
19	Uttar Pradesh	40 (22+18)	42*	17	25		7	2	1	16	3
20	Uttarakhand	9 (8+1)	9	8	1						
21	West Bengal	35 (8+27)	7	6	1	28	27				
Total		**321 (195+126)**	**291***	**175**	**116**	**37**	**48**	**18**	**8**	**38**	**8**

Note: * Including new 07 sites,

C. Compliance status on Action taken/initiated by SPCBs/PCCs is given below:

(i) Andhra Pradesh

APPCB has communicated action taken report for following 04 probable/contaminated sites vide its letter dated 13.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by APPCB	Observations/ Suggestions of CPCB
1.	Kadapa Dump site, Kadapa, Andhra Pradesh	-	Closure and containment of MSW Dump site at Kadapa completed under CBIPM project and converted the same as Public Park.	Complied. **The site may be de-listed.**
2.	Madhurawada, Vishakhapatnam, Andhra Pradesh – 530048	PCS	Inspection was carried out by APPCB at given site location and confirmed that only MSW dumpsite is located. Accordingly, APPCB has collected groundwater samples nearby the MSW dumpsite. Analysis results reveal no contamination.	It is observed that soil sampling was not carried out by APPCB. Therefore, APPCB shall carry out soil samples along with sediment and surface water samples (if available) nearby the dumpsite and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
3	M/s Rithwik Energy Systems (biomass power plant), Rachagunneri, Chittoor district, Andhra Pradesh-517325	PCS	Inspection was carried out by APPCB at given site location.	It is observed that sampling was not carried out by APPCB. Therefore, APPCB shall carry out samples of soil/ groundwater/surface/ sediment nearby the site and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by APPCB	Observations/ Suggestions of CPCB
4	Uranium Tailings pond of M/s. UCIL, Tummalapalli, Kadapa District, AP	PCS	**"New site"**, identified through Public complaint. Accordingly, APPCB has verified the said site and informed that source of groundwater contamination, Environmental epidemiological & toxicology and fact finding survey/ studies have been awarded to group of Institutions namely; IIT-Madras, Sri Venkateswara Institute of Medical Sciences, ICAR-Indian Agricultural Research Institute / National Research Centre for Banana, TN.	APPCB may submit status report of the studies carried out to CPCB.

Note: *If the concentration levels are exceeding Screening/Response levels/Standards, APPCB shall carry out detailed site investigation and remediation, if required.*

(ii) Assam

Assam PCB has communicated action taken reports for following 04 probable/contaminated sites vide its letters dated 27.01.2020 & 21.05.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Assam PCB	Observations/ Suggestions of CPCB
1.	Rangia, District-Kamrup, Assam	CS	Inspection was carried out by Assam PCB. Accordingly, soil and groundwater samples were collected. Analysis results reveal that chemicals of concern (CoCs) for soil samples are within the screening/response levels. However, it was reported that except **Nickel,** the concentration of other CoCs	It is observed that Assam PCB has not analyzed the samples for general parameters and other heavy metals. Therefore, Assam PCB shall carry out re-sampling of soil/sediment/GW/SW and submit analysis reports of chemicals of concern (CoCs) with

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Assam PCB	Observations/ Suggestions of CPCB
			in groundwater samples within the prescribed limit of BIS drinking water standard**.**	general parameters & heavy metals along with site visit Photographs.
2.	Jeypore Coalfield, Namrup, Tinsukia, Assam-786614	CS	Inspection was carried out by Assam PCB and informed that the Coalfield at Jeypore is about 20 km away from said co-ordinates. Soil and groundwater sampling was carried out at given location. Analysis results reveal that CoCs for soil samples are within the screening/response levels. However, in groundwater sample, **Copper** concentration level is exceeded the prescribed limit of BIS drinking water standard**.**	
3	Dhemaji district, Assam-787058	PCS	Inspection was carried out by Assam PCB and informed that no industries are in the vicinity of the premises and presently, the land is use for agriculture. Soil and groundwater sampling was carried out. Analysis results reveal that CoCs are within the screening/ response levels/standard.	
4	Hindustan Paper Corporation Limited, Jagiroad, Morigaon district, Assam-782413	PCS	Inspection was carried out by Assam PCB. Accordingly, soil and groundwater sampling was carried out at given location. Analysis results reveal that CoCs are within the screening/response levels/standard.	

Note: *If the concentration levels are exceeding Screening/Response levels/Standards, Assam PCB shall carry out detailed site investigation and remediation, if required.*

(iii) Delhi

DPCC has communicated incomplete action taken reports for following 26 probable/contaminated sites vide its email dated 22.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by DPCC	Observations/ Suggestions by CPCB
1.	Mandoli & Seelampur E-Waste site East Delhi	CS	Action taken report not submitted by DPCC.	DPCC shall carry out detailed investigation of the site by engaging reputed remediation consultant/Institute. Action plan in this regard may be submitted to CPCB.
2.	Jhilmil Industrial Area , New Delhi	CS		
3	Gazipur landfill-site, Gazipur, Delhi	CS		
4	Road side & in front of C-58/1, Essco Sanitations, National Capital Territory (Delhi) Wajirpur Industrial Area	PCS	DPCC submitted that based on preliminary assessment/visual verification carried out, contamination is not observed at the site.	DPCC shall carry out preliminary site investigation along with sampling of soil/waste/ sediment/GW/SW/ and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
5.	Mundika Delhi-110041	PCS		
6.	Yamuna River at Badarpur, New Delhi-110044	PCS		
7.	Road side and in front of A-5, Lawrence road industrial area-, New Delhi-110032	CS	DPCC inspected the site and accordingly carried out soil samples. Analysis results reveal that soil is contaminated.	DPCC shall carry out detailed investigation of the site by engaging reputed remediation consultant/Institute. Action plan in this regard may be submitted to CPCB.
8.	Road side & in front of Sulabh Complex, Near Police Chowki, Wajirpur Industrial Area-New Delhi-110052	CS		
9.	Mandoli Village, Northeastern Delhi-110093	CS		
10.	Sarita Vihar, New Delhi-110076	PCS	DPCC submitted that based on preliminary	DPCC shall carry out preliminary site

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by DPCC	Observations/ Suggestions by CPCB
11.	Najafgarh drain, Kakrola, New Delhi-110078	PCS	assessment/ visual verification carried out, contamination is not observed at the site.	investigation along with sampling of soil/waste/ sediment/GW/SW/ and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
12.	Open land adjoining to 168, Patparganj Industrial Area-New Delhi-110091	PCS		
13.	Open Land adjacent to Ajit Printers B-58 Damodar Park, Dilshad Garden Industrial Area, New Delhi-110052	CS	DPCC inspected the site and accordingly carried out soil samples. Analysis results reveal that soil is contaminated.	DPCC shall carry out detailed investigation of the site by engaging reputed remediation consultant/Institute. Action plan in this regard may be submitted to CPCB.
14.	Open land in front of 77, SSI Industrial Area, New Delhi-110033	CS		
15.	Open land which is on back side of Anuradha Petrol Pump and near to C-32, Rajdhani roller fuor mill, Lawrence road industrial area, New Delhi-110035	CS		
16.	Road side and in front of A-5, Lawrence road industrial area, New Delhi-110035	CS		
17.	Open land adjoining to plot no. 36 A and 34 A, Rajasthan Udyog Nagar Industrial Area-New Delhi-110033	PCS	DPCC submitted that based on preliminary assessment/visual verification carried out, contamination is not observed at the site.	DPCC shall carry out preliminary site investigation along with sampling of soil/waste/ sediment/GW/SW/ and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy
18.	GTK Road industrial area-New Delhi-110033	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by DPCC	Observations/ Suggestions by CPCB
19.	Nimri Village, Shastri Nagar industrial area, New Delhi. Pincode-110031	PCS		metals along with site visit Photographs.
20.	Bhalsawa Landfill, New Delhi-110033	CS	DPCC inspected the site and accordingly carried out soil samples. Analysis results reveal that soil is contaminated.	DPCC shall carry out detailed investigation of the site by engaging reputed remediation consultant/Institute. Action plan in this regard may be submitted to CPCB.
21.	Road side & in front of C-58/1, Essco Sanitations, National Capital Territory (Delhi) Wajirpur Industrial Area-110052	PCS	DPCC submitted that based on preliminary assessment/ visual verification carried out, contamination is not observed at the site.	DPCC shall carry out preliminary site investigation along with sampling of soil/waste/ sediment/GW/SW/ and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
22.	Near Railway Line and Gali N0. 4 & 5,New Friends Colony Industrial Area-New Delhi-110026	CS	DPCC inspected the site and accordingly carried out soil samples. Analysis results reveal that soil is contaminated.	DPCC shall carry out detailed investigation of the site by engaging reputed remediation consultant/Institute. Action plan in this regard may be submitted to CPCB.
23.	Between the Railway line and in front of 17 Gali No. 3, Anand Parbat Industrial Area-New Delhi - 110005	PCS	DPCC submitted that based on preliminary assessment/visual verification carried out, contamination is not observed at the site.	DPCC shall carry out preliminary site investigation along with sampling of soil/waste/ sediment/GW/SW/ and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
24.	Railway Land near 18/32, Gali No.5, Anand Parbat Industrial Area-New Delhi-110005	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by DPCC	Observations/ Suggestions by CPCB
25.	Kirti Nagar Industrial Area-110015	PCS		
26.	Naraina industrial area, Phase 1-2, South-West, New Delhi-110028	PCS		

(iv) Goa

Goa PCB has communicated action taken reports for 02 following probable/contaminated sites vide letter dated 10.01.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Goa PCB	Observations/ Suggestions of CPCB
1.	M/s Sunrise Zinc Ltd, Plot No. L-2 & M/S Nicomet Industries Ltd Plot no, L-15,19 & 20, Cunicolum Industrial Estate, Punjim, Goa	CS	Inspection report along with analysis results is awaited from Goa PCB.	Goa PCB shall submit Inspection reports along with site visit photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/ surface water samples.
2.	Quarry located in Village Pilium of Dhar Bandora Survey No 46-Pin -403401	CS	Inspection was carried out by Goa PCB and informed that excavation and clearance of ETP sludge from said HW dumped site has been completed in May, 2016. Analysis results of soil samples reveals that **Chromium & Arsenic** are above screening/ response level. However, analysis results of groundwater/ surface water are not submitted.	Goa PCB shall submit detailed analysis report. If the concentration levels are exceeding screening/response levels/ standards, Goa PCB shall carry out detailed site investigation and remediation, if required.

(v) Gujarat

GPCB has communicated action taken reports for following 24 probable/contaminated sites vide letters dated 25.11.2019, 06.01.2020 & 19.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
1.	Gorwa Pond, Vadodara Gujarat, Behind Hema Chemicals, Near Samta Colony, Subhanpura Road, Vadodara	CS	(i) Analysis results of soil samples collected by Gujarat PCB, reveal that CoCs are within the screening/response levels. (ii) Surface water samples collected from the pond, reported as contaminated with Color and BOD.	GPCB shall carry out detailed site investigation and status report may be submitted to CPCB.
2.	Aji GIDC Industries Association Reg No. G 904, DT-26/4/1983, Plot No. 121, Road AB Corner, Aji GIDC Estate Rajkot	CS	(i) Analysis of all CoCs was not done for soil samples collected from the Plot No. 237/5. (ii) Sampling was not carried out from the Plot No. 121.	GPCB shall submit analysis reports of chemicals of concern (CoCs) vis-à-vis VOCs & Aromatic hydrocarbons (BTEX) of collected soil/ groundwater/ surface water samples of both Plot No. 121 and 237/5.
3.	Larsen Chem, B/2, Ganeshpura, OppJanta Petrol Pump, Modasa Sabar kantha, Gujarat	CS	(i) Hazardous waste was not observed at the site. (ii) Analysis results of soil samples collected, revealed no contamination. (iii) Groundwater samples collected from the bore wells, reported as yellowish color; however, analysis report of the same was not submitted.	GPCB shall: (i) Provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected groundwater samples. (ii) Carry out detailed site investigation and status report may be submitted to CPCB.
4.	Swastik Organic,	CS	(i) Hazardous waste lying at the site was already	GPCB shall submit detailed investigation report along

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
	survey no 93 paiki,Sabar Dairy Road, Piplodi, Gujrat		lifted and shifted to TSDF. However, soil contamination may still remain at the site. (ii) In the downstream at village Boriya Khurad, about 7 to 8 bore wells reported as contaminated with reddish brown coloured water. (iii) In this regard, it is also reported that crops like wheat, cotton & castor are irrigated with this colored water. (iv) Groundwater samples collected and reported about 200 Pt Co yellowish color; however, analysis report of the same was not submitted. (v) The responsible party has awarded the remediation work to GITCO.	with remediation plan to CPCB.
5.	Effluent Channel Project Limited (ECPL), Baroda Effluent Canal, Vadodara and Bharuch District	CS	As per earlier inspection and analysis report of Groundwater has been contaminated with high BOD, COD, Cyanide, and Phenolic compounds. Remediation work is on-going. However, no status report is submitted to CPCB.	GPCB shall submit latest progress of on-going remediation works along with earlier Detailed Investigation Report to CPCB.
6.	Hema Chemicals Unit II, Nandesari, Vadodara	CS	(i) Analysis result/report of soil samples collected, revealed that site is contaminated with chromium.	GPCB shall: (i) Carry out groundwater samples and submit analysis reports of

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
7.	Jambusar, District-Bharuch,	CS	(ii) Groundwater sampling was not carried out.	chemicals of concern (CoCs) with general parameters and heavy metals. (ii) Carry out detailed site investigation and status report may be submitted to CPCB.
8.	AnkleshwarIndustrial Estate, GIDC Industrial Estate, Ankleshwar. Bharuch, Ankleshwar	CS	(i) Analysis result/report of soil samples collected was not provided. (ii) Groundwater sampling was not carried out.	GPCB shall: (i) Provide analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals of soil samples collected. (ii) Carry out groundwater sampling and submit anaylsis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
9.	Daman Ganga River, Behind railway track near CETP, Vapi - Gujarat-396191	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Surface water samples collected from the River, reported yellowish & light brown color. (iii) Groundwater and sediment sampling was not carried out.	GPCB shall: (i) Provide surface water analysis report contains chemicals of concern (CoCs) along with general parameters and heavy metals. (ii) Carry out groundwater & sediment sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
10.	Lord Seaside Society, a Parsi Settlement at Tadgam,	PCS	(i) In 2009, Hon'ble High Court had issued the order to Setup Common Effluent Treatment Plant (CETP) at Sarigam Estate. Based on the order; GIDC	GPCB shall carry out detailed site investigation and status report may be submitted to CPCB.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
	Valsad-396135		has changed the disposal line with high quality HDPE pipeline & also they have shifted the aliment of pipeline to backside of residential area. Earlier this disposal line was passing near Lord Seaside society. (ii) Soil samples collected in 2018 and it was reported as no contamination w.r.t. general parameters. (iii) Analysis results of the groundwater samples collected, revealed that CoCs are within the prescribed limit of BIS drinking water standard**.**	
11.	River Par, Atul Wier, Valsad District Gujarat - 396001	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Surface water sample collected, reported as colourless. However, analysis report was not provided.	GPCB shall submit surface water analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
12.	Jamnagar Refinery, Gujarat-361142	PCS	(i) As per photographs, metal scraps lying at the site. (ii) Soil and groundwater samples collected, analysis report revealed that no contamination.	GPCB shall: (i) Direct concerned unit to remove the metal scraps lying at the site. (ii) After removing the said scraps from the site, carry out soil samples at different depths.
13.	Pariyej Community Reserve, Kheda district,	PCS	(i) Surface water sample collected, analyzed for CoCs only and reported no contamination.	GPCB shall carry out sediment & soil sampling and submit analysis report of chemicals of concern (CoCs) along with general

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
	Gujarat-387225		(ii) Sediment and Soil sampling was not carried out.	parameters and heavy metals.
14.	MuthiaVilage, Naroda GIDC, Phase IV, Ahmedabad 2 Sites-380330	PCS	(i) Analysis result/report of soil samples collected, revealed that no contamination. (ii) Analysis report of groundwater samples collected was not provided.	GPCB shall submit analysis reports of chemicals of concern (CoCs) of groundwater samples collected.
15.	Bank of Bhil Khadi, Salvav, NH-No:8, Vapi-396191	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Analysis report not provided of surface water sample collected. (iii) Groundwater sampling was not carried out.	GPCB shall: (i) Provide analysis report of surface water contains chemicals of concern (CoCs) along with general parameters and heavy metals. (ii) Carry out groundwater & sediment sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
16.	Pandesara, Gujarat Industrial Development Corporation (GIDC), Surat, Gujarat-394230	PCS	(i) As per the coordinates, the site found at residential area. (ii) Nearby said residential area, excavated soil lying observed. (iii) Sampling of soil/ groundwater was not carried out.	GPCB shall carry out soil & groundwater sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters & heavy metals.
17.	Hatorah Village Kosamba Taluka, Surat Gujarat-395003	PCS	(i) Old dump of solid/semi-solid hazardous waste lying at the site. (ii) Soil sampling carried	GPCB shall: (i) Direct to concerned unit to lift and dispose through TSDF/SLF the solid/semi-

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
			out, however, analysis report not provided. (iii) Sampling of groundwater/surface water was not carried out.	solid hazardous waste lying at the site. (ii) Provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil samples. (iii) Carry out groundwater & surface water sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
18.	Dungrifalia Millat Nagar, Behind Hotel Good Luck, Vapi-Gujarat-396191	PCS	(i) No. of Scrap Traders (like Plastic, Paper, Wooden etc.) and Automobile scrap traders are at site. (ii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (iii) Surface water sample collected, reported as grey in color as per photographs. However, analysis report not provided. (iv) Groundwater samples was not carried out.	GPCB shall: (i) Investigate any hazardous waste/scrap lying at the site. (ii) Provide surface water analysis report contains chemicals of concern (CoCs) along with general parameters and heavy metals. (iii) Carry out groundwater & sediment sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
19.	Premises of Trans Global, P. No: A-1-4311, Phase 4, GIDC, Vapi-Gujarat-396195	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Groundwater samples was not carried out.	GPCB shall carry out groundwater & sediment sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
20.	Premises of Gamma	PCS	(i) Soil samples collected, analyzed for heavy metals	GPCB shall carry out groundwater & sediment

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
	Colours, P. No: 1302, Phase 3, GIDC Vapi-396195		by using TCLP extraction method. (ii) Groundwater samples was not carried out.	sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
21.	Bank of Bhil Khadi, Behind Hotel Safari, Near NH-No:8, Vapi-396191	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Surface water sample collected, reported as grey in color as per photographs. However, analysis report not provided. (iii) Groundwater samples was not carried out.	GPCB shall: (i) Provide surface water analysis report contains chemicals of concern (CoCs) along with general parameters and heavy metals. (ii) Carry out groundwater & sediment sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
22.	Salvav, Vapi, Gujrat	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. (ii) Groundwater/ surface water sample was not carried out.	GPCB shall carry out groundwater & surface water sampling and submit analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals.
23.	Valad, Dist-Gandhinagar	-	Report submitted, it is observed that, (i) Hazardous waste lying at the site was already lifted and shifted to TSDF. (ii) Analysis results/ reports of soil and groundwater samples collected, revealed that no contamination.	Complied. It is proposed that the site may be **de-listed** from the list of probable contaminated sites.
24.	Umalla, Bharuch	PCS	Inspection report including sampling & analysis and visit photographs not yet submitted.	GPCB shall submit Inspection reports along with site visit color photographs and analysis reports of chemicals of concern (CoCs) with

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Gujarat PCB	Observations/ Suggestions of CPCB
				general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from the contaminated sites.

Note: *Gujarat SPCB shall **c**arry out re-sampling of soil, wherein analyzed for heavy metals by using TCLP extraction method. Therefore, the concentration of heavy metals in soil may be analyzed in total.*

In the view of above, CPCB vide letter dated 04.05.2020 communicated the aforesaid observations and comments to GPCB. In response, GPCB vide its letter dated 11.06.2020, requested to grant more time to submit the data as asked by CPCB. Further, conveyed that re-investigation of the sites will be started once the situation of Covid-19 Pandemic gets normal in the state.

(vi) Haryana

Haryana PCB has communicated action taken reports for following 17 probable/contaminated sites vide its email communication dated 17.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
1.	Prem Colony, Kundli Sonepat	CS	Site was inspected by Haryana PCB and accordingly, sampling of groundwater & soil was carried out. Analysis results of groundwater reveals that fluoride concentration is higher than prescribed standard. However, analysis report of soil samples collected is awaited.	Haryana PCB shall: (i) Provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil samples from contaminated sites. (ii) If concentration levels in soil found above the screening/ response levels, detailed site investigation may be carried out.
2.	Pace City-II, Sector 37, Gurgaon Haryana	CS	Site was inspected by Haryana PCB and accordingly, sampling of groundwater, soil &	Haryana PCB shall carry out detailed site investigation.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
			surface water was carried out. Analysis results of surface water reveals that the concentration of Chromium, colour, O&G is higher than prescribed standard. Soil and groundwater samples were found no contamination. No sediment sampling has carried out.	
3	Sectors 25 & 29, Dyeing Industry, Panipat, Haryana	CS	Site was inspected by Haryana PCB and accordingly, sampling of groundwater, soil & surface water was carried out. Analysis results of groundwater reveals that the concentration of TDS is higher than prescribed standard. Soil and surface water samples were found as no contamination. No sediment sampling has carried out.	Haryana PCB shall carry out sediment sampling and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.
4	Palla Village, Faridabad district, Haryana-121003	PCS	Site was inspected by Haryana PCB and submitted that the said site is located at residential area and no dumping of hazardous waste is observed.	Haryana PCB shall carry out sampling of soil/ groundwater/surface water around the residential area and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
5.	Autopin Colony Sector-22 , Faridabad-121002	PCS	Site was inspected by Haryana PCB and submitted that the said site is located at residential area and	Haryana PCB shall carry out sampling of surface water and sediment around the residential area and submit

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
			no dumping of hazardous waste is observed. Sampling of soil and groundwater was carried out. Analysis results of groundwater samples reveals that concentration of Chloride & TDS is found higher than prescribed standard. However, analysis results reveal that no contamination is in soil samples.	inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
6.	Bajghera Village, Palam Vihar, Gurgaon, Haryana-122017	PCS	Site was inspected by Haryana PCB and submitted that the said site is located at residential area and no dumping of hazardous waste is observed. Sampling of surface water, soil and groundwater was carried out. Analysis results of surface water samples reveals color and odor. No contamination is reported in soil and groundwater samples.	Haryana PCB shall re-carry out surface water along with sediments samples and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with Photographs.
7.	Bandhwadi, landfill Site, Gurgaon-122001	PCS	Site was inspected by Haryana PCB and submitted that the said site is located at residential area and no dumping of hazardous waste is observed.	Haryana PCB shall re-carry out groundwater along with sediments samples and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
			Sampling of soil and groundwater was carried out. Analysis results of groundwater samples reveals that concentration of Chloride & TDS is found higher than standard limit. No contamination is reported in soil samples.	metals along with Photographs.
8.	Agra Canal Near Sector 25, Faridabad, Haryana-121004	PCS	Site was inspected and it is observed that, the site falls in the premises of HIL Ltd., Sector-25, Faridabad. Groundwater and soil sampling was carried out. Analysis results of groundwater samples reveals that concentration of Chloride & TDS is found higher than standard limit. No contamination is reported in soil samples.	Haryana PCB shall carry out sampling of surface water and sediment around the premises of HIL Ltd., Sector-25, Faridabad and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
9.	Sahraul village, Sector -18, Gurgaon, Haryana, India-122015	PCS	Site was inspected and no dumping of hazardous waste is observed. Sampling of soil & groundwater is carried out. Analysis results of groundwater reveals that concentration of Chloride & TDS is found higher than standard limit. No contamination is	Haryana PCB shall re-carry out groundwater along with surface water and sediments samples and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with Photographs.
10.	New Industrial Town (NIT), Faridabad, Haryana -121001	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
			reported in soil samples.	
11.	Ganesh Colony, Mehrana Village, Panipat, Haryana: 132103	PCS	Site was inspected and Sampling of groundwater, soil & surface water was carried out. Analysis results of groundwater reveals that the concentration of TDS is higher than prescribed standard. Soil and surface water samples were found as no contamination. No sediment sampling has carried out.	Haryana PCB shall re-carry out groundwater along with sediments samples and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with Photographs.
12.	Manakpura Industrial Estate Jagadhri to Yamuna River, Yamunanagar District-135001	PCS	Site was inspected and Sampling of soil was carried out. Analysis results of soil samples reveals no contamination.	Haryana PCB shall carry out groundwater/ surface water/ sediment samples and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
13.	Open Space in front of 360E PACE City - 2, Sector 37- B Gurgaon-122002	CS	Site was inspected by Haryana PCB and accordingly, sampling of groundwater, soil & surface water was carried out. Analysis results of surface water samples reveals that the concentration of Chromium, colour, O&G is higher than prescribed standard. Soil and groundwater samples were found as no contamination. No sediment sampling has carried out.	Haryana PCB shall carry out detailed site investigation.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
14.	Near Gayatri Automation, PACE City -2, Sector 37 Gurgaon-122002	PCS	Site is inspected and it is observed that it is a residential area and no dumping of hazardous waste is observed. Sampling of soil/groundwater/ surface water is not carried out.	Haryana PCB shall carry out sampling of soil/ groundwater/ surface water/sediment around the residential area and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
15.	Pinjore-Baddi Highway from Village Kona to Maranwala, Panchkula - 134102	PCS	Site is inspected and Sampling of soil and groundwater was carried out. Analysis results of soil reveals no contamination. Analysis results of groundwater sample is not provided.	Haryana PCB shall provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected groundwater samples.
16.	Nalla Near Sector 22, Faridabad, Haryana-121002	PCS	Site was inspected by Haryana PCB and submitted that the said site is located at residential area and no dumping of hazardous waste is observed. Sampling of soil and groundwater was carried out. Analysis results of groundwater samples reveals that concentration of Chloride & TDS is found higher than prescribed standard. However, analysis results reveal that no contamination in soil samples.	Haryana PCB shall carry out sampling of surface water and sediment around the residential area and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Haryana PCB	Observations/ Suggestions by CPCB
17.	Near Bhindwas Bird Sactuary, Jhajjar , Haryana-124507	PCS	Site is inspected and it is observed that the source of water of the said bird century is rain water of its own catchment area. Sampling of surface water is carried out. Analysis results of surface water reveals no contamination except coliform counts. No soil/ sediment sample was carried out.	Haryana PCB shall carry out sampling of soil/ /sediment and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.

(vii) Himachal Pradesh

HPPCB has communicated action taken reports for following 06 probable/ contaminated sites vide its letters dated 21.09.2019, 31.12.2019, 19.03.2020 & 23.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by HPPCB	Observations/ Suggestions by CPCB
1.	Effluent Drain, Housing Board Phase-III, Baddi, Himachal Pradesh	CS	Site was Inspection by HPPCB and submitted that: (i) No hazardous waste was found at the site. (ii) Soil and Surface water samples collected, analysis results reveal that no contamination.	As per the Photograph submitted by the HPPCB of the site, it clearly depicts that no hazardous waste is accumulated on the said site. Further, analysis results of soil and surface water reveal that no contamination. However, it is observed that groundwater and sediment samples are not collected. Therefore, HPPCB shall carry out sediment and groundwater sampling and submit analysis

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by HPPCB	Observations/ Suggestions by CPCB
				result of chemicals of concern (CoCs) along with general parameters and heavy metals.
2.	Parwanoo Block, Solan District, Himachal Pradesh-173212	PCS	Site was Inspection by Himachal Pradesh and submitted that: (i) No hazardous waste was found at the site. (ii) Filed investigation report is awaited.	HPPCB shall: (i) Submit investigation report along with analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals of soil/sediment/surface water/groundwater samples carried out.
3	Kala Amb, Trilokpuri road, Himachal Pardesh-173030	PCS	Site was Inspection by HPPCB and submitted that: (i) No hazardous waste was found at the site. (ii) Soil and Surface water samples carried out, analysis results reveal that no contamination.	As per the Photograph submitted by the HPPCB of the site, it clearly depicts that no hazardous waste is accumulated on the said site. Further, analysis results of soil and surface water reveal that no contamination. However, it is observed that groundwater and sediment samples are not collected. Therefore, HPPCB shall carry out sediment and groundwater sampling and submit analysis result of chemicals of concern (CoCs) along with general parameters and heavy metals.
4	River Markandaya, Kala Amb, Sirmour, Himachal Pradesh-173030	PCS		
5.	River Kaushalya, Village Khadeen,	PCS	Site was Inspection by Himachal Pradesh and submitted that:	HPPCB shall: (i) Submit investigation report along with

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by HPPCB	Observations/ Suggestions by CPCB
	Parwaanoo Block, Solan District, HImachal Pradesh-173212		(i) No hazardous waste was found at the site. (ii) Filed investigation report is awaited.	analysis report of chemicals of concern (CoCs) along with general parameters and heavy metals of soil/sediment/surface water/groundwater samples carried out.
6.	Open area along Sandholi Nala, Opposite Keshav Auto, Baddi Nalagarh Highway NH-21A-173205	PCS	Site was Inspection by HPPCB and submitted that: (i) No hazardous waste was found at the site. (ii) Soil and Surface water samples carried out, analysis results reveal that no contamination.	As per the Photograph submitted by the HPPCB of the site, it clearly depicts that no hazardous waste is accumulated on the said site. Further, analysis results of soil and surface water reveal that no contamination. However, it is observed that groundwater and sediment samples are not collected. Therefore, HPPCB shall carry out sediment and groundwater sampling and submit analysis result of chemicals of concern (CoCs) along with general parameters and heavy metals.

(viii) Jharkhand

Jharkhand PCB has communicated action taken reports for following 14 probable/contaminated sites vide its letter dated 15.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Jharkhand PCB	Observations/ Suggestions by CPCB
1.	Roro hills, Jharkhand -833201	CS	Site was inspected by Jharkhand PCB and submitted that detailed investigation report on "Rehabilitation of Roro abandoned asbestos mines" along with remediation status as per direction of Hon'ble NGT is submitted. Remedial action is taken by Dept. of Mining, Jharkhand.	Jharkhand PCB shall submit report on Remedial action has been taken by Dept. of Mining, Jharkhand to CPCB.
2.	Manikui-Chandil Swarnarekha River Polluted Site, Seraikella-Kharswan, Jharkhand	CS	Site was inspected by Jharkhand PCB and submitted that assessment work is awarded to M/s SGS India Pvt. Ltd. Analysis results are awaited.	Jharkhand PCB shall submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/ groundwater/surface water samples.
3	Shib Ghat Jugsalai Kharkai River Contaminated Site, Jamshedpur, Jharkhand-831001	PCS		
4	Ratanpur Raghunathpur Kanki, Seraikella-Kharswan, Jharkhand-832401	PCS		
5.	Chasnala - Damodar River Polluted Site Dhanbad Jharkhand-826001	PCS	Site is inspected Jharkhand PCB and submitted that sampling of surface water is carried out. Analysis results of CoCs with general parameters and heavy	Jharkhand PCB has not carried out sediment sampling. Therefore, Jharkhand PCB shall carry out sediment sampling and submit analysis results of chemicals of concern

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Jharkhand PCB	Observations/ Suggestions by CPCB
			metals reveal no contamination.	(CoCs) with general parameters and heavy metals.
6.	Domohani Kharkai River Jamshedpur, Jharkhand-831001	PCS	Site was inspected by Jharkhand PCB and submitted that assessment work is awarded to M/s SGS India Pvt. Ltd. Analysis results are awaited.	Jharkhand PCB shall submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/ groundwater/surface water samples.
7.	Lupungdih Subarnarekha River Polluted Site, East Singhbhum Jharkhand-831001	PCS		
8.	Sindri - Damodar Polluted Site Dhanbad-826001	PCS	Site is inspected Jharkhand PCB and submitted that sampling of surface water is carried out. Analysis results of CoCs with general parameters and heavy metals reveal no contamination.	Jharkhand PCB has not carried out sediment sampling. Therefore, Jharkhand PCB shall carry out sediment sampling and submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals.
9.	Kandra Polluted Site, Seraikella-Kharswan, Jharkhand-831001	PCS	Site was inspected by Jharkhand PCB and submitted that assessment work is awarded to M/s SGS India Pvt. Ltd. Analysis results are awaited.	Jharkhand PCB shall submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/ groundwater/ surface water samples.
10.	Ghatshila, Subarnarekha River, East Singhbhum, Jharkhand-831001	PCS		
11.	Pataratu Thermal Power Plant, Jharkhand Electricity Board, Paratu Village Near Ranchi-834002	PCS	Site was inspected Jharkhand PCB and submitted that the said power plant is undertaken by M/s Pataratu Vidyut Utpadan Nigam, which is under construction.	Jharkhand PCB has not carried out sampling. Therefore, Jharkhand PCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Jharkhand PCB	Observations/ Suggestions by CPCB
				metals along with site visit Photographs.
12.	Chandrapura Thermal Power Station DVC Bokaro Jharkhand -827001	PCS	Site was inspected by Jharkhand PCB and submitted that power-plant ash pond is near to the location and seepage flow from this pond to river may be occurred. Sampling of surface water is carried out. Analysis results of CoCs with general parameters and heavy metals reveals no contamination in surface water.	Jharkhand PCB has not carried out sediment sampling. Therefore, Jharkhand PCB shall carry out sediment sampling and submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals.
13.	Adityapur Ind. Area, Near Jamshedpur, Behind Pepsi Factory,Ranchi-834002	PCS	Site was inspected by Jharkhand PCB and submitted that assessment work is awarded to M/s SGS India Pvt. Ltd. Analysis results are awaited.	Jharkhand PCB shall submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/ surface water samples.
14.	Sonari Chatt Ghat Subarnarekha River Polluted, Jamshedpur, Jharkhand-831001	PCS		

Note: *Sampling and analysis, done by same lab/consultant may be conflict of Interest.*

(ix) Karnataka

Karnataka PCB has communicated Action taken reports for following 25 probable/contaminated sites vide its letter dated 03.02.2020 and email communications dated 09.01.2020, 10.01.2020, & 22.01.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
1.	Goripalya near Mysore Road, Bangalore,	CS	Inspection was carried out by Karnataka SPCB and	Karnataka SPCB shall carry out sampling of soil/groundwater/surface

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
	Karnataka. E-waste recycling in Bangalore, Karnataka		submitted that dumping of MSW waste was happening. BBMP authorities have cleared the waste and sent to their solid waste landfill site for further treatment and disposal.	water of the site and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
2.	Cauvery River, downstream Nanjangud, Mysore District, Karnataka	CS	Inspection was carried out by Karnataka SPCB and submitted that dumping of MSW waste was happening. In this regard, CMC Nanjangud has been informed to provide STP to treat sewage for irrigation / secondary purposes.	Karnataka SPCB shall submit the status.
3	Mangamanapalya Road, Hosur Road, Bangalore, Karnataka	CS	The co-ordinates mentioned were verified and it pertains to Hosur Road, i.e., NH-7 (Chennai-Bengaluru Highway) and fly over road to Electronics City. The road and fly over is developed.	Karnataka SPCB shall carry out sampling of soil/groundwater/surface water nearby the site and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
4	Peenya Industrial area, Bangalore, Karnataka	CS	As per the GPS readings, the location falls behind M/s. Paragon Polymer Products Pvt. Ltd., Shed No. B-69, 2nd Cross, Ist Stage, PIE, Bengaluru (Green category).	Karnataka SPCB shall carry out sampling of soil/groundwater/surface water around the M/s. Paragon Polymer Products Pvt. Ltd and submit inspection report along with analysis results of chemicals of concern (CoCs) with general

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
				parameters & heavy metals and photographs.
5.	Mavallipura Dumpsite, Yelahanka, Banglore	CS	Inspection was carried out by Karnataka SPCB and submitted that solid waste processing facility is existed, currently not in operation. However, there is huge quantity of accumulated legacy waste is lying at the site.	Karnataka SPCB has submitted only brief note. However, inspection report along with analysis results and photographs are not provided till date. Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/surface water samples from contaminated sites.
6.	Lalbagh Lake, Bangalore, Karnataka-560004	PCS	Inspection was carried out by Karnataka SPCB and submitted that sewage generated from residential area was entering into the lake. BWSSB authorities have replaced and reconstructed manhole and diverted all the sewage into their sewer network.	
7.	Madiwala Lake ,BTM 2nd Stage, Banglore, Karnataka-560076	PCS	Karnataka SPCB has submitted that Board is regularly monitoring water and sediment quality of Madiwala Lake.	
8.	Hebbal Lake, Banglore, Karnataka-560024	PCS	Inspection was carried out by Karnataka SPCB and submitted that sewage generated from nearby area was entering into the lake.	

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
9.	Bellandur Lake, Bangalore, Karnataka-560103	PCS	Karnataka SPCB has submitted that Board is regularly monitoring water and sediment quality of Bellandur Lake.	
10.	Kengeri tank, Bangalore, Karnataka-560060	PCS	Inspection was carried out by Karnataka SPCB and submitted that sewage generated from nearby area was entering into the tank.	
11.	Arekere lake, Bangalore, Karnataka-560076	PCS	Karnataka SPCB has submitted that Board is regularly monitoring water quality of Arakere Lake.	
12.	Agara Lake, Banglore city, Karnataka-560102	PCS	Karnataka SPCB has submitted that Board is regularly monitoring water quality of Lake.	
13.	Begur Lake, Begur road, Banglore, Karnataka-560068	CS	Karnataka SPCB has submitted that Board is regularly monitoring water quality of Lake. Sediment sample of lake is having higher concentration for **Zinc as 20000 mg/kg, Chromium, copper, Lead and nickel as 5000 mg/kg, which are higher than screening level.**	SPCB shall carry out detailed assessment of the site and may submit status report to CPCB.
14.	Harihar Taluk, Davengere District, Karnataka-577601	PCS	Inspection was carried out by Karnataka SPCB and submitted that	Karnataka SPCB has submitted only brief note. However, inspection report along with analysis

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
			sewage generated from nearby area.	results and photographs are not provided till date. Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/surface water samples from contaminated sites.
15.	Tumkuru Amanikere Lake Watershed, Karnataka, India-572101	PCS	Inspection was carried out by Karnataka SPCB and submitted that sewage generated from nearby area enter into the lake.	Karnataka SPCB has submitted only brief note. However, inspection report along with analysis results and photographs are not provided till date. Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/surface water samples from contaminated sites.
16.	Federal Mughal Pvt Ltd, Doddaballapur Road, Yelahanka, Bangalore, Karnataka-560064	PCS	Remedial action is under progress.	Karnataka SPCB shall provide status on remedial action.
17.	Vrishabavati River, Bangalore-560001	PCS	Karnataka SPCB has submitted that Board is regularly monitoring Vrishabhavathi Valley (Near Kalyani Motors-	Karnataka SPCB has submitted only brief note. However, inspection report along with analysis results and photographs are not provided till date.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
			Nayandahalli) and banned the establishment of new Electroplating and surface treatment units since 2013.	Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/ surface water samples from contaminated sites.
18.	Dandeli, Karnataka-pincode-581325	PCS	Inspection was carried out by Karnataka SPCB and submitted that industrial activity is happening.	Karnataka SPCB has submitted only brief note. However, inspection report along with analysis results and photographs are not provided till date. Karnataka SPCB shall provide Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites.
19.	Peenaya Industrial Estate I-Stage, Bengluru-560058	PCS		
20.	Metagalli industrial area Mysore city, Karnataka, India-570016	PCS		
21.	Hebbal Industrial area Mysore city, Karnataka, India-570020	PCS	Inspection was carried out by Karnataka SPCB and submitted that industrial activity utilized by M/s. Infosys Limited (Software Company).	Karnataka SPCB shall carry out sampling of soil/groundwater/surface water around the M/s. Infosys Limited and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
22.	Hootagalli Industrial area Mysore city,	PCS	Inspection was carried out by Karnataka SPCB and	Karnataka SPCB has submitted only brief note. However, inspection

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Karnataka PCB	Observations/ Suggestions by CPCB
	Karnataka, India-570023		submitted that industrial activity is happening.	report along with analysis results and photographs are not provided till date. Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/surface water samples from contaminated sites.
23.	Peenaya Industrial Estate, II Stage Bengluru-560058	PCS		
24.	Peenaya Industrial Estate, IV Stage Bengluru-560058	PCS	Inspection was carried out by Karnataka SPCB and submitted that the said industry is functioning in powder coating with pre-treatment activity.	
25.	Bidar, Karataka (Vani Oragnics Pvt. Ltd.)	PCS	No inspection report along with analysis results is submitted.	Karnataka SPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/groundwater/ surface water samples from contaminated sites.

(x) Kerala

Kerala SPCB has communicated Action taken reports for following 13 probable/contaminated sites vide its letters dated 14.11.2019 and 12.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/Initiated by Kerala PCB	Observations/ Suggestions by CPCB
1.	Ammanthuruthu-Karipadam	-	DPR is completed under NCEF project of MoEF&CC and CPCB.	As per the detailed site investigation and Risk Assessment study carried out, it is declared/confirmed that

S. No.	Name of the Site	CS/ PCS	Action taken/I nitiated by Kerala PCB	Observations/ Suggestions by CPCB
				remediation is not required. Therefore, it is proposed that the site may be **de-listed.**
2.	Kuzhikandom Thodu (Creek), Kerala	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	Tendering process is under progress for execution of remediation work.
3	Kalamukke Lake, Kochi	-	Site was inspected by Kerala SPCB and accordingly, sampling of surface water and sediment is carried out. Analysis results of surface water samples reveal about higher concentration of TDS, sulphate & chloride due to marine environment. Analysis results of sediment samples reveals no contamination.	No action is required. Therefore, it is proposed that the site may be **de-listed.**
4	Vadavathoor, Kottayam	CS	Site was inspected by Kerala SPCB and accordingly, sampling of soil & water is carried out and analysis report is awaited.	Kerala PCB shall submit the analysis results of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ groundwater/ surface water samples from contaminated sites. If concentration levels found above the screening/ response levels/ standards, detailed site investigation may be carried out.
5.	Edayar, Edayattuchal Kochi, Kerala (in &	CS	DPR is completed under NCEF project	Remediation work not yet initiated by Kerala SPCB.

S. No.	Name of the Site	CS/ PCS	Action taken/I nitiated by Kerala PCB	Observations/ Suggestions by CPCB
	around the premises of M/s. Binani Zinc Ltd.)		of MoEF&CC and CPCB.	
6.	Edayar, Chakkarachal Kochi, Kerala (in & around the premises of M/s. Binani Zinc Ltd.)	CS		
7.	Periyar River, Vandiperiyar, District - Idduki,Kerala-685533	-	Site was inspected by Kerala SPCB and accordingly, sampling of surface water and sediment is carried out. Analysis results of surface water and sediment samples reveal that no contamination.	No action is required. Therefore, it is proposed that the site may be **de-listed**.
8.	Vembanad (Vembanad Kayal or Vembanad Kol), Kottayam, Kerala-686001	PCS	Site was inspected by Kerala SPCB and identified as a wastewater drainage at Aroor, Alappuzha. However, no sampling of surface water and sediment was carried out due to very low flow in this drain as the drought season prevailed.	Kerala SPCB shall carry out samplings of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.
9.	Meenachil River, Kottayam, Kerala	PCS	Site is inspected by Kerala SPCB and identified as a spot in Arabian sea at 600 m from the shore at Alappuzha. Hence, it was proposed to take samples for analysis with the assistance of Maritime Board/ concerned department.	Kerala SPCB shall provide Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected sediment & surface water samples from contaminated sites.

S. No.	Name of the Site	CS/ PCS	Action taken/I nitiated by Kerala PCB	Observations/ Suggestions by CPCB
10.	Ashtamudi Lake, Kollam District, Kerala-691602	PCS	Site is inspected by Kerala SPCB an accordingly, sampling of surface water is carried out. Analysis results of surface water samples reveal about higher concentration of TDS, Sulphate & chloride due to marine environment.	Kerala SPCB shall carry out sediment samples and submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals.
11.	Parvathy Puthanar, Thiruvananthapuram, Kerala-695001	PCS	Site is inspected by Kerala SPCB and identified as a wastewater drainage beside railway tracks, however, the drain was not seemed to be joining Parvathy Puthanar. Surface water sampling was carried out and analysis results reveal that no contamination w.r.t. CoCs.	Kerala SPCB shall carry out sediment samples and submit analysis results of chemicals of concern (CoCs) with general parameters and heavy metals.
12.	Eloor Industrial area, Cochin, Kerala-683501	PCS	Site was inspected by Kerala SPCB. As per given geo-co-ordinates, the site is situated about 25 km away from Eloor-Edayar Industrial area. Sampling of soil & groundwater was carried out. Analysis results reveal that no contamination. For soil samples, analysis results reveal no contamination w.r.t. CoCs.	Kerala SPCB shall carry out soil samples and submit analysis results of general parameters and heavy metals.
13.	Bramhpuram, Kochi-682303	PCS	Site is inspected by Kerala SPCB and	Kerala SPCB shall submit analysis results of

S. No.	Name of the Site	CS/ PCS	Action taken/I nitiated by Kerala PCB	Observations/ Suggestions by CPCB
			found Brahmapuram Diesel Power Plant at Brahmapuram which is provided for storing oil and sludge in separate tanks and sludge is disposed as per Rules. However, no supportive documents are not provided. Sampling of soil was carried out. Analysis report is not properly represented.	chemicals of concern (CoCs) with general parameters and heavy metals of collected Soil/sediment/ surface water/ groundwater samples.

(xi) Madhya Pradesh

MPPCB has communicated action taken reports for following 21 probable/ contaminated sites identified vide letters dated 04.01.2020 & 18.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
1.	Sajjan chemical Pvt Ltd (Khandarwesa Mines, Near Nimali Village)	-	Detailed site investigation completed under NCEF project of MoEF&CC and CPCB. No action is required for remediation. Therefore, it is proposed that the site may be **de-listed**.	
2.	M/s Grasim Chemical, Grasim Nagar, Nagda, Madhya Pradesh	PCS	(i) Soil samples collected, analysis results reveal that concentration of Sulphate, Chloride and Iron is besides high. However, no screening/response level is available for the same. Further, heavy metals are analyzed by using TCLP extraction method*. (ii) Groundwater samples collected, analysis results reveal that no	MPPCB shall submit analysis report of heavy metals (total concentration) for soil samples.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
			contamination with heavy metals.	
3.	Sajjan Chemicals -Plot No ; 54 E dosigoan Industrial area, Ratlam, Madhya Pradeh	CS	(i) Detailed site investigation completed under NCEF project, wherein CPCB is implementing agency. DPR is under progress and likely to be completed by July, 2020. (ii) As per detailed site investigation carried out, it is revealed that groundwater is contaminated with color and TDS. (iii) Hazardous waste is still lying at the premises.	MPPCB shall ensure that waste is lying, be lifted and dispose through TSDF/SLF, progress report in this regard may be submitted to CPCB.
4.	Sajjan chemical Pvt Ltd (Plot No -61 B, Dosigaon Industrial Area, Ratlam)	CS	(i) Detailed site investigation completed under NCEF project, wherein CPCB is implementing agency. DPR is under progress and likely to be completed by July, 2020. (ii) As per detailed site investigation carried out, it is revealed that groundwater is contaminated with color and TDS. (iii) Hazardous waste already been lifted and disposed at TSDF.	After finalization of DPR, MPPCB shall initiate remediation works for groundwater and impacted soil.
5.	Indo Zinc, Plot-79, Sector -3, Pithampur, Dist-Dhar, Madhya Pradesh	PCS	(i) Soil samples collected, analysis results reveal that soil is contaminated with Zinc (88100 mg/kg). Further, heavy metals are analyzed by using TCLP extraction method*. However, analysis of other	MPPCB shall: (i) Submit analysis report of CoCs, such as, Mercury & Arsenic for both soil and groundwater samples and *heavy metals for soil samples.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
			CoCs (such as: Mercury & Arsenic) is not done due to unavailability of facilities. (ii) Groundwater samples collected, analysis results reveal that groundwater contamination with fluoride (275.94 mg/L).	(ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.
6.	M/s Jayant Vitamin, Ratlam	CS	(i) Detailed site investigation completed under NCEF project, wherein CPCB is implementing agency. DPR is under progress and likely to be completed by July, 2020. (ii) As per detailed site investigation carried out, it is revealed that groundwater is contaminated with color and TDS. (iii) No historical waste dump was found, except old industrial equipment and chemical storage tanks as per detailed investigation report.	After finalization of DPR, MPPCB shall ensure the old industrial equipment and chemical storage tanks from the said premises be removed and dispose through environmentally sound mechanism.
7.	Atal Ayub Nagar, Near UCIL factroy, Bhopal-462001	PCS	(i) The said area falls under jurisdiction of residential zone. (ii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method*. VOC (Trichloromethane) is found higher than response level. (iii) Groundwater samples collected, analysis results reveal that contaminated with VOC (chloroform).	MPPCB shall: (i) Submit analysis report of heavy metals* & pesticides (Carbamate) of both soil and groundwater samples. (ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
8.	Kainchi Chhola colony, Bhopal-462001	PCS	(i) The said area falls under jurisdiction of residential zone. (ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals. However, analysis of Pesticides (Carbamate) is not done due to unavailability of facilities. (iii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method.	MPPCB shall submit analysis report of heavy metals for soil samples, and pesticides (Carbamate) for both soil & groundwater samples.
9.	Garib Nagar, Bhopal-462001	PCS	(i) The said area falls under the jurisdiction of residential zone. (ii) Groundwater samples are collected and analysis results reveal that groundwater is contaminated with VOC (chloroform). (iii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. Pesticide analysis is not done due to unavailability of facilities.	MPPCB shall: (i) Provide the analysis report of pesticides (Carbamate) and heavy metals for soil samples. (ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.
10.	Blue Moon & Nawab Colony, Bhopal-462001	PCS	(i) The said area falls under the jurisdiction of residential zone. (ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals. (iii) Soil samples collected, analysis results reveal that contamination with	MPPCB shall: (i) Submit analysis report of pesticides (Carbamate) for both soil & groundwater samples, and heavy metals for soil samples. (ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
			Trichloromethane (VOC). Further, heavy metals are analyzed by using TCLP extraction method.	
11.	New Arif Nagar, Bhopal-462001	PCS	(i) The said area falls under the jurisdiction of residential zone. (ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals. (iii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method.	MPPCB shall submit analysis report of pesticides (Carbamate) for both soil & groundwater samples, and heavy metals for soil sample
12.	Shiv Nagar, near Hindustan Petroleum depot, Bhopal--462001 Shakti Nagar, Near Arif Nagar, Near Union Carbide factrory, Bhopal	PCS	(i) The said area falls under the jurisdiction of residential zone. (ii) Groundwater samples collected, analysis results reveal that except Manganese (0.516 mg/L) all the heavy metals are within prescribed limits. (iii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method.	MPPCB shall submit analysis result of heavy metals for soil samples.
13.	Mandideep Industrial area, Mandideep, Raisan-462040	PCS	(i) Soil samples collected, analysis results reveal that concentration of Sulphate, Chloride and Iron is besides high. However, no screening/response level is available for the same. Further, heavy metals are analyzed by using TCLP extraction method. Analysis of Aluminium is not done due to unavailability of facilities.	MPPCB shall submit analysis report of soil for heavy metals including Aluminium & pesticides (Carbamate).

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
			(ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals.	
14.	Ratlam Industrial Area-457001	PCS	(i) Soil samples collected and analyzed. Analysis of Arsenic & pesticides (Carbamate) was not done due to unavailability of facilities. Further, heavy metals are analyzed by using TCLP extraction method. (ii) Groundwater samples collected, analysis results reveal that groundwater is contaminated with Color, Chloride, Alkalinity, Sulphate Hardness, TDS, BOD and COD.	MPPCB shall: (i) Submit analysis reports of groundwater and soil for heavy metals (including Arsenic) & pesticides (Carbamate). (ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.
15.	Post Vindhyan Nagar, Dist. Sangruli, MP-486885	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. Pesticide analysis is not done due to unavailability of facilities. (ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals.	MPPCB shall submit analysis reports of soil samples for heavy metals (including Arsenic) & pesticides (Carbamate).
16.	M/s Union carbide (UCIL), J.P. Nagar, Bhopal, Madhya Pradesh 462001	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. However, analysis was not done for pesticides (Carbamate). (ii) Groundwater samples collected, analysis results reveal that no contamination.	MPPCB shall submit analysis reports of soil samples for heavy metals & pesticides (Carbamate).

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
17.	M/s Boardia Chemicals Pvt Ltd.Ratlam, Madhya Pradesh-457001	PCS	(i) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. However, analysis of Aluminium, Arsenic, Lead, Mercury, Phenolic compounds, & PAH components are not done due to unavailability of facilities. (ii) Groundwater samples collected, analysis results reveal that contaminated with Color, Chloride, Alkalinity, Sulphate Hardness, TDS, BOD and COD.	MPPCB shall: (i) Submit analysis reports for heavy metals (including Aluminium, Arsenic, Lead, & Mercury), Phenolic compounds, PAH components & pesticides (Carbamate). (ii) Initiate detailed investigation of site, to ascertain the level and extent of contamination.
18.	M/S Beta Napthol-village Maksi, Shajapur dist 465106	PCS	(i) Soil samples collected, heavy metals are analyzed by using TCLP extraction method. Analysis of Aluminum is not done due to unavailability of facilities. (ii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals.	MPPCB shall provide the analysis report of heavy metals including Aluminum for soil sample.
19.	Deoguradiya (Municipal landfill) Site, Near Devguradia, Indore -452001	PCS	(i)The said area falls under the jurisdiction of residential zone. (ii) Soil samples collected, analyzed for heavy metals by using TCLP extraction method. However, hexavalent chromium is not done. (iii) Groundwater samples collected, analysis results reveal that no contamination with heavy metals.	MPPCB shall provide the analysis report of heavy metals including hexavalent chromium for soil samples.

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by MPPCB	Observations/ Suggestions by CPCB
20.	Solar Evaporation Ponds outside UCIL premises, Bhopal	PCS	(i) Surface water samples collected, analysis results reveal no contamination. (ii) Sediment & soil samples collected, analyzed for heavy metals by using TCLP extraction method.	MPPCB shall: (i) Carry out groundwater samples and submit analysis report. (ii) Submit the analysis report of heavy metals along with pesticides (Carbamate) for both soil & sediment samples.
21.	Dabli, Mnglia, Indore, MP	CS	(i) CPCB vide letter dated 10.01.2020 issued directions u/s 18(1) of Water Act, 1974 to MPPCB regarding oil contamination due to leaking of underlines pipe lines. (ii) Oil & Grease conc. in groundwater sample was reported as 1 mg/L (BIS limit for Mineral oil in Drinking water is 0.5 mg/L). (iii) Soil samples collected, heavy metals are analyzed by using TCLP extraction method.	MPPCB shall initiate detailed investigation of the site, to ascertain the level and extent of contamination.

***Note:** *MPPCB shall **c**arry out re-sampling of soil, wherein samples analyzed for heavy metals by using TCLP extraction method. Therefore, the concentration of heavy metals in soil may be analyzed in total.*

In the view of above, CPCB vide letter dated 08.05.2020 communicated the aforesaid comments/observations to MPPCB. In response, MPPCB vide its letter dated 19.05.2020, requested to grant 1-month additional time to submit the data/information as asked by CPCB. Further, conveyed that re-investigation of the sites will be started once the situation of Covid-19 Pandemic gets normal in the state.

(xii) Maharashtra

Maharashtra PCB has communicated partial reports on 06 probable/contaminated sites vide its email communication dated 27.11.2019 and letter dated 03.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by MPCB	Observations/ Suggestions by CPCB
1.	Mithi River, Mumbai, Maharashtra	CS	MPCB issued direction u/s 5 of E(P)A 1986 to Municipal Corporation of Greater Mumbai (MCGM).	MPCB has not provided inspection report along with sampling and analysis details. Therefore, MPCB shall: (i) Carry out sampling of soil/groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Submit the compliance status of directions issued to MCGM.
2.	M/s Godavari Bio-Refineries, Ahmed Nagar District, Maharashtra	CS	Remediation work is under taken by Responsible Party.	MPCB shall submit status report on remediation works under taken by Responsible Party.
3	Deonar, Mumbai , Maharashtra 400088	PCS	Proposal for preliminary assessment of the sites has been requested from IIT and CSIR-NEERI.	MPCB shall submit status report on preliminary site assessment. Sampling of soil/ groundwater/surface water/sediment/waste may be carried out and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
4	Tarapur Industrial area, Tarapur, Thana dist.- 401504, 401506	PCS		
5.	Nashik, MIDC (Industries located in MIDC Area)	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by MPCB	Observations/ Suggestions by CPCB
6.	Karavale village, Kalyan, Maharashtra	CS	Maharashtra SPCB informed the site as hazardous waste dumped area and coordinated with defaulting industries and TSDF (M/s Mumbai Waste Management Ltd., Taloja). Approx. 2000 MT of hazardous waste was lifted & disposed through to TSDF.	MPCB shall carry out sampling of soil/ groundwater/surface water/sediment and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.

(xiii) Odisha

Odisha SPCB has communicated preliminary site investigation reports for following 32 Probable/Contaminated sites vide its letter dated 21.05.2020 and letter dated 30.11.2019 informed about that formation of Empowering Monitoring Committee (EMC) to monitor the investigation & remediation activities. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
1.	RKL-II (In Beldihi village along the play ground between Govt primary school & St. Georgia school)	CS	Site inspection was carried out by OSPCB and submitted that: (i) Responsible polluter party identified as M/s Lotus chemicals. (ii) Soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Cr (Total & Hexavalent) is higher than screening/response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
				may be submitted to CPCB.
2.	Site KCL IV, outside the premises of M/s KCL near Northern Boundary- Mayurbhanj Orissa	CS	Site inspection was carried out by OSPCB and accordingly, soil samples collected and analyzed for CoCs. Analysis results reveal no contamination in soil w.r.t. CoCs.	OSPCB has carried out only few soil samples. However, waste/ groundwater/surface water/sediment samples are not carried out. Therefore, OSPCB shall carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
3	Site KCL V, outside the premises of M/s KCL near main Gate; Mayurbhanj Orissa	CS		
4	Site NALCO-I, M/s National Aluminum Co. Products, Angul	CS		
5.	Site KCL-I, , Inside the premises of M/s KCL near H2SO4 Tank	CS		
6.	Site KCL II, Inside the premises of M/s KCL near Gate, Mayurbhanj, Orissa	CS	Site inspection was carried out by OSPCB and accordingly soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Hexavalent Cr is higher than screening/response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
7.	Site KCL III, ,Inside the premises of M/s KCL inside drier room, Mayurbhanj, Orissa	CS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
8.	Gypsum Pond - Paradip Phosphate & IFFCO, Paradip, Odisha	CS	Site inspection was carried out by OSPCB and accordingly, soil samples collected and analyzed for CoCs. Analysis results reveal no contamination in soil w.r.t. CoCs.	OSPCB has carried out only few soil samples. However, waste/ groundwater/surface water/sediment samples are not carried out. Therefore, OSPCB shall carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
9.	Site NALCO-II, M/s National Aluminum Co. Products, Angul	CS		
10.	Site NALCO-III, M/s National Aluminum Co. Products, Angul	CS		
11.	Site ECFC-II (Outside the Premises along the boundary wall)), Mayurbhanj, Orissa	CS		
12.	RKL-III (In a low lying area in Kaluga industrial estate near Kalinga Sponge industry, around 500 m away from M/s Konark Chemicals and M/s Siddharth Chemicals)	CS	Site inspection was carried out by OSPCB and accordingly, soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Cr (Total & Hexavalent) is higher than screening/response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
13.	Dumpsite JCL-I (Outside the Premises Of M/S Jayshree	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	Remediation work initiated by the Responsible Party.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
	Chemicals Ltd Near Rushikulya River)			OSPCB shall monitor the remediation activities initiated by Responsible Party and may submit the status report to CPCB.
14.	RKL-IV, inside the premises of M/S Siddharth Chemicals	CS	Site inspection was carried out by OSPCB. However, soil sampling was not carried out as the area is completely concreted by M/s Sidharth Chemicals.	OSPCB shall carry out sampling of all matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals. If concentration levels reported above the screening/response levels /standards, detailed site investigation may be carried out.
15.	Site ECFC-I (Backside of the unit.) Mayurbhanj, Orissa	CS	Site inspection was carried out by OSPCB and accordingly soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Hexavalent Cr is higher than screening/response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
16.	RKL-I (Inside The Premises Of M/S Lotus Chrome Chemicals)	CS		
17.	Dumpsite JCL-III (Outside the	CS	DPR is completed under NCEF project	Remediation work initiated by the

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
	Premises Of M/S Jayshree Chemicals Ltd Near Rushikulya River)		of MoEF&CC and CPCB.	Responsible Party. OSPCB shall monitor the remediation activities and may submit the status report to CPCB.
18.	Jayashree Chemicals, Ganjam	CS		
19.	Site INDAL-III (Located outside the unit premises of M/s Indian Aluminum Company Limited), Hirakud, Sambalpur	CS	Site inspection was carried out by OSPCB and accordingly soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Cyanide is higher than screening/ response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
20.	Site INDAL-I (Located inside the unit premises of M/s Indian Aluminum Company Limited), Hirakud, Sambalpur	CS	Site inspection was carried out by OSPCB and accordingly, soil samples collected and analyzed for CoCs. Analysis results reveal no contamination in soil w.r.t. CoCs.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
21.	Site INDAL-II (Located inside the unit premises of M/s Indian Aluminum Company Limited), Hirakud, Sambalpur	CS	Site inspection was carried out by OSPCB. However, sampling was not carried out.	OSPCB shall carry out sampling of soil/sediment groundwater/ surface water/wastes and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with site visit Photographs.
22.	Site OCL-I, ORICHEM abandoned site (inside the premises of M/s Orichem Ltd and also outside the boundary of wall), Talcher, Orissa	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	Remediation work not yet initiated. However, no information about whether the hazardous waste lying at the site removed or not.
23.	Brajrajnagar, Ib Valley-768201	PCS	Site inspection was carried out by OSPCB and accordingly, soil samples collected and analyzed for CoCs. Analysis results reveal no contamination in soil w.r.t. CoCs.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
24.	Koniabera Site, Angul-759122	PCS		
25.	Tentulei Common Polluted Site, Angul-759122	PCS	Site is inspected. Soil/ groundwater sampling was not carried out as GPS location was not matched with the site.	OSPCB shall carry out sampling of all matrix near by the suspected site/area and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with site visit Photographs.
26.	Brahamani Nandira River Polluted Sites, Angul-759122	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
27.	Sukinda, Orissa-755018	PCS	Site inspection was carried out by OSPCB and accordingly soil sampling carried out and analyzed for CoCs. Analysis results reveal that concentration of Hexavalent Cr is higher than screening/response levels.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall: (i) Carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
28.	Kandsar & Karaberini Sites, NALCO, Angul-759122	PCS	Site is inspected. Soil/ groundwater sampling was not carried out as GPS location was not matched with the site.	OSPCB shall carry out sampling of all matrix near by the suspected site/area and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals along with site visit Photographs.
29.	Girang & Kulad Villages, NALCO, Angul-759122	PCS	Site inspection was carried out by OSPCB and accordingly, soil samples collected and analyzed for CoCs. Analysis results reveal no contamination in soil w.r.t. CoCs.	OSPCB has carried out only few soil samples. However, waste/ groundwater/ surface water/sediment samples are not carried out. Therefore, OSPCB shall carry out sampling of groundwater/surface water/sediment/waste and submit analysis reports of chemicals of
30.	Ash Pond Contaminated Sites of CPP, NALCO, Orissa, M/s National Aluminum Co. Products, Angul, 759122	PCS		
31.	Lanjigarh, Kalahandi-766027	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by OSPCB	Observations/ Suggestions by CPCB
				concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
32.	Jharsuguda, Odisha-768202	CS	Proposal for ESA-II is submitted to OSPCB.	Detailed site investigation yet to initiate by Responsible party. OSPCB shall submit the status report to CPCB.

(xiv) Punjab

PPCB has communicated analysis reports of groundwater samples for following 09 probable/contaminated sites vide its letter dated 10.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Punjab PCB	Observations/ Suggestions by CPCB
1.	Basti Sheikh, Jalandhar	CS	No report is received	Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
2.	Hambran Road Msw DumpSite, Ludhiana	CS	Analysis result of groundwater sample is submitted by Punjab PCB, parameters are found within the limit.	Punjab PCB only carried out groundwater samples. However, other matrices are not carried out. Therefore, Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of
3	Buddha Nullah, Ludhiana, Punjab	CS		

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Punjab PCB	Observations/ Suggestions by CPCB
				concern (CoCs) along with general parameters and heavy metals.
4	Mahaluxmi Orgo Chemical Industries, Nabha Road, Bhawanigarh, Sangrur	CS	No report is received	Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
5.	Tajpur road MSW Sumpsite, Ludhiana	CS	Analysis result of groundwater sample is submitted by Punjab PCB, parameters are found within the limit.	Punjab PCB only carried out groundwater samples. However, other matrices are not carried out. Therefore, Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
6.	PSIEC Leather Complex, Jalandhar, Punjab	CS	No report is received	Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
7.	Kala Sanghia Drain, Jalandhar, Punjab144623	PCS		
8.	Nasrali Village, Mandi Gobindgarh-147301	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/initiated by Punjab PCB	Observations/ Suggestions by CPCB
9.	Ajnali Village, Mandi Gobindgarh, Punjab.-147301	PCS	Analysis result of groundwater sample is submitted by Punjab PCB, parameters are found within the limit.	Punjab PCB only carried out groundwater samples. However, other matrices are not carried out. Therefore, Punjab PCB shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.

(xv)Tamil Nadu

TNPCB has communicated action taken reports for following 14 Probable/Contaminated sites vide its letters dated 15.10.2019 & 20.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
1.	Noyyal river, Tirupur, Tamil Nadu	CS	Site is inspected by TNPCB and submitted that: (i) Textile dying/bleaching industries are located upstream of the site. (ii) Dump of hazardous wastes is not observed at the site (iii) The site contaminated due to earlier discharge of effluent from Textile dyeing units. Now all	TNPCB has not provided inspection report along with analysis results and photographs. TNPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
			the units are achieving Zero discharge.	
2.	Eachangadu, Cuddalore, Tamil Nadu	CS	Site is inspected by TNPCB and submitted that: (i) the site is located at the premises of Residential Colony at Kudikkadu village, and the site is barren land without any activities. (ii) Dump of hazardous wastes is not observed at the site. (iii) Soil samples collected, analysis results reveal that mercury and methylene Chloride are below detective limit.	It is observed that TNPCB has collected only soil samples and analysis results reported that no contamination of mercury and methylene Chloride. Therefore, TNPCB shall carry out sediment/groundwater/ surface water samples and analyze for chemicals of concern (CoCs) with general parameters and heavy metals and report may submit to CPCB. If concentration levels found above the screening/response level/standards, TNPCB shall carry out detailed site investigation, to ascertain the level and extent of contamination.
3	Kodaikanal , Tamil Nadu	CS	Detailed site assessment along with trail remediation has been done by M/s HUL. CTE is awaited since long from TNPCB for execution of remediation work. Now, it is submitted that the Technical Sub Committee of TNPCB has approved the grant of CTE to the unit.	TNPCB shall issue Consents for execution of remediation works at the earliest, may follow-up the remediation activity and submit status report from time to time.
4	Vanitec Limited (inside the premises of CETP) Vallayambattu,	CS	The site was inspected by TNPCB and submitted that:	It is observed that TNPCB has collected only groundwater sample and analysis results reported

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
	Vadiumbadi, Vellore, Tamil Nadu		(i) Directions has been issued to the CETP to provide capping of SLF within 3 months. (ii) Groundwater samples was collected from nearby open wells, analysis results show that no presence of chromium. However, Sulphate, Chloride, Calcium and TDS levels are reported besides high.	that Sulphate, Chloride, Calcium and TDS levels besides high. Therefore, TNPCB shall carry out soil/sediment/ surface water samples and analyze for chemicals of concern (CoCs) with general parameters and heavy metals and report may submit to CPCB. If concentration levels found above the screening/response level/standards, TNPCB shall carry out detailed site investigation, to ascertain the level and extent of contamination.
5.	TCCL, Ranipet , Tamil Nadu	CS	DPR is completed under NCEF project. Accordingly, CPCB communicated final DPR along templates of tender document to State of TN and TNPCB for execution of Remediation work.	Remediation works not yet started and hazardous waste still lying at the site. Therefore, TNPCB shall initiate remediation works at the earliest and status may be submitted to CPCB.
6.	Tondairpet, Chennai, Tamil Nadu	CS	Remediation work is on-going by M/s BPCL.	TNPCB shall follow-up the remediation works and submit the status report CPCB from time to time.
7.	Walajapet Lake Water Polluted Site, Vellore, Tamil Nadu-632513	PCS	The site was inspected by TNPCB and submitted that surface water samples collected from Lake, analysis results reported that hexavalent chromium and Total chromium is less than 0.01 mg/L. However, Sulphate, Chloride, BOD, COD and TDS	It is observed that TNPCB has collected only one surface water sample and analysis results reported that Sulphate, Chloride, BOD, COD and TDS levels are besides high. Therefore, TNPCB shall carry out soil/sediment/ groundwater samples and analyze for chemicals of concern (CoCs) with

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
			levels are reported besides high.	general parameters and heavy metals and report may submit to CPCB. If concentration levels found above the screening/response level/standards, TNPCB shall carry out detailed site investigation, to ascertain the level and extent of contamination.
8.	Manali, Chennai, Tamil Nadu-600068	-	Site is inspected by TNPCB and submitted that: (i) The industries located in the Manali area are majorly air polluting industries. (ii) Closely monitoring the air quality in the said area and concluded that the site is not a contaminated.	As concluded by the TNPCB, it is proposed that the site may **de-listed**.
9.	Tirukalimedu Village, Kanchipuram, Tamil Nadu-631501	-	Site is inspected by TNPCB and submitted that: (i) The site was physically verified and found that a temple is located. (ii) Dump of hazardous wastes is also not observed at the site.	As per information provided by TNPCB, it is proposed that the site may **de-listed**.
10.	Peranampattu Pond Site, Vellore Tamil Nadu - 632001	PCS	The site was inspected by TNPCB and submitted that water samples were collected from the inlet and out let of Peranambut lake,	It is observed that TNPCB has collected only water sample from the Lake/pond and analysis results reported that Sulphate, Chloride and TDS levels besides high.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
			analysis result does not show any presence of chromium in the lake. However, Sulphate, Chloride and TDS levels are reported besides high.	Therefore, TNPCB shall carry out soil/sediment/groundwater samples and analyze for chemicals of concern (CoCs) with general parameters and heavy metals and report may submit to CPCB. If concentration levels found above the screening/response level/standards, TNPCB shall carry out detailed site investigation, to ascertain the level and extent of contamination.
11.	Kancheepuram, Tamil Nadu-631501	-	Site is inspected by TNPCB and submitted that temple is located and no contamination is noticed at the said site.	As per information provided by TNPCB, it is proposed that the site may be **de-listed**.
12.	Ranipet, Tamil Nadu-632401	PCS	The site was inspected by TNPCB and submitted that leachate samples were collected, analysis results revealed that hexavalent chromium & total chromium are above the limits.	TNPCB has not provided inspection report along with analysis results and photographs. TNPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites. TNPCB shall initiate detailed site investigation, to ascertain the level and extent of contamination.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by TNPCB	Observations/ Suggestions by CPCB
13.	Perumgudi, Chennai-600035	PCS	Site is inspected by TNPCB and submitted that leachate samples collected generated from the MSW dumpsite, analysis results reveal that TSS, COD, BOD are exceeded the prescribed standards in the SWM Rules, 2016.	TNPCB has not provided inspection report along with analysis results and photographs. TNPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites.
14.	Karunguri Village, Kancheepuram, Tamil Nadu-631501	PCS	The site was inspected by TNPCB and submitted that soil sample collected nearby M/s Sun Pharmaceuticals Ltd., analysis results reveal that Copper, Nickel and Cadmium are exceeded with screening/response levels.	It is observed that TNPCB has collected only one soil sample and analysis results reveal that site is contaminated with Copper, Nickel and Cadmium. Therefore, TNPCB shall: (i) Carry out sediment/ groundwater/surface water samples and analyze for chemicals of concern (CoCs) with general parameters and heavy metals and report may submit to CPCB. (ii) Carry out detailed site investigation, to ascertain the level and extent of contamination.

(xvi) Telangana

Telangana SPCB has communicated Action taken reports for following 09 probable/contaminated sites vide its email communication dated 19.10.2019. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/PCS	Action taken/ initiated by TSPCB	Observations/ Suggestions by CPCB
1.	Noor Muhammad Kunta Lake, Katedan Industrial Estate Hyderabad	CS	TSPCB proposed remediation of the lake under the World Bank aided CBIPMP Project. However, the remediation works could not be taken-up due to the status quo orders issued by the Hon'ble High Court of Telangana & AP in WP No.39864 of 2014.	As per the DPR prepared under the World bank assisted CBIPM Project of MoEF&CC and Telangana SPCB, remediation of Noor Muhammad Kunta Lake is required.
2.	Patancheru, Medak District , Andhra Pradesh	CS	The site is inspected by TSPCB and submitted that; Hyderabad Metropolitan Development Authority (HMDA) proposed to construct STP of capacity of 30 MLD on the Naka Vagu.	TSPCB shall submit status report on construction of STP of capacity 30 MLD to CPCB.
3	Musi River, Hyderabad, Andhra Pradesh, Pincode-500001	PCS	The site is under consideration of the matter of the Hon'ble NGT in OA No.673 of 2018, wherein directed to prepare an action plan to restore the water quality by constituting river rejuvenation Committee.	TSPCB shall submit status on action plan to restore the water quality to CPCB.
4	Asani kunta Lake, Medak district, Andhra Pradesh-502220	PCS	The site is inspected by TSPCB and submitted that the lake is located in the	SPCB shall provide Inspection reports contain recent site visit color photographs and analysis

S. No.	Name of the Site	CS/PCS	Action taken/ initiated by TSPCB	Observations/ Suggestions by CPCB
			downstream of the industrial area of Bollaram and sewage from the residential area in Bollaram and industrial discharges are joining in the lake.	reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites.
5.	Maheshwaram, Hydrabad- 501506	PCS	The site is inspected by TSPCB and submitted that no dumping of hazardous waste was observed.	TSPCB has not provided inspection report along with analysis results and photographs. TSPCB shall provide Inspection reports contain recent site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/sediment/groundwater/surface water samples from contaminated sites.
6.	Chevella Industrial Area Rangareddy District- 501503	PCS		
7.	LB Nagar Industrial Area, Rangareddy District-501503	PCS		
8.	Moula Ali Industrial Area Rangareddy District-501503	PCS		
9.	Gundlapochampally Industrial Area Rangareddy District-501503	PCS		

(xvii) Uttar Pradesh

UPPCB has communicated action taken reports for following 42 Probable/contaminated sites vide its letter dated 19.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
1.	Khanchandrapuri, Rania Kanpur Dehat	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	Tendering process is under progress for execution of remediation works by UPSIDA and UPPCB.
2.	Shivnathpura, Rania, (Kanpur Dehat) Ramabai Nagar, Kanpur, Uttar Pradesh	CS		
3	Deva Road, Lucknow (Palhauri	CS	DPR is completed under NCEF project	Remediation work not yet initiated.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
	Village, Deva Road, Chinhat, Lucknow)		of MoEF&CC and CPCB.	
4	India Pesticide Limited, Lucknow	CS		
5.	Uttardhauna, Chinhat Block, Lucknow	CS		
6.	Chakar Village Chinhat, Lucknow	CS		
7.	Industrial Area Meerut Road, Ghaziabad, Uttar Pradesh	CS	Remediation work is under taken by M/s SPRL (Responsible Party).	UPPCB may monitor on going remediation work has been under taken by Responsible Party and submit progress report to CPCB.
8.	Lohia Nagar C Block, Ghaziabad	CS		
9.	Juhi Baburaiya (Rakhi Mandi), Kanpur	CS	Site inspected by UPPCB and submitted that hazardous waste is not present at the site.	UPPCB shall carry out sampling of soil/ groundwater/surface water/sediment/waste, if any and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
10.	Shivnagar Colony, Unnao	PCS	Site was inspected UPPCB and submitted that: (i) No dumps of hazardous waste are observed. (ii) Groundwater sampling was carried out and analysis results reveal that Color, TDS, Alkalinity & Magnesium is found higher than BIS drinking water acceptable limit.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
				may be submitted to CPCB.
11.	Nauriaya Kheda Kanpur	CS	Site was inspected by UPPCB and submitted that scattered dumping of MSW is observed at the site.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/groundwater/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
12.	Motipur Village, Chakeri Ward, Near Jajmau Industrial Area, Kanpur	PCS	Site is inspected by UPPCB and submitted that no dumping of hazardous waste is observed at the site.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
13.	Wajidpur, Kanpur	PCS		
14.	Devri Village, Moradabad	PCS		
15.	Bhuapur Village, Kaushambhi, Gaziabad, Uttar Pradesh	PCS	Site is inspected by UPPCB and submitted that: (i) No dumping of hazardous waste is observed at the site. (ii) Sampling of groundwater is carried out and analysis reports are awaited.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
				metals along with site visit Photographs. (ii) If analysis results of groundwater samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
16.	Shakti Nagar, Aligarh	CS	Site is inspected by UPPCB and accordingly, carried out groundwater and surface water samples from nearest Domestic Drain. However, analysis results are awaited.	UPPCB has carried out groundwater and surface water samples. However, soil/ waste/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater and surface water samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
17.	Kanoria Chemical Renukoot, Renukoot, Sonebhadra, Uttar Pradesh	CS	Site was inspected by UPPCB and submitted that: (i) Mercury bearing sludge has been stored in captive SLF. Presently, the industry is owned by	UPPCB has carried out only surface water samples. However, soil/ waste/ groundwater/ sediment samples are not carried out. Therefore, UPPCB shall:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
			M/s Grasim industries limited. (ii) Surface water samples collected and analysis results are awaited.	(i) Carry out sampling of soil/sediment/waste/ groundwater and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of surface water samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
18.	Barnawa Village, Baghpat, District Meerut (Confluence point of Kali River & Hindon River)	CS	Site was inspected by UPPCB and submitted that except river with blackish water is observed, no dumping of hazardous waste is observed.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
19.	Firozabad	CS	Site was inspected by UPPCB and submitted that except drain with piles of MSW, no dumping of hazardous waste is observed.	
20.	Panki Industrial Area, Kanpur	CS	Site was inspected by UPPCB and submitted that scattered dumping of MSW is observed at the site.	
21.	Jaibheem Nagar, Ward No. 5, Meerut, UdevriP	CS	Site was inspected by UPPCB and submitted that scattered MSW is	

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
			observed beside sewage drain. The grey colored water is also observed at the drain.	
22.	Kunrwa, Jirgha Dandi, Sonebhadra District, Uttar Pradesh	PCS	Site is inspected by UPPCB and submitted that sampling of groundwater is carried out and analysis reports are awaited.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
23.	Dabal Village, Muzaffarnagar	PCS	Site was inspected by UPPCB and submitted that no dumping of hazardous waste is observed.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs
24.	Jajmau Industrial Area, Kanpur	PCS		
25.	Jalapur Chooiya, Bijnor	PCS		
26.	Chandenamal Village, Block Thana Bhawan, District Muzaffarnagar.	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
27.	Magarwara Industrial Area, Unnao	PCS	Site was inspected UPPCB and submitted that: (i) No dumps of hazardous waste are observed. (ii) Groundwater sampling was carried out and analysis results reveal that Color, TDS, Alkalinity & Magnesium is found higher than BIS drinking water acceptable limit.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) Carry out detailed investigation of the site and status on the same may be submitted to CPCB.
28.	Chetwa, Meorpur block, District Sonebhadra, Uttar Pradesh	PCS	Site is inspected by UPPCB and submitted that sampling of groundwater is carried out and analysis reports are awaited.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater samples collected exceeds the

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
				limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
29.	Murdhawa Industrial Area, P.O. Renukoot Dist. Sonebhadra, Uttar Pradesh	PCS	Site is inspected by UPPCB and submitted that: (i) No dumping of hazardous waste is observed at the site. (ii) Sampling of groundwater is carried out and analysis reports are awaited.	UPPCB has carried out only groundwater samples. However, soil/ waste/ surface water/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/surface water/ sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
30.	Singrauli Super Thermal Power Plant, Singrauli	CS	Site is inspected by UPPCB and accordingly, carried out groundwater and surface water samples. However, analysis results are awaited.	UPPCB has carried out groundwater and surface water samples. However, soil/ waste/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/sediment/waste and submit analysis reports of chemicals of concern (CoCs) with general

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
				parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater and surface water samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
31.	Tejab Mill Campus, Anwarganj, Kanpur	CS	Site was inspected by UPPCB and submitted that scattered dumping of MSW is observed at the site.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs.
32.	Ashapur Village, Fatehpur	PCS	Site was inspected by UPPCB and submitted that no dumping of hazardous waste is observed.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs
33.	Ranipur Village, Fatehpur	PCS		
34.	Rooma-Treatment Storage Disposal Facility, Kanpur	PCS	Information not provided by UPPCB.	UPPCB shall carry out preliminary investigation including sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of
35.	Hindustan Laboratories, UPSIDC, Industrial	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
	Area, Naini, Allahabad			concern (CoCs) with general parameters & heavy metals along with site visit Photographs
36.	Karula Nala(Drain), Moradabad	PCS	Site was inspected by UPPCB and submitted that sewage drain is observed and accordingly, sample of surface water is collected and analysis results are awaited.	UPPCB has carried out surface water sample. However, soil/ waste/ sediment/groundwater samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/sediment/waste/groundwater and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater and surface water samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB
37.	Babusarai, District Bhadohi	PCS	Site was inspected by UPPCB and submitted that no dumping of hazardous waste is observed.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs
38.	Bharat Oil and Waste	PCS	Site was inspected by UPPCB and	UPPCB has not carried out sampling.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
	Management, Kanpur		submitted that dumped hazardous waste was disposed of after stabilization at TSDF.	Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs
39.	Dewa Road, Lucknow (Palhauri Village, Deva Road, Chinhat, Lucknow)	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	Remediation work not yet initiated.
40.	Gudhrauly Village, Fatehpur	PCS	Site was inspected by UPPCB and submitted that no dumping of hazardous waste is observed.	UPPCB has not carried out sampling. Therefore, UPPCB shall carry out sampling of soil/surface water/ groundwater/ sediment/ waste and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs
41.	Loni, UP	PCS	"New site", based on complaints received, inspection carried out by the officials of CPCB on 14.06.2019 and 09.01.2020. Accordingly, sampling of waste, sediment and groundwater carried out. Analysis results reveal that groundwater is contaminated with color and TDS. Waste and sediment samples were found highly acidic.	UPPCB shall carry out detailed investigation of the site and status report of the same be provided to CPCB.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPPCB	Observations/ Suggestions by CPCB
			Sediment samples were contaminated with heavy metals such as: Chromium, Nickel, Copper, Lead, Arsenic, Antimony & Zinc.	
42.	Bank of River Ramganga, Moradabad, UP	CS	As per direction of Hon'ble NGT, O. A. No. 621/2018, e-waste residue had been lifted. UPPCB has carried out sampling of groundwater and surface water and analysis results are awaited.	UPPCB has carried out groundwater and surface water samples. However, soil/ waste/ sediment samples are not carried out. Therefore, UPPCB shall: (i) Carry out sampling of soil/sediment/waste/and submit analysis reports of chemicals of concern (CoCs) with general parameters & heavy metals along with site visit Photographs. (ii) If analysis results of groundwater and surface water samples collected exceeds the limits, detailed investigation of the site may be carried out and status report of the same be provided to CPCB

(i) Uttarakhand

Uttarakhand PCB has communicated action taken reports for following 09 Probable/ contaminated sites vide its letters dated 24.01.2020 & 17.03.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPCB	Observations/ Suggestions by CPCB
1.	Ibrahimpur Village, Bhadarabad, Haridwar District, Uttarakhand	CS	No inspection report along with recent site visit photographs and analysis results are submitted.	UPCB shall carry out preliminary site investigation including sampling soil/sediment/ waste/groundwater/ surface water and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.
2.	Village-Tansipur, Roorkee, Uttarakhand-247656	PCS		
3	Sansarpur Village, Chutmulpur Road, Saharanpur, Uttarakhand Pincode-247551	PCS	As per geo-coordinates, the site is located in UP. Hence, no inspection was carried out.	UPCB shall carry out preliminary site investigation including sampling soil/sediment/ waste/groundwater/ surface water and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.
4	Kashipur area dist., US Nagar Uttarakhand-244713	PCS	Site was inspected by UPCB and accordingly, sampling of soil & surface water was carried out. Analysis results reveal that BOD, COD and Oil & grease parameter reported above the limit in surface water samples. However, analysis result of soil/ sediment	UPCB shall: (i) Carry out groundwater sampling and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals. (ii)Provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy
5.	Moradabad Road , Kashipur Distt US Nagar, Uttarakhand-244713	PCS		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPCB	Observations/ Suggestions by CPCB
			samples is not provided.	metals of collected soil/sediment samples.
6.	Selaqui Industrial Area, Dehradun, Uttarakhand pincode 248197	PCS	Site was inspected by UPCB and accordingly, sampling of soil & surface water was carried out. Soil sample was analyzed for CoCs and analysis results reveals that concentrations are below the screening/ response level.	UPCB shall: (i) Carry out groundwater sampling and submit analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals. (ii)Provide analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected surface water samples.
7.	Lalkaun Area distt Nanital, Uttarakhand-262402	PCS	Site was inspected by UPCB and accordingly, sampling of groundwater was carried out. Analysis results reveal no contamination.	UPCB shall provide Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/ surface water samples.
8.	Jasodhar Industrial area, Distt pauri-246149	PCS	No inspection report along with recent site visit photographs and analysis results are submitted.	UPCB shall carry out preliminary site investigation including sampling soil/sediment/ waste/groundwater/ surface water and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) with general parameters and heavy metals.
9.	Ramnagar Industrial Area and its adjoining area, Uttarakhand-244715	PCS	Site was inspected by UPCB and accordingly, sampling of groundwater was	UPCB shall provide Inspection reports contain site visit color photographs and analysis reports of chemicals of

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by UPCB	Observations/ Suggestions by CPCB
			carried out. Analysis results reveal no contamination.	concern (CoCs) with general parameters and heavy metals of collected soil/ sediment/ surface water samples.

(ii) West Bengal

WBPCB has communicated partial status on 35 probable/contaminated sites vide its letter/email communications dated 02.06.2020. Accordingly, the reports were examined and following observations and suggestions are made as below:

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
1.	Tiljala, Picnic Gardens, Kolkata	PCS	WBPCB submitted that no documentary evidence of contaminated site. However, there are micro/small scale secondary lead smelting units are in operation occasionally. These units are disposing HW as per HOWM Rules, 2016.	WBSPCB shall carry out limited sampling (soil/ groundwater/surface water) around the micro/ small scale secondary lead smelting units and submit inspection report along with analysis results of chemicals of concern (CoCs) with general parameters & heavy metals and photographs.
2.	Dhapa Disposal Site, Kolkata	-	WBPCB submitted that Closure and containment of MSW Dump site at Dhapa completed under CBIPM project.	Complied. **The site may be de-listed.**
3	Nibra Industrial Area, Howrah, West Bengal	CS	DPR is completed under NCEF project of MoEF&CC and CPCB.	No information about Remediation work initiated by WBPCB or not.
4	Private Approach Road South of Nezone Tubes, Chakduni, Delhi Road, SH13, Dist-Hooghly	-	Detailed Project Report (DPR) prepared for 25 contaminated sites for execution of remediation works under the World Bank assisted capacity Building for Industrial Pollution Management Project (CBIPM Project). However, WBPCB submitted that remediation is not required because groundwater was not contaminated, the environmental and social risks were not	
5.	Balaji Technomech, Chakduni, Delhi	-		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
	Road, SH13, Dist-Hooghly		significant and also submitted that highway expansion work had already been carried out. **Therefore, it is proposed that, the 25 sites may be de-listed**.	
6.	Shentracon Chemicals,Mollaber Delhi Road, SH13, Dist-Hooghly	-		
7.	Om Forging, Bangihati, Delhi Road, SH13, Dist-Hooghly	-		
8.	Hooghly Alloy & Steel, Dakshin Rajyadharpur, Delhi Road, SH13, Dist-Hooghly	-		
9.	Misrilall Mines, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
10.	Shree Krishna Timber, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
11.	Sheela Foam, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
12.	Sasmalpara Abandoned Dump, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
13.	Dipendra Sasmal's House Approach Road, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
14.	Padmabati Colony Abandoned Dump 1, Baidyabati, Delhi Road, SH13, Dist-Hooghly	-		
15.	Padmabati Colony Abandoned Dump	-		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
	2, Baidyabati, Delhi Road, SH13, Dist-Hooghly			
16.	Sada Shiv Shakti Exim Baidyabati, Dist-Hooghly Opp-Zenith Timbers	-		
17.	Bhola Baba Corrugated Box, Bighati, Delhi Road, SH13, Dist-Hooghly	-		
18.	Steel Cracker Unit II, Bighati, Delhi Road, SH13, Dist-Hooghly	-		
19.	Sonar Bangla Hindu Hotel, Bighati, Delhi Road, SH13, Dist-Hooghly	-		
20.	Appayan Hotel Dump, Bighati, Delhi Road, SH13, Dist-Hooghly	-		
21.	Indotan Chemicals, Garji, Delhi Road, SH13, Dist-Hooghly	-		
22.	Delhi Road, Near Shivang Trexium Pvt. Ltd. & Shree Balaji Veneers Pvt. Ltd. Netaji More, Dist. Hooghli (HW site 3 in NPC report from 2006)	-		
23.	Near minu weigh bridge, Delhi Road (100 mt from Netaji More) Near Dhaba, Dist. Hooghli	-		

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
24.	Near Zenith Timber products, Near Netaji More, Dist. Hooghli	-		
25.	Near Pashupati Seong and East India Flour Mills, Delhi Road, Dist. Hooghli	-		
26.	Ashalata Brick field, Near Indotan Industries, Hooghli	-		
27.	Near Ghosh and Sarkar Weigh Bridge, Village Simla/Madpur, District-Hoogli	-		
28.	Near M/s Shivam Gases Ltd., Chakundi Industries Area, Dankuni Hooghli.	-		
29.	Calcutta Chemical Products,Dankuni Durgapur road,vill.-Dankuni,Dist.-Hoogly-712310	PCS	WBPCB submitted that study for remediation had been conducted by a Consultant (i.e. ERM India Pvt. Ltd.) Accordingly, the concerned industries located in and around the sits had been directed to take requisite measure as recommended by the Consultant.	WBPCB shall submit the updated status of measures taken by the concerned industries located in and around the site.
30.	Bandel Thermal Power Station (BTPS), Hooghly District, West Bengal-712123	-	WBPCB submitted that no such contaminated site has identified or been reported. However, Thermal Power Plant are the generator of very low quantity of HW and are being disposed as per	It is proposed that the site may be **de-listed**.

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
			HOWM Rules, 2016 on regular basis. Further, submitted that there is no available orphan dump site of HW within the industrial premises.	
31.	19, BT Road, Khardah,Kolkata-700116	PCS	WBPCB submitted that study for remediation had been conducted by a Consultant (i.e. ERM India Pvt. Ltd.) Accordingly, the concerned industries located in and around the sits had been directed to take requisite measure as recommended by the Consultant.	WBPCB shall submit the updated status of measures taken by the concerned industries located in and around the site.
32.	Kolaghat thermal power plant, Midnapore district, West Bengal-721301	-	WBPCB submitted that no such contaminated site has identified or been reported. However, Thermal Power Plant are the generator of very low quantity of HW and are being disposed as per HOWM Rules, 2016 on regular basis. Further, submitted that there is no available orphan dump site of HW within the industrial premises.	It is proposed that the site may be **de-listed**.
33.	Durgapur, West Bengal-713201	PCS	WBPCB submitted that study for	

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by WBPCB	Observations/ Suggestions by CPCB
34.	Durgapur Napthelene,WEST BENGAL-713201	PCS	remediation had been conducted by a Consultant (i.e. ERM India Pvt. Ltd.) Accordingly, the concerned industries located in and around the sits had been directed to take requisite measure as recommended by the Consultant.	WBPCB shall submit the updated status of measures taken by the concerned industries located in and around the site.
35.	Belda Chemicals, vill.-Kharagpur (Mednipur) West Bengal-721301	PCS		

D. Information has been not received from the States (namely; Chhattisgarh, and Rajasthan), on Action taken/initiated for assessment of contaminated sites

(i) Chhattisgarh

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Chhattisgarh ECB	Observations/ Suggestions by CPCB
1.	Bhilai steel plant, Chhattisgarh	CS	No information received	Chhattisgarh Environment Conservation Board shall carry out preliminary site investigation including sampling of all possible matrix and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
2.	BALCO, Korba	CS		
3	Muckdum Side Bhilai-3 Bhilai steel plant-491000	PCS		
4	Nandini-Khundani Abandoned Mines, bhilai, Distt.-Durg; Near M/s Vishnu Chemicals, Industrial Area, Bhilai.491001	PCS		
5.	Lal Ghat Risdi Area, nearM/s Balco Korba- 495677	PCS		

(ii) Rajasthan

S. No.	Name of the Site	CS/ PCS	Action taken/ initiated by Rajasthan PCB	Observations/ Suggestions by CPCB
1.	Amanishah nalla, Sanganer Indutrial Area, Jaipur	CS	No information received	Rajasthan SPCB shall carry out preliminary site investigation including sampling of all possible matrices and submit Inspection reports contain site visit color photographs and analysis reports of chemicals of concern (CoCs) along with general parameters and heavy metals.
2.	Village Bichhadi, Block Girva, Rajasthan	CS		
3	Mewar Industrial area, University New Campus Road, Udaipur, Rajasthan-313001	PCS		
4	Jaitpur Village, Rohat Block, Pali, Rajasthan-306421	PCS		
5.	Sokarna village, Balotra, Rajasthan-344022	PCS		
6.	Bhilwara textile, Kothari river, Rajasthan-311001	PCS		
7.	Zawar Mines, Udaipur, Rajasthan 313901	PCS		
8.	M/S Puransons, RIICO Industrial Area, Bhiwadi, Alwar District, Rajasthan-301019	PCS		
9.	Rajpur Dariba mines,District-Rajasmand,Rajasthan-313324	PCS		
10.	Ramky waste management , Udaipur Rajasthan 313004	PCS		
11.	Malvia Nagar Industrial Area, Jaipur City, Rajasthan-302017	PCS		

8.2 Compliance status on Observations and Recommendations of the Monitoring Committee related to Contaminated sites are as below:

S. No.	Observations	Recommendations of the Committee	Compliance status
1.	**Disposal of hazardous wastes accumulated at identified sites:** (i) The Committee has observed that there are several contaminated dumpsites in various parts of country where hazardous and other wastes were dumped historically, which resulted in contamination of soil, groundwater and surface water thereby posing health and environmental risks.	(i) CPCB/SPCBs/PCCs to ensure that the hazardous waste accumulated at all such identified sites shall be disposed of either through Treatment, Storage and Disposal Facilities (TSDFs) or onsite secured landfilling (SLF) on priority to stop further contamination **(CPCB/ SPCBs/PCCs: 06 months)**	(i) Detailed information is given at **Section-C of Chapter 8** for kind reference.
2.	**Guidelines for Identification and Assessment of Contaminated Sites:** (i) The Committee notes that CPCB is working on standard uniform identification and assessment guidelines for the probable contaminated sites and any new additional sites, such guidelines will bring a consistency and uniformity in dealing with the contaminated sites issues.	(i) For a consistent and uniform application and approach across the country, guidelines for identification and assessment of contaminated sites shall be published. **(CPCB: 03 months)**	(i) Guidance document on Assessment and remediation of Contaminated Sites in India issued by MoEF&CC, communicated to 21 SPCBs/PCC. Based on this guidance document, a "Reference document on identification, inspection and assessment of contaminated sites in India" has been prepared by CPCB is given at **Annexure-XIII** for kind reference.
3.	**Assessment and remediation of Contaminated sites:** (i) The Committee has observed that there is a need of awareness and capacity	(i) Capacity building program for officials of SPCBs/PCCs on the entire process of remediation, which may include practical training on use of tools for soil and	(i) MoEF&CC sponsored "Capacity Building Program i.e. Five – Day International Seminar on Contaminated Sites;

	building in SPCBs/PCCs on the entire remediation process including identification, detailed assessment, DPR preparation and execution of remediation. (ii) Further, the committee notes with regret that even today there are about 195 probable contaminated sites (329-134) which needs a thorough assessment for its confirmation as contaminated site or otherwise. Though the DPRs of 17 sites out of 21 are prepared under NCEF Project and the same have been forwarded to respective State Governments and State Boards. However, no remediation efforts have been initiated at such sites.	groundwater screening such as hand-held XRF instruments, Colorimeter, PID for VOCs/ SVOCs, hand operated augers, groundwater pumps, level meters, etc. shall be organized by CPCB. **(CPCB: 06 months)** (ii) Assessment of about 195 probable contaminated sites and any new additional sites recommended by CPCB/ SPCBs/PCCs shall be completed within period of 1 year after publication of such guidance document by CPCB. **(CPCB/SPCBs/PCCs: 1 year)** (iii) For effective implementation of the	Concurrent Conference on Geoenvironment and Sustainability; and Demonstration Sessions/Workshop on Environmental Subsurface Investigations" was organized by IIT Delhi during 17-21 February, 2020 for the officials of MoEF&CC/CPCB/SPCBs/PCCs, Academic & Research Institutions, Industry, etc. is given at **Annexure-XIV** for kind reference. CPCB has proposed a 3 separate training programs on identification and assessment of contaminated sites for the officials of SPCBs/PCCs for the financial year 2020-21. (ii) Detailed progress on assessment of probable contaminated sites under taken by SPCBs/PCCs is given at **Section-C** of **Chapter 8** for kind reference. (iii) Odisha SPCB has informed vide its

		remediation plan at State level, Empowered Monitoring Committee chaired by Principal Secretary, Department of Environment having representatives from department of Industries, SPCB/PCC, Ground water development agency, etc. shall be constituted. **(State Govt: 04 months)**	letter dated 19.05.2020 that State level, Empowered Monitoring Committee (SLEMC) under the chairmanship of Additional Chief Secretary (Env. & Forest Dept.) has been constituted.
4.	**Financial Arrangements for remediation of contaminated sites:** (i) The Committee while taking note of public trust doctrine read with provisions of section 9 of E (P) Act, it is the duty of the Govt. both Central and State to protect environment by taking remedial measures irrespective of the financial arrangements which seems to be a matter of ongoing deliberations.	(i) Financial arrangements between Central-State Governments for the proposed remediation projects shall be resolved immediately so that the remediation works as proposed in DPRs can be undertaken on priority. These DPRs (2017-18 and 2018-19) may need to be revisited if no action is taken in a reasonable time for execution of remediation works. (ii) Govt. should take up on priority not only remediation projects at the sites where DPRs have	(i) It is humbly submitted that MoEF&CC has sanctioned central share under National Clean Energy Fund (NCEF) scheme of Rs. 15.5 crore for preparation of Detailed Project Reports (DPRs) for 08 areas contaminated (containing 21 sites) for remediation. Further, it is humbly submitted that there is no funding for execution of remediation works, since NCEF scheme has been discontinued by Government of India. The DPRs along with templates of bidding have been forwarded to concerned State Govts and SPCBs with request to implement remediation works.

		been prepared but also the assessment of about 195 sites, besides any new addition of potentially contaminated site, if any. **(MoEF&CC/State Govt.: 06 months)**	
5.	**Networking of Academic and Research Institutes:** (i) Execution of remediation program would require necessary interdisciplinary expertise at the SPCBs/ PCCs. The CPCB/SPCBs/ PCCs may find it difficult to work on these aspects unilaterally and therefore there has to be coordination and information sharing among these agencies beside developing a network of academic and research institutes which can help in creating an "Expertise Pool". (ii) The committee also notes that a part of such capacity building efforts specific action research programs can be initiated by these agencies and more particularly professional courses on remediation and restoration can be sponsored at academic/ research institution which will help to create a critical mass of expertise in this subject.	(i)MoEF&CC/CPCB/ SPCBs/PCCs shall undertake action research and also promote academic courses on this subject in association with academic and research institutions. **(MoEF&CC/CPCB/SPCBs /PCCs: 06 months)**	(i) Under a project sponsored by MoEF&CC at IIT Delhi, a National Network of Experts and Resources for Subsurface Investigations and Remediation of Contaminated Sites (NERCS) has been formed. In this regard, Web page of NERCS is given at **Annexure-XV** for kind reference.

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Final Report

(March 2018 to March 2020)

Research Project:

Capacity Building of Academic Institutions IIT Delhi to Support Remediation Initiatives

(Grant in Aid General Budget Head)

MoEF/40-90/2017-HSMD (EAP) dated 22nd March 2018 and IITD/RP 03531 dated 23rd April 2018

including Sub-Project:

Procurement of Advanced Equipment

(Grant for Creation of Capital Assets Budget Head)

MoEF/40-81/2016-HSMD (EAP) dated 10th Sept. 2018 and IITD/RP 03614 dated 16th Oct. 2018

Sponsored by:

Ministry of Environment, Forest and Climate Change

Geotechnical & Geoenvironment Group,
Civil Engineering Department,
Indian Institute of Technology Delhi

May 2020

Executive Summary

This Report describes the research activities conducted and outcomes achieved under the project sponsored by MoEF&CC at IIT Delhi titled "Capacity Building of Academic Institutions IIT Delhi to Support Remediation Initiatives" (including the sub-project "Procurement of Advanced Equipment") covering the duration March 2018 to March 2020.

The following is a summary of the outcomes which are elaborated in detail in the Report:

(i) Capacity Building through Workshops and Research Activities:

Two events were organised – A 2-day National Networking Workshop (July 2018) and a 5-day International Seminar cum Concurrent Conference and Demonstration Workshop / Sessions titled 'Geoenvironment-2020' (Feb 2020). A total of almost 300 participants underwent capacity building relating to subsurface investigations/characterization for remediation of contaminated sites including field demonstration of equipment hitherto not available in the country.

The program, list of participants, proceedings and outcomes of the National Workshop can be viewed on http://www.nercs.in/workshop_index.html and of the International Seminar can be viewed on http://www.nercs.in/giw_index.html

Details are presented in Sections 4.1 and 4.2 of the Report

The following benefitted by participating in the two events

(a) 270+ participants witnessed state-of-the-art-lectures, case studies and demonstrations of Advanced Subsurface Investigation/Characterization Equipment and received hands-on-training at the two events:

- MoEF&CC, CPCB and SPCBs	50
- Faculty/Researchers of Academic/Research Institutes	92
- Young researchers, Scholars and Post Docs.	59
- Industry	51
- Others	20
Total:	~270+

(b) 100+ institutions / organizations benefitted in the form of capacity building through demonstration / training of their officials

(i) MoEF&CC, CPCB, SPCBs of Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Haryana, Jharkhand, Madhya Pradesh, Maharashtra, Meghalaya, Tamil Nadu, West Bengal, Andhra Pradesh, Punjab, Telangana, Karnataka, Gujarat, Odisha, Uttar Pradesh.

(ii). Academic Institutions:

IISc:	Bangalore
IITs:	Bombay, Delhi, Kanpur, Madras, Kharagpur, Roorkee, Dhanbad, Palakkad, Guwahati, Hyderabad, Tirupati, Ropar, Patna

NITs:	Calicut, Durgapur, Jaipur, Surathkal, Allahabad, Tiruchirappalli, Jalandhar, Patna, Silchar, Rourkela, Agartala.
Govt. Institutions:	Delhi Technical University, Jamia Millia Islamic University, University College of Engg., Tiruchirappalli and 7 others
Private Institutions:	VIT Vellore, SRM Institute of Science & Technology, PSG Institute of Technology & Applied Research, DAVIET Jalandhar and 13 others

(iii). Research Institutions:
DRDO, CSIR-NEERI, CSIR-CRRI, CSIR-CBRI, CSIR-IITR, ICAR-IISS, ICAR-IITR, CSMRS, C-FARM, CSIR-IICT, ICAR-CSSRI.

(iv). Industries:
AECOM, ERM, JACOBS, NTPC, RITES, Coal India Ltd., Advisian, Tata Consulting Engineers, Stratus Environmental, Parson Overseas, Innovative Quality Solutions, Kadam Environmental Consultants, BEIL Infrastructure, BRCPL, CTC Geotechnical, ENV DAS India, Ramky, KKB Envirocare Consultants, SAS Ground Engineers, Soiltech India Pvt. Ltd.

(ii) Network of Experts & Resources

A Network of Experts and Resources in the area of Subsurface Investigations and Remediation of Contaminated Sites (NERCS) has been compiled and a new website has been created. One can view the database (i) name-wise, (ii) city-wise and (iii) based on the area of expertise. The profiles and resources available with the experts have been listed under the categories (a) Academics & Research, (b) Ministry & Pollution Control Boards, and (c) Industry.

The network list can be viewed at http://www.nercs.in/network_index.html

Details are presented in Section 4.3 of the Report.

The NERCS list comprises of 80+ national experts. It is a dynamic list which is updated periodically. The list is to be supplemented by select international experts, and the process was undertaken in Feb 2020 during Geoenvironment-2020 and can be formalized after receipt of next instalment of funds.

(iii) Procurement of Equipment

The following advanced equipment for subsurface investigations at contaminated sites have been procured as follows: (a) Ground Penetrating Radar; (b) Electrical Resistivity Imaging System; (c) MASW System; (d) Shallow Depth Soil Coring/ Groundwater Sampling/ Soil-Gas-Vapour Sampling System; (e,f,g) 3-in-1 Equipment - Medium Depth Direct Push Rig with Soil Sampling, Groundwater Sampling / Pore Gas Kit + In-situ Optical Image Profiling and Logging System for Soils + Cone Penetrometer; (h) Samplers; (i) Landfill Gas Analyser; (j) VOC Analyzer; (k) Handheld XRF; (l) Soil Digester; (m) TCLP Apparatus; (n) Modular Shelter for Rig; (o) Contaminant Transport Software.

Details are presented in Section 4.4 of the Report.

(iv) Field Demonstration of Equipment

Field applications of various equipment was demonstrated to 150+ participants of the 5-day event 'Geoenvironment-2020' held in February 2020. For the first time in the country, live field demonstrations were conducted for the following state-of-the-art equipment:

- *Environmental Direct Push Sampling*
- *Profiling by Optical Imaging and Hydraulic Pressure Testing*
- *Shallow Depth Sampling*
- *Electrical Resistivity Imaging*
- *Ground Penetrating Radar Surveying*

The demonstrations included a special field session on retrieving environmental soil samples at every 1.5m depth from a 15m deep borehole adjacent to a waste-water drain. Details are presented in Section 4.5 of the report.

(v) Research Activities

Contamination detection studies were conducted at two sites, one adjacent to a waste water drain and the other at a MSW landfill/dumpsite. The concentrations of heavy metals, dissolved salts and other physico-chemical parameters were determined and compared with background levels in local soils. Details are presented in Section 4.6 of the Report.

(vi) Statement of Expenditure & Utilization Certificate

The project closure date was 31st March 2020. The finalization of accounts is held up on account of ongoing Covid-19 lockdown. The Statement of Expenditure and the Utilization Certificate will be submitted after 6 to 8 weeks of lifting of lockdown.

(vii) Significant Achievements

(a) Under this sponsored project, for the first time in India an advanced equipment (3-in-1) has been acquired which enables environmental soil sampling at contaminated sites without any cross contamination – a facility which hitherto has not been available in the country.
(b) Capacity building through lectures, demonstrations and hands-on-experience on the new advanced machine and other associated state-of-the-art equipment has been conducted for almost 300 academicians, researchers and practitioners from 100+ institutions / organizations nation-wide including 20 central / state pollution control boards, 50 academic institutions, 13 research institutions and 25 industry organizations).
(c) A new website (www.nercs.in) has been created and a Network of Experts and Resources on Contaminated Sites (NERCS) has been compiled and uploaded on it. This network can provide technical assistance to MoEF&CC on problems relating to contaminated sites in the country, as and when so required.

Contents

Annexures

Appendices

Total: (829 pages)

Website/Annexures:

- The complete details (program, presentations, list of participants, image gallery of sessions) of the two-day national networking workshop are available online at http://www.nercs.in/workshop_index.html. The following sections can be accessed: program; list of participants; summary and outcome; brief writeups; presentations (pdf files); image gallery for each session.
- The proceedings of the two-day workshop are attached in Annexure B

4.2 Geoenvironment-2020: Five – Day International Seminar on Contaminated Sites; Concurrent Conference on Geoenvironment and Sustainability; and Demonstration Sessions/Workshop on Environmental Subsurface Investigations (February 2020)

Geoenvironment-2020 was the second major activity organized under the sponsored project from 17th to 21st February 2020 at IIT Delhi. Three activities were conducted by the Geotechnical & Geoenvironment Group of IIT Delhi during this event, namely: (i) an International Seminar on Contaminated Sites, (ii) a concurrent Conference on Geoenvironment & Sustainability and (iii) Demonstration Sessions/Workshop on Environmental Subsurface Investigations (Soil Sampling, OIHPT, ERT, GPR, HH-XRF).

A total of 12 overseas experts and 18 national experts contributed to the International Seminar and shared their experiences on characterization and remediation of contaminated sites. About 50 researchers and practitioners have contributed research papers and field experiences on Sustainability and Geoenvironment under three themes, namely (i) Investigations and Remediation; (ii) Landfills & Slurry Ponds and (iii) Re-Use & Sustainability. 150+ participants took part in the demonstration sessions/workshop.

The total participation at Geoenvironment-2020 was over 190 experts, researchers and practitioners from IITs, IISC, NITs, CSIR institutions, Environment Ministry and Pollution Control Boards, and industry participants from environmental/geotechnical/site investigation consultants.

Detailed program of 3-in-1 event is given in the following pages.

Geoenvironment-2020: DETAILED SCHEDULE

Day 1 : 17th February 2020, Monday
Venue: Seminar Hall, IIT Delhi

0800-0900	**Registration**		
0900-1000	**Inauguration**		
	Welcome Address *by Prof. R. Ayothiraman*	*(0900-0902)*	
	About Geoenvironment-2020 *by Prof. Manoj Datta*	*(0902-0910)*	
	About the New Equipment & Field Demonstrations *by Prof. G.V. Ramana*	*(0910-0915)*	
	Inaugural Address *by Mrs Geeta Menon, Joint Secretary, MoEF&CC*	*(0915-0930)*	
	Keynote Address by *Prof. V. Ramgopal Rao, Director, IIT Delhi*	*(0930-0945)*	
	Global Perspective - Contaminated Sites & Geoenvironment by *- Prof. Peter Dietrich, Hemholtz Centre for Environmental Research, Germany* *- Prof. Michael Harbottle, Cardiff University, U.K.* *- Prof. Gopal Achari, University of Calgary, Canada*	*(0945-1000)*	
	Vote of Thanks by *Prof. Prashanth Vangla*	*(1000-1002)*	
	International Seminar on Contaminated Sites		
1002-1100 ***Session Chair***	**Session A** ***Gopal Achari, University of Calgary, Canada***		
	Direct Push Methods for Environmental Sampling & Logging in Soils and Unconsolidated Formations ***Wesley McCall*** *& Adam McMath*	*(30+5)*	
	Case Studies on Use of XRF and PID/VOC Detector for Sub-Surface Investigation and Remediation ***Padmanabhan Girinathannair***	*(20+5)*	
1100-1130	**Tea (Red Square)**		
1130-1335 ***Session Chair***	**Session B** ***Michael Harbottle, Cardiff University, UK***		
	Status of Contaminated Sites in India ***B. Vinod Babu*** *, G. Rambabu, Gargi Biswas*	*(20+5)*	
	Recent Advances in 3D Electrical Resistivity for Geotechnical and Environmental Engineering ***Orlando Leite/LD Mohapatra*** *and J.Gance*	*(25+5)*	
	On-site Screening of Heavy Metals in Soils using the Thermo Scientific Niton XL3t GOLDD+ Handheld XRF Analyzer *M. Bauer and* ***Malathesh MR***	*(20)*	
	State-of-the-art GPR Technologies for Surveying of Contaminated Sites ***Parampreet Singh***	*(15)*	
	Shallow Depth Environmental Soil Sampling ***Neeraj Chadha***	*(15+5)*	
	About Optical Imaging Hydraulic Profiling Tool ***Wesley McCall***	*(15)*	
1335-1430	**Lunch (Red Square)**		
1430-1550 ***Session Chair***	**Session C** ***J.K Saha, ICAR-IISS, Bhopal***		**Demo Session** **Group 1** **1430-1630**
	Remediation of Contaminated Sites: Two Case Studies ***Tapan Chakrabarti***	*(20+5)*	
	Geomicrobiology for Remediation of Contaminated Subsurface ***Pinaki Sar***	*(20+5)*	
	Inventory and Mapping of Probably Contaminated Sites in India ***Sangram A. Kadam***	*(15+5)*	
	Contaminated Sites at Waluj in the State of Maharashtra ***V.M. Motghare***	*(15)*	
1550-1615	**Tea (Red Square)**		

Day 1 : 17th February 2020, Monday

Venue: Seminar Hall, IIT Delhi

Conference on Geoenvironment and Sustainability

1615-1845	**Session D** **Theme A(I): Contaminated Land: Investigations & Remediation**] Intermixed mode **Theme B: Landfills and Slurry Ponds**	**Demo Session** **Group 1** **1430-1630**
Session Chairs	***J.T. Shahu and G.V. Ramana, IIT Delhi***	
#228	Stability Assessment of Water-Retention Type Tailings Dam in Static and Pseudo-Static Conditions *Pankaj Kumar,* ***BVS Viswanadham***	
#103	Quantifying Remediability- The Need and a Possible Approach *Lakshmi Priya,* ***George K Varghese***	
#130	Environmentally Sustainable Alternative of Coal Ash Disposal in Mine Void Filling ***Vinod Kumar Mauriya***	
#129	Hybrid Bioreactor Landfill: A Novel Approach for Enhancement of Rate of Degradation in Anaerobic Bioreactor Landfill ***T. S. Khambekar****, S. T. Mali*	
#163	Performance Evaluation of Sand-Bentonite Enriched Soils as Barrier Material in Engineered Landfills ***Jaskiran Sobti****, S. K. Singh*	
#133	Electrokinetic Treatment (EKT)- A laboratory Study for Remediating Soils Contaminated with Leachate ***Vikas Gingine,*** *Rafaela Cardoso*	
#119	Height Raising of Iron Ore Tailing Dam over Soft Tailings ***S. K. Rout,*** *B. Das, A. K. Mandal, Manoj De*	
#110	Groundwater Pollution Risk Assessment Correlated to Pollution Potential from the Non-Engineered Landfill Site ***M. K. Kaushik***	
#139	Understanding the (Bio)geochemistry of an Arsenic-Contaminated Aquifer for Sustainable Remediation ***Akshat Verma****, G. Pahuja, A. Kumar, J. J. Nilling, P. A. Murugan, S. Matheswaran, A. Singh*	
#117	Challenges of Eco-friendly Solid Waste Disposal in Ethiopia: The Case of Hawassa Industrial Park ***K. T. Berhe****, Sunil B.M., S. Shrihari*	
#136	Indicators Based Performance Evaluation of Municipal Solid Waste Management System – An Insight ***A. J. Kotangale****, R. M. Damgir*	**Tutorials/ Interactive Sessions** **TT1 & TT 2** **1730-1830**
#106	Efficacy Assessment of Amended Laterite Soil as a Subsurface Liner to Attenuate Migration of Contaminants in Leachate of Ash Pond Structures ***Avishek Adhikary****, S. K. Dutta Mazumdar, Supriya Pal*	
#120	Stability Assessment of Pond-Ash Embankments for Static and Seismic Conditions ***Gaurav Sharma****, M. Shazan, Koushik Pandit, Pradeep Kumar*	
#150	Subsurface Soil Contamination and Remediation Strategy for Industrial Area of Bangalore ***Prathima B****, Lokesh H. K, G. L. Sivakumar Babu*	
#193	Direct Push Technique for Collecting Continuous Core Soil Samples for Environmental Studies in Delhi Silt ***Tanmay Gupta****, D. Bansal, D. Parida, Upendra M., Vinay K. Singh, M. Datta, G. V. Ramana*	
#184	Assessment of Moisture Migration from an Open Wastewater Drain using ERT ***Debaprakash Parida****, Vinay K. Singh, D. Bansal, R. Ayothiraman, Manoj Datta, G. V. Ramana*	

Geoenvironment-2020: DETAILED SCHEDULE

Day 2 : 18th February 2020, Tuesday
Venue: Seminar Hall, IIT Delhi

0800-0900	**Registration**	
	International Seminar on Contaminated Sites	
0900-1100	**Session A**	
Session Chair	***Peter Dietrich, Hemholtz Centre for Environmental Research, Germany***	
	Risk-Based Remediation Planning of Contaminated Sites ***Gopal Achari*** *(30+5)*	
	A Comparison of Soil Sampling Methods for Environmental & Geotechnics Studies ***Manoj Datta,*** *G.V. Ramana and R. Ayothiraman* *(20+5)*	
	Choosing the Appropriate Remedial Application for your Site ***Anthony Cole***, *Chetan Zaveri* *(30+5)*	
	Approach for Bioremediation of Municipal Solid Waste Dumps ***G L Sivakumar Babu,*** *P Sughosh, B Prathima, TG Parameswaran, N Anusree* *(20+5)*	
1100-1130	**Tea (Red Square)**	
1130-1335	**Session B**	**Demo Session** **Group 2** **1100-1300**
Session Chair	***GL Sivakumar Babu, IISc Bengaluru***	
	Insights on Soil for Remediation of Soil for Mercury Contamination ***Atul Narayan Vaidya*** *(20+5)*	
	Prioritisation of Contaminated Sites using Sparse Data (Preliminary) ***R. J. Thiessen*** *& Gopal Achari* *(30+5)*	
	Safe Concentration Limit of Heavy Metals in Soil & Compost: Approaches in their Determiantion ***J. K. Saha*** *(20+5)*	
	Bio-strategies for Assessment & Remediation of Sites Contaminatd with Recalcitrant Compounds *Vivek Kumar Gaur, Varsha Tripathi,* ***Natesan Manickam*** *(20+5)*	
	Use of Airborne, Surface, and Borehole Geophysical Techniques at Contaminated Sites ***Sanjay Rana*** *(20+5)*	
1335-1430	**Lunch (Red Square)**	
1430-1550	**Session C**	**Demo Session** **Group 3** **1430-1630**
Session Chair	***Tapan Chakrabarti, CSIR-NEERI, Nagpur***	
	Entailing Transformation in Sanitation Facilities using DRDO Biotoilet, an Eco-friendly and Appropriate Sanitation Solution ***Soumya Chatterjee,*** *Mohan G. Vairali, Sampriti Kataki, Sonika Sharma* *(20+5)*	
	Investigations at a Fuel Oil Contaminated Land for Source Identification ***George K. Varghese,*** *Muhammed Siddik A* *(10)*	
	Sewage Contamination of Groundwater- Fixing Responsibility ***George K. Varghese***, *M. S. P.Yadav* *(10)*	
	Case Studies of In-situ Remediation of LANPL and Heavy Metal (As) Polluted Shallow Groundwater Sites ***Brijesh Kumar Yadav***, *Shreejita Basu, Shashi Ranjan, Pankaj Kumar Gupta* *(15)*	
	Case Study by SPCB ***Awaited*** *(12)*	
	Case Study by SPCB ***Awaited*** *(12)*	
1550-1615	**Tea (Red Square)**	

Day 2 : 18th February 2020, Tuesday

Venue: Seminar Hall, IIT Delhi

Conference on Geoenvironment and Sustainability

1615-1845	**Session D** **Theme A(II): Contaminated Land: Investigations & Remediation**] **Intermixed mode** **Theme C: Reuse and Sustainability**	**Demo Session** **Group 3** **1430-1630**
Session Chairs	***R. Ayothiraman and Prashanth Vangla , IIT Delhi***	
#137	Landfill Mining Potential of Legacy Waste and its Associated Challenges *Ayush Singh,* ***Munish Kumar Chandel***	
#064	Integrated Geophysical Investigations at a Tailing Pond ***Sanjay Rana***	
#134	Mechanically Stabilized Earth Walls with Alternate Backfills for Highway Structures *S. Vibha,* ***Divya P.V.***	
#116	Impact of Lime on the Behaviour of Black Cotton Soil Stabilized with Bagasse Ash *Polapala Sai Pradeep,* ***M Muthukumar***	
#122	Coimbatore of Foundry Sand Waste Material for Road Construction ***Anil Kumar Sinha*** *, M. Vinoth, S. Ravi Shanker, V. G. Havanagi*	
#105	Electrokinetic Remediation of Soil Contaminated with Chromium (VI) and 2,4-Dichlorophenoxyacetic Acid (2,4-D) –An Experimental Approach ***Supriya Pal*** *, D. Hazra, Sahinur R. Mondal, A. Adhikary, Mrinal K.Mandal, Hirok Chaudhuri*	
#125	Stablization of Soil with Lime and Waste Plastic Strips ***S.P.Guleria***	
#126	A Preliminary Study on Geotechnical Properties of Bioremediated Oil Contaminated Soil Using Bacteria and Organic Manure ***Surya Muthukumar,*** *Dharuneeswar P., Gowtham Kumar, Harish Kumar, John Jesuran*	
#123	Utillization of Beach Shells for Soil Stabilization ***Shwetha Prasanna***	
#113	Assessment of Micro-Silica as a Ameliorate material for Municipal Solid Waste Clay Liner System – A Case Study ***G. Venkatesan,*** *G. Swaminathan*	
#142	Identification of Soil Properties using Integrated Remote Sensing and Statistical Technique for Effective Agricultural Practices at Pollachi in Tamilnadu,India *Dhayalan V.,* ***D. Saranyadevi***	**Tutorials/ Interactive Sessions** **TT3 & TT4** **1730-1830**
#135	Assessment of Heavy Metal Contamination in the Vicinity of the Jamunia Open Cast Mine - Jharia, India ***Priya Pariyar*** *, Manish Kumar Jain, Sudhanshu Ranjan*	
#192	Shallow Depth Environmental Soil, Groundwater, and Gas Vapor Sampling Techniques ***Nitish Puri,*** *Bhaskar J. Medhi, Lalit Kandpal, Rituraj Devrani, Manoj Datta, G.V. Ramana*	
#155	Study on Nonlinear Displacement Characteristics of Recycled C&D Waste for RE Wall using Composite Reinforcements ***Thaiyam Sameer K*** *., M. V. Shah, A. R. Gandhi*	
#194	A Field Study to Identify Underground Utility using Ground Penetrating Radar ***Sayanti Banerjee,*** *Sushmita Panda, Debtanu Seth, B.Manna, Manoj Datta*	
#217	Utilization of Waste Hair Fibers and Shredded Tyre Chips in Geoengineering Applications ***M. Upendra*** *, Raghvendra Sahu, R. Ayothiraman, G.V. Ramana*	
#198	Sustainable Practice of Remediating Contaminated Sites using Industrial Waste *Muthukkumaran K,* ***Devahi P***	
#228	Laboratory Investigation of MSW for Use as Filler Material in Embankments ***BVS Viswanadham*** *, Saptarshi Kundu, Ankit Kumar*	
2000-2200	**Dinner and Musical Evening (Banquet Hall, Essex Farms, Near IIT Delhi)**	

Geoenvironment-2020: DETAILED SCHEDULE

Day 3 : 19th February 2020, Wednesday

Venue: Seminar Hall, IIT Delhi

International Seminar on Contaminated Sites

0900-1100	**Session A**		
Session Chair	***Indumathi M Nambi, IIT Madras***		
	Balancing Between Goal Specification, Modelling and Site Characterization Efforts ***Peter Dietrich***	*(30+5)*	
	Use of Sustainability Principles and Field Screening Tools to Optimize Contaminated Media Disposal Volume for Soil Remediation Project in India ***Nin Prakash,*** *Rajat Srivastav*	*(25+5)*	
	Subsurface Investigation on Perchloro Ethylene Drycleaning Sites (Michigan, USA) ***Sunil Kulkarni***	*(20+5)*	
	The Circular Geoenvironment - Maximising Geoenvironmental Services to Minimize Environmental Harm ***Michael Harbottle***	*(30+5)*	
1100-1130	**Tea (Red Square)**		
1130-1335	**Session B**		**Demo Session** **Group 4** **1100-1300**
Session Chair	***Ron J. Thiessen, University of Calgary and Advisian, Canada***		
	Mitigating Human Health Risk due to Petroleum Contamination of Groundwater through Advanced Electrochemical Oxidation Methods ***Indumuthi M Nambi***	*(20+5)*	
	Heavy Metals in Soils from Landfills - An International Review ***Ingo Holzle***	*(25+5)*	
	Assessment of the Impact at Contaminated Sites ***Gowri Sankar Kowtha***	*(20+5)*	
	Advantages of Environmental Subsurface Profiling over Soil Sampling ***G. V. Ramana,*** *Manoj Datta , R. Ayothiramn, P. Vangla*	*(20+5)*	
	Contamination Caused by Open Dumpsites in Delhi : Results of Sub-Surface Investigations ***Kamlesh Parikh*** *, Nick Cawtharne, Shashank Prajapati, M. Somani, Manoj Datta*	*(20+5)*	
1335-1430	**Lunch (Red Square)**		
1430-1550	**Session C**		
Session Chair	***Bappaditya Manna, IIT Delhi***		
	Case Study of Hazardous Waste Landfill Site ***Manoj Patel***	*(20+5)*	
	Remedial Measures Following Failure of Leachate Collection Layer of Hazardous Waste TSDF ***Bhanu Prakash V.***	*(15)*	
	Heavy Metal Contamination in Soil of Jaipur City ***Amit Kumar,*** *Aditya Sharma, Samyam Dangyach*	*(15)*	
	Ground and Surface Water Contamination due to Boragaon Dumpsite in Guwahati City ***Abinash Mahanta,*** *Amarsinh B. Landage*	*(12)*	
	Case Study by SPCB ***Awaited***	*(12)*	
1550-1615	**Tea (Red Square)**		

Day 3 : 19th February 2020, Wednesday Venue: Seminar Hall, IIT Delhi		
Conference on Geoenvironment and Sustainability		
1615-1700	**Session D**	Tutorials/ Interactive Sessions
	Theme D: Others/Special Topics	TT 5
Session Chair	***G.V. Ramana, IIT Delhi***	1615-1700
#214	Assessment of the heavy metals contamination in the soil of coalfield by using conventional and probabilistic approach; a case study of Jharia coalfield ***Azeem Uddin Siddiqui***	
#	Awaited Case Studies	
#	Presentations of Awaited Papers	
1700-1800	**Closure**	
Session Chair	***Manoj Datta, IIT Delhi***	
	Summarization Feedback Distribution of Participation Certificates	

A unique feature of Geoenvironment-2020 was the field demonstration of newly acquired state-of-the-art equipment. Six demonstration sessions have been organized on (a) environmental direct push sampling, (b) profiling by optical imaging and hydraulic pressure testing, (c) shallow depth sampling, (d) electrical resistivity, (e) mapping by ground-penetrating radar as well as (f) rapid assessment by handheld X-ray fluorescence and volatile organic compounds detector.

The Major outcomes of Geoenvironment-2020 was as follows:

(a) For the first time in the country, live field demonstrations were conducted for the following state-of-the-art equipment:

- *Environmental Direct Push Sampling*
- *Profiling by Optical Imaging and Hydraulic Pressure Testing*
- *Shallow Depth Sampling*
- *Electrical Resistivity Imaging*
- *Ground Penetrating Radar Surveying*
- *Rapid Assessment by Handheld X-ray Fluorescence and Volatile Organic Compound Detector*

(b) 150+ participants witnessed demonstrations of the state-of-the-art Subsurface Characterization Equipment and received hands-on-training

- MoEF&CC, CPCB and SPCBs	26
- Faculty of Academic and Research Institutions	47
- Young researchers, Scholars and Post Docs.	34
- Industry	35
- Others	17
Total:	159

(c) 60+ institutions / organizations benefitted in the form of capacity building through demonstration / training of their officials

- MoEF&CC, CPCB, SPCBs (Arunachal Pradesh SPCB, Bihar SPCB, Delhi SPCB, Himachal Pradesh SPCB, Haryana SPCB, Jharkhand SPCB, Madhya Pradesh SPCB, Maharashtra SPCB, Meghalaya SPCB, Tamil Nadu SPCB, West Bengal SPCB)
- Academic Institutions:

IISc:	Bangalore
IITs:	Bombay, Delhi, Kanpur, Madras, Kharagpur, Roorkee, Dhanbad, Palakkad
NITs:	Calicut, Durgapur, Jaipur, Surathkal, Allahabad, Tiruchirappalli
Govt. Institutions:	Delhi Technical University; Jamia Millia Islamia University; University College of Engg., Tiruchirappalli and 6 others.
Private Institutions:	VIT Vellore; SRM Institute of Science & Technology; PSG Institute of Technology & Applied Research; DAVIET Jalandhar and 10 others.

- Research Institutions:

  DRDO, CSIR-NEERI, CSIR-CRRI, CSIR-CBRI, CSIR-IITR, ICAR-IISS, ICAR-IITR, CSMRS, C-FARM

- Industry:
  AECOM, ERM, JACOBS, NTPC, RITES, Coal India Ltd., Advisian, Tata Consulting Engineers, Stratus Environmental, Parsan Overseas, Innovative Quality Solutions, Kadam Environmental Consultants, BEIL Infrastructure, BRCPL, CTC Geotechnical.

(d) Expert lectures, demonstrations and tutorials on Contaminated Sites and Geoenvironment, were imparted by 8 international invited speakers and 27 national invited speakers.

International invited speakers at Geoenvironment-2020 were:

- Prof. Gopal Achari	University of Calgary, Canada
- Prof. Peter Dietrich	Helmholtz Centre for Environmental Research-UFZ, Germany
- Prof. Michael Harbottle	Cardiff University, UK
- Dr. Ronald J. Thiessen	Advisian, Canada
- Mr. Orlando Liete	IRIS Instruments, France
- Mr. Anthony Cole	AECOM, Malaysia
- Mr. Wesley McCall and Mr. Adam McMath	Geoprobe Systems, USA
- Dr. Ingo Holzle	ETH Zurich, Switzerland

(e) Expansion of NERCS: Applications were received for registration of new members in NERCS from national participants. In addition, more than a dozen international participants were invited for sending invitation to join NERCS.

(f) Case-studies and research findings in the form of printed and E-Proceedings were compiled, with 31 case-studies / short papers for the International Seminar on Contaminated Sites, and 34 research papers for the Conference on Geoenvironment and Sustainability.

Website/Annexures:

- The complete details (program, presentations, list of participants, image gallery of sessions) of the five-day International Seminar on Contaminated Sites; Concurrent Conference on Geoenvironment and Sustainability; and Demonstration Sessions/Workshop on Environmental Subsurface Investigations are available online at http://www.nercs.in/giw_index.html. The following sections can be

accessed: detailed program; demonstration sessions; list of speakers and participants; summary and outcome; proceedings (abstracts and full length papers); presentations; image gallery for each session.

- The proceedings of the five-day event are attached in Annexure C.

4.3 Network of Experts and Resources on Contaminated Sites (NERCS)

A Network of Experts and Resources on Contaminated Sites (NERCS) has been established and a printed Network List and directory of almost 80+ national experts/resource persons has been published, listing the expertise, facilities, experience, publications/reports of each individual member.

The Network List has also been uploaded on website: http://www.nercs.in/giw_index.html. It is a dynamic list which is updated periodically.

NERCS is a virtual network that is accessible to all.

The NERCS List comprises of 226 pages and can be viewed as follows:

(i) Name-wise,

(ii) City-wise,

(iii) As per area of expertise:
   (a) Sources of Subsurface Contamination;
   (b) Types of Contaminants;
   (c) Subsurface Investigations;
   (d) Remediation

(iv) One-two page profiles of experts have been presented under the broad headings:
   (a) Academic & Research;
   (b) Ministry & Pollution Control Boards;
   (c) Industry

A brief snapshot of a few pages of the Network List (sorted name-wise) is presented in the following pages. For other pages, please visit www.nercs.in or refer Annexure D.

Name	Organization & City	Area of Interest/Expertise				Cat.[6]	Profile Pg. No.
		SoC[1]	ToC[2]	SI[3]	R[4]/PRM[5]		
Mr. Aditya Narayan Singh	MoEF&CC, Delhi	A1, A5			PRM	M&P	184
Dr. Ajay Kalamdhad	IIT Guwahati	A1, A6	B1, B2	C3		AS	71
Dr. Akhilendra Gupta	NIT Jaipur	A1, A2	B1, B2, B3	C3, C4	D1, D3	AS	73
Dr. Amit Kumar	MNIT Jaipur	A1, A6	B1, B4	C4	D1	AS	75
Dr. Amritanshu Shriwastav	IIT Bombay, Mumbai	A2, A3	B2, B3	C3, C4	D2	AS	77
Dr. Anil Kumar Mishra	IIT Guwahati	A1	B1, B2	C3		AS	79
Dr. Anshumali Singh	IIT (ISM) Dhanbad	A2, A4, A6	B1, B2, B4	C1, C2, C3, C4, C6		AS	81
Dr. Anshuman Singh	NIT Patna	A1, A2	B1, B3, B4	C4	D1, D2, D3	AS	83
Dr. Arvind K Agnihotri	NIT Jalandhar	A1, A5	B1, B2	C2, C3	D1, D2	AS	85
Dr. Ashim Kanti Dey	NIT Silchar	A1	B3	C1, C2, C6	D1, D2, D3	AS	87
Dr. Asif Qureshi	IIT Hyderabad		B1			AS	89
Dr. B. Hanumantha Rao	IIT Bhubneshwar	A1, A2, A5	B1, B2	C2, C3, C4	D2	AS	91
Dr. B. Janaki Ramaiah	IIT Tirupati	A1, A4, A5		C1, C2, C3, C4, C5	D1, D2, D3	AS	93
Dr. B. M. Sunil	NIT Surathkal	A1, A4, A6	B1, B2	C1, C2, C3	D2, D4	AS	95
Mr. B. Vinod Babu	CPCB, Delhi	A1, A3	B1, B2, B3	C2, C4, C5	D1, D2, D3, PRM	M&P	185
Dr. Bajrang Singh	ENV DAS India Pvt. Ltd., Lucknow	A1, A6	B1, B4	C1, C2, C3, C4	D1, D2, D4	IR	211
Dr. Basavaraju Manu	NIT Surathkal	A1, A2, A6	B1, B2, B3	C2, C3	D1, D2	AS	97
Dr. Brajesh K Dubey	IIT Kharagpur	A1, A4, A5, A6	B1, B4	C3, C4, C5	D1, D3	AS	99
Dr. Brijesh Kumar Yadav	IIT Roorkee	A1, A2, A6	B1, B2, B3	C2, C3, C4	D2, D3	AS	101
Mr. Chetan Zaveri	AECOM India Pvt. Ltd., Gurugram	A1, A2, A3, A6	B1, B4	C1, C2, C4, C5	D1, D4	IE	199
Mr. Chinna Reddy Mamidi	Ramky Enviro Enggs. Ltd., Kanpur	A1, A2, A3, A4, A5, A6	B1, B2, B3	C1, C2, C3, C4, C5	D1, D2, D3	IR	213
Dr. D. N. Arnepalli	IIT Madras	A1	B1, B3	C3	D1, D2	AS	103
Dr. Danish Ahmed	NIT Srinagar	A1, A7	B2, B4	C6	D1, D4	AR	163
Dr. Deepak Swami	IIT Mandi	A1, A4	B1, B2	C2, C3, C4	D2	AS	105
Dr. Divya P. V.	IIT Palakkad	A1, A5			D1, D2	AS	107
Mr. Durvijay Sing Jatav	MPPCB, Ujjain					M&P	190
Dr. G L Sivakumar Babu	IISc Bangalore	A1	B1, B2, B3	C1, C3, C4, C5	D1, D2	AE	45
Mr. G. Rambabu	CPCB, Delhi	A1, A3	B1, B2, B3	C2, C4, C5	D1, D2, D3, PRM	M&P	187
Dr. G. V. Ramana	IIT Delhi	A1, A4, A5		C1, C2, C3, C4		AE	47
Dr. George K Varghese	NIT Calicut	A1, A2, A3	B1, B2	C3, C4		AS	109
Mr. Gowri Sankar Kowtha	Stratus Env., Inc., Cameron Park, California	A1, A2, A3, A5, A7	B1, B3	C2, C5	D1, D2, D3	IE	201

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Name	Organization & City	Area of Interest/Expertise				Cat.[6]	Profile Pg. No.
		SoC[1]	ToC[2]	SI[3]	R[4]/PRM[5]		
Dr. Harshit Mishra	IIT Kanpur	A1, A4, A6	B1, B2	C3, C4	D1, D3	AS	111
Mr. Harshvardhan Thakkar	MPPCB, Bhopal	A1, A6, A7	B1, B2, B4	C3, C4	D1, D4	M&P	192
Dr. Indumathi M Nambi	IIT Madras, Chennai	A1, A2, A3, A7	B1, B2, B3, B4	C2, C3, C4	D1, D2, D3	AE	49
Dr. J. K. Saha	IISS, Bhopal	A1, A6	B1, B2	C4		AE	51
Dr. K. Muthukkumaran	NIT Trichy	A1, A2, A4, A5	B1	C1, C2, C3, C5	D1, D2, D3	AS	113
Dr. Kalyan Adhikari	NIT Durgapur	A1, A2, A3, A4, A5, A6, A7	B1, B2, B3	C1, C2, C3, C4, C5	D1, D2, D3	AE	53
Dr. Kiran Bala	IIT Indore	A1, A2, A5	B1, B2		D1, D2	AS	115
Dr. Kumar Venkatesh	MNNIT Allahabad, Prayagraj	A1, A2	B1, B2	C1, C2, C3	D1	AS	117
Dr. L. Vijay Anand	IIT Ropar	A2, A6, A7	B1, B2, B3, B4	C2, C3, C4, C5	D1, D2, D3	AS	119
Dr. Laxmikant Yadu	NIT Raipur	A5, A6	B2, B3			AR	165
Dr. M. Muttharam	CEG, Anna Univ. Chennai	A1, A3, A5	B1, B2, B3	C2, C3, C4	D1, D2	AS	121
Dr. M.K. Kaushik	DAVIET, Jalandhar	A1, A6, A7	B1, B2, B4	C2, C3, C4, C6	D1, D4	AR	167
Mr. Madan Kumar D. Tiwary	Ramky Enviro Engineers Ltd., Hyderabad	A1, A2, A3, A4, A5	B1, B2, B3	C1, C2, C3, C4, C5	D1, D2, D3	IR	215
Dr. Manoj Datta	IIT Delhi	A1, A2, A3, A4, A5	B1, B2, B3	C2, C3, C5	D1, D2, D3	AE	55
Mr. Manoj Kumar Gangeya	MoEF&CC, Delhi				PRM	M&P	184
Dr. Mohana K. Reddy Mudiam	CSIR-IICT Hyderabad	A1, A2, A3, A6	B1, B2, B3, B4	C3, C4, C5	D3	AE	57
Dr. Munish Kumar Chandel	IIT Bombay, Mumbai	A1	B1, B2, B3	C2, C3, C4	D1, D2	AS	123
Dr. Natesan Manickam	CSIR-IITR, Lucknow	A2, A3, A6, A7	B3, B4	C2, C3, C4	D1, D2, D3	AE	59
Dr. O. Eswara Reddy	SVEC, Tirupati	A2, A3, A4, A5	B1, B2	C1, C2, C3	D1, D2, D3	AS	125
Dr. P Raghuveer Rao	IISc Bangalore	A1, A7	B1, B3, B4	C2, C3, C4	D1, D2, D3	AR	169
Dr. P. Anbazhagan	IISc Bangalore			C1, C2, C3, C4, C5	D1, D2, D3	AS	127
Dr. Pinaki Sar	IIT Kharagpur	A1, A2, A3, A4, A7	B1, B2, B3	C2, C3	D1, D2	AE	61
Dr. Pramod Kumar	IIT Roorkee	A1, A2, A3	B1, B2, B3	C2, C3, C4, C5	D1, D2	AS	129
Ms. Prathima B	IISc Bangalore	A1, A2	B1, B3	C2, C3, C4	D2, D3	AR	171
Dr. (Mrs.) Pritam Sangwan	DRDO, Delhi	A1, A2, A3, A6, A7	B1, B2, B3, B4	C2, C3, C4, C5	D1, D2, D3	AS	131
Dr. Rabi Narayan Behera	NIT Rourkela	A1, A4, A5	B1, B2	C3, C4		AS	133

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Name	Organization & City	Area of Interest/Expertise				Cat.[6]	Profile Pg. No.
		SoC[1]	ToC[2]	SI[3]	R[4]/PRM[5]		
Dr. Raj Mohan Singh	MNNIT Allahabad, Prayagraj	A1, A2		C2, C4, C6	D2, D4	AS	135
Dr. Rakesh Chandra Vaishya	MNNIT Allahabad, Prayagraj	A1, A3, A5	B1, B2	C1, C3	D1, D2, D3	AS	137
Dr. Ramakrishna Bag	IIT Patna	A1, A2, A5	B2, B4	C2, C3, C4	D1, D2	AS	139
Dr. Ramanathan Ayothiraman	IIT Delhi			C1, C2, C5		AR	173
Dr. Ritu Pandey	ENV DAS India Pvt. Ltd., Lucknow	A1, A2, A4, A5	B1, B2, B3	C2, C3, C4, C5	D1, D2, D3	IR	217
Dr. S. V. Mohan	CSIR-IICT, Hyderabad	A1, A2, A3, A4, A7	B3		D1, D4	AE	63
Mr. S.S.S. Murali	APPCB, Vijayawada	A1, A7	B1, B2	C1, C2, C3	D1	M&P	194
Er. Sandeep Garg	Eco Lab Consultants Pvt. Ltd., Mohali	A1, A2, A3, A4, A6	B1, B2, B3	C2, C3, C4, C5	D1, D2, D3	IR	219
Mr. Sandeep Sahu	SAS Ground Engineers, New Delhi			C1, C2, C3, C4, C5	D1, D2, D3	IR	221
Dr. Sanjay Rana	PARSAN, New Delhi	A1, A2, A3	B2	C1	D1, D2	IE	203
Dr. Seetha N.	IIT Hyderabad	A1, A2, A6	B4	C3, C4		AS	141
Mr. Shailendra Singh Bist	Udaipur Min Tech Pvt. Ltd.	A4	B3	C1, C2, C5	D1, D2, D3	IR	223
Dr. Shihabudhee M. Maliyekkal	IIT Tirupati	A1, A2, A3	B1, B2, B3	C1, C2	D1, D2, D3	AS	143
Dr. Sonu Singh	MoEF&CC, Delhi	A1			PRM	M&P	184
Dr. Sowmiya Chawla	IIT (ISM) Dhanbad	A1, A4, A7	B1, B4	C1, C4	D1, D3	AR	175
Dr. Sreedeep S.	IIT Guwahati	A1, A5, A6	B1, B2	C3, C4	D3	AS	145
Mr. Subodh Kulkarni	Soil Tech (India) Pvt. Ltd., Pune	A1, A7		C6		IE	205
Dr. Sudha Goel	IIT Kharagpur	A1, A5, A6	B1, B2, B3, B4	C3, C4	D1, D2	AS	147
Mr. Sunil Kulkarni	Innovation and Quality Solutions, Secunderabad	A1, A2, A3, A7	B1, B3, B4	C1, C2, C4, C5, C6	D1, D2, D3	IE	207
Dr. Supriya Pal	NIT Durgapur	A2, A5	B3	C3, C4	D1, D2	AS	149
Dr. Suresh A. Kartha	IIT Guwahati	A1, A2, A4, A7	B1, B2	C3, C4, C6	D1, D4	AS	151
Dr. Tapan Chakrabarti	CSIR-NEERI, Nagpur	A1, A3	B1, B3, B4	C1, C2, C3	D1	AE	65
Dr. Trishikhi Raychoudhury	IIT Patna	A2, A7	B1, B2, B3	C3	D2	AS	153
Dr. Umesh Mishra	NIT Agartala	A1, A2, A3, A4, A5	B1, B2, B3	C1, C2, C3, C4	D1	AS	155
Dr. V. P. Singh	MNNIT Allahabad, Prayagraj	A1, A2, A3, A4	B1, B3	C2, C3, C4	D1, D2, D4	AS	157
Dr. Vikas Gingine	KLSGIT, Belagavi, Belgaum	A1, A4	B1, B2, B3	C1, C3	D2, D3	AS	159
Dr. Vimal Kumar	CFARM, New Delhi	A4, A5, A6	B1, B2	C2	D1	IR	225

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The NERCS list is to be supplemented by select international experts. Compilation of database of select international experts was undertaken in February 2020 during Geoenvironment 2020 and some of the experts are listed under Section 4.2, para (d) of major outcomes. This process was interrupted by the Covid-19 lockdown in March 2020. Formalization of collaboration between experts from India with experts from 2 or 3 International Institutions/Research Centers can begin after visiting/interacting with the identified international experts along with officials of MoEF&CC. This can be accomplished after lockdown due to COVID-19 is lifted, the second installment (25% of total budget) is received (as per terms and conditions of Contract (Appendix III)) and extension of the project is granted by MoEF&CC as Phase-2.

Website/Annexures:

- The complete details of Network of Experts and Resources on Contaminated Sites are available online at http://www.nercs.in/network_index.html. The network list can be accessed name-wise, city-wise, area of interest-wise and category-wise (academic and research, ministry & pollution control boards and industry)
- The hard copy of the NERCS List is attached in Annexure D (226 pages)

4.4 Procurement of Advanced Field Equipment

The equipment procured from the project fund is listed in Annexure E. From amongst the 19 equipment (including software and accessories), 16 equipment were procured and Rs. 608 Lakhs (approximately), excluding IITD overheads, have been spent as against Rs. 685 Lakhs received (including institute overheads). Three equipment have not been procured on account of reasons listed in Annexure E.

Brief details & photographs of the following equipment are given in the following pages:

- *Ground Penetrating Radar*
- *Electrical Resistivity Imaging System*
- *MASW (Multichannel Analysis of Surface Waves): Reflection and Refraction Survey*
- *Shallow Depth Soil Coring/ Groundwater Sampling/Soil-Gas-Vapour Sampling System*
- *Medium Depth Direct Push Rig with Soil Sampling/ Ground Water Sampling/Pore-Gas Kit (7822DT: Integrated 3-in-1)*
- *Cone Penetrometer: Piezocone and Seismic Cone (7822DT: Integrated 3-in-1)*
- *Samplers*
- *Landfill Gas Analyzer*
- *VOC Detector*
- *Handheld XRF*
- *Soil Digester*
- *TCLP Apparatus*
- *Modular Shelter/ Container for Field Rig*
- *Contaminant Transport Software*

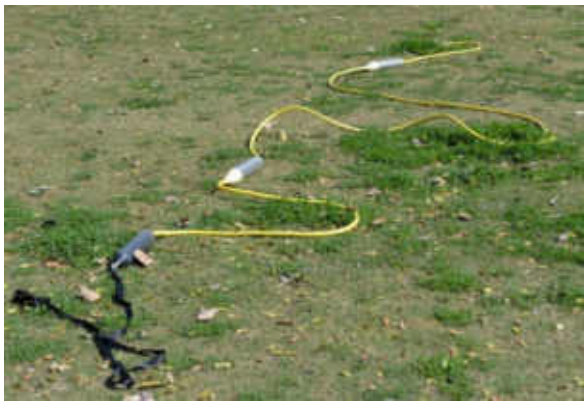
4.4.1 Ground Penetrating Radar

Manufacturer: Utsi Electronics Ltd., UK Rep.: Avantech Engg. Consortium P. Ltd., New Delhi

Ground Penetrating Radar (GPR) is a geophysical method which sends electromagnetic pulses into the ground and detects the reflected signals to identify buried objects, pipes, cables, underground utilities, voids etc. It identifies boundaries between materials having different permittivities. Useful in soil, rock, ice and pavements. Suitable for detecting boundaries up to a few metres depth below the ground surface. Groundvue 3.0 from Utsi Electronics, UK, comprises of 8-channel controller (capable of 1600 scans per second) with antennas having frequency ranges of 250 MHz to 1 GHz and processing software (Reflex-W) along with a snake antenna of frequency 40 MHz.

(a) Ground Penetration Radar Assembly

(b) Standard Antenna (250 Mhz)



(c) Snake Antenna

(d) Demonstration of Equipment at Geoenvironment-2020

(e) Demonstration of Equipment at Geoenvironment-2020

4.4.2 Electrical Resistivity Imaging System

Manufacturer: IRIS Instruments, France Rep.: Aimil Ltd., New Delhi

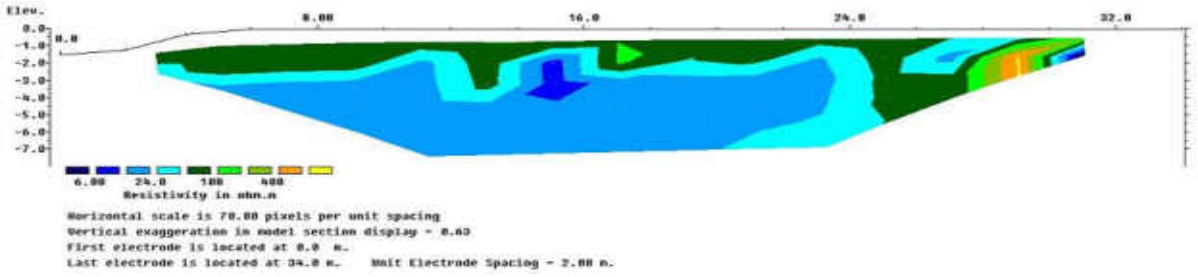
Electrical Resistivity Imaging (or Tomography) is a non-invasive geophysical subsurface imaging technique in which apparent electrical resistivity of the subsoil is measured by inducing current into the ground and measuring the potential drops along an array of electrodes. Vertical and lateral variations of electrical resistivity are obtained by placing electrodes in different linear configurations, resulting in a 2-D Tomographic image. Combining different 2-D sections, a 3-D Tomographic image can also be obtained. The variation or anomalies in resistivity help in finding soil lithology, groundwater, fracture zones, depth of bedrock, saltwater intrusion, groundwater contamination, and many more. Syscal system from IRIS Instruments is an automatic resistivity calculating unit with a multi-channel system (Syscal junior pro), cable (length of 360 m with 72 switches each at 5m spacing), 72 stainless electrodes, and jumpers to connect the electrode with the cable. This system works with three Softwares: Electre Pro (for Array configuration), Prosys II and RES2DINV/ RES3DINV (for data processing and inversion).

(a) Electrical Resistivity Imaging System: Resistivity meter, Electrodes, Cables and Connectors

(b) Equipment Setup in Field

(c) Demonstration of Equipment at Geoenvironment-2020

(d) Demonstration of Equipment at Geoenvironment-2020



(e) Typical Output from the Electrical Resistivity Imaging Test

4.4.3 MASW (Multichannel Analysis of Surface Waves): Reflection and Refraction Survey

Manufacturer: OYO Corporation, Japan Rep.: Aimil Ltd., New Delhi

The MASW equipment evaluates shear-wave velocity distribution with depth either in 1D (depth) or 2D (depth and surface distance) formats. It measures the dispersion of surface waves with depth and then estimates the shear wave velocity. The shear wave velocity can be used to estimate the shear modulus with depth. This is a non-destructive technique and can be used to detect the thickness of cover layer and intermediate layers. This equipment has also applications like: soil-bed rock mapping, seismic site characterization and liquefaction hazard assessment. Specifications are as follows: 24 Channel engineering seismograph (McSEIS-SW) with 4.5 Hz geophones and a drop hitter system (WEH -250).

(a) MASW Instrumentation

(b) 24 Channel Engineering Seismograph

(c) Drop Hitter, Hammer and Accessories

(d) Geophones

4.4.4 Shallow Depth Soil Coring/ Groundwater Sampling/Soil-Gas-Vapour Sampling System

Manufacturer: AMS Inc., USA Rep.: Complete Instrumentation Solutions P. Ltd., Gurgaon

The AMS kits are capable of environmental sampling of soil/ gas/ groundwater up to a shallow depth of 3 m in different ground conditions. The environmental soil sampling kit has stainless-steel components (augers, rods, samplers) so that no contaminants are introduced during drilling and sampling. These can be decontaminated after sampling. Six types of kits include: environmental soil sampling kit, bulk density soil sampling kit, flighted auger kit, hollow stem auger kit, petrol powered core sampling kit and heavy-duty gas vapour probe kit along with various accessories and consumables. Automatic vacuum gas sampling chamber/ vacuum pump station and peristaltic pump are used for collecting gas and groundwater samples respectively.

(a) Environmental Soil Sampling Kit

(b) Bulk Density Soil Sampling Kit

(c) Flighted Auger Kit

(d) Hollow Stem Auger Kit with Peristaltic Pump

(e) Petrol Powered Core Sampling Kit with Hammer and Removal Foot Jack

(f) Heavy Duty Gas Vapour Probe Kit

(g) GVP Tip attached with Vacuum Gas Sampling Chamber(Left) and Peristaltic Pump for Groundwater Sampling (Right)

(h) Demonstration of Equipment at Geoenvironment-2020

(i) Demonstration of Equipment at Geoenvironment-2020

4.4.5 Medium Depth Direct Push Rig with Soil Sampling/ Ground Water Sampling/ Pore-Gas Kit (7822DT: Integrated 3-in-1)

Mfr: Geoprobe Systems, USA Rep.: Complete Instrumentation Solutions P. Ltd., Gurgaon

Geoprobe 7822DT: The 7822DT is a self-propelled, crawler-mounted, highly-mobile, compact rig which uses 3-in-1 integrated techniques i.e. direct push, rotary and percussion to drive a sampler/probe into the ground.

Direct Push Soil Sampling: The environmental soil sampling system DT 325 consists of a dual tube sampler with outer diameter of 3.25 inches. DT325 allows recovery of core samples in 1.5 m long plastic liners in single push down operation. The samples are untouched by hand and can be sealed using endcaps and transported to the lab for environmental analysis. Continuous soil cores can be recovered down to depths of 15 m without any cross-contamination and without generation of extra cuttings of soil during the push-down operation.

Groundwater Sampling: The Screen Point 16 (SP16) groundwater sampling tips are used to collect groundwater samples from different soil layers beneath the ground water table.

Pore-Gas Vapour Sampling: The Post Run Tubing System (PRT) allows the user to collect soil vapour samples quickly and easily at the desired sampling depth without the time-consuming complications associated with rod leakage and contamination.

(a) The Geoprobe 7822DT Drill Rig

(b) A Typical Dual Tube with Liner and Cutting Shoe

(c) Groundwater Sampling and Pore-Gas Vapour Sampling Units

(d) Demonstration of Equipment at Geoenvironment-2020

(e) Lifting of Dual Tube Assembly

(f)Pushing Dual Tube into the Sub-surface Soil

(g) Removing Liner from the Inner Tube

(h) Liners Containing Continuous Core Samples

4.4.6 In-situ Optical Imaging & Hydraulic Profiling Tool (OIHPT) for Soils (7822DT: Integrated 3-in-1)

Mfr: Geoprobe Systems, USA Rep.: Complete Instrumentation Solutions P. Ltd., Gurgaon

The OIHPT (Optical Imaging & Hydraulic Profiling Tool) equipment comes with a probe tip on which an electric dipole, a light source (UV & visible), a camera and a flow screen are placed. The probe is driven by 7822DT rig. The electric dipole is used for measuring electrical conductivity of soil and camera along with the light source is used to measure visual images as well as fluorescence of the contaminants (hydrocarbons (NAPL)) present in the subsurface. The hydraulic profiling tool measures the flow and pressure required for water to out from the flow screen during penetration. This injection pressure log with depth is an excellent indicator of formation permeability. The in-situ measurements of electric conductivity, fluorescence and flow properties are logged using a computerized logging system. The log is presented in form of continuous depth plot of measured electric conductivity, fluorescence, flow pressure and flow volume. The OIHPT, along with continuous collection of samples using DT325, provide the necessary and sufficient information for High Resolution Site Characterization of contaminated sites.

(a) OIHPT Instrumentation

(b) Demonstration of Equipment at Geoenvironment-2020

(c) Setting up the Equipment

(d) Field Check

(e) Field Check

(f) Performing OIHPT test

(g) Output on screen

(h) Output on screen

4.4.7 Cone Penetrometer: Piezocone and Seismic Cone (7822DT: Integrated 3-in-1)

Mfr: Geoprobe Systems, USA Rep.: Complete Instrumentation Solutions P. Ltd., Gurgaon

The Geoprobe Cone Penetration Testing equipment can apply a downward force of 200 kN to push an electrical piezocone and measure tip resistance, skin friction, pore water pressure, depth and inclination of the cone during penetration. A seismic adaptor above the piezocone allows measurement of shear wave velocities when seismic pulses are generated by hitting a shear plate placed on the ground. The data helps in determination of the subsurface stratigraphy in-situ and estimation of geotechnical parameters of the materials from the cone data generated by static pushing at a controlled rate of 2 cm/sec. The seismic cone data is useful for assessment of liquefaction risk and earthquake generated ground surface movements.

(a) The CPT Cone

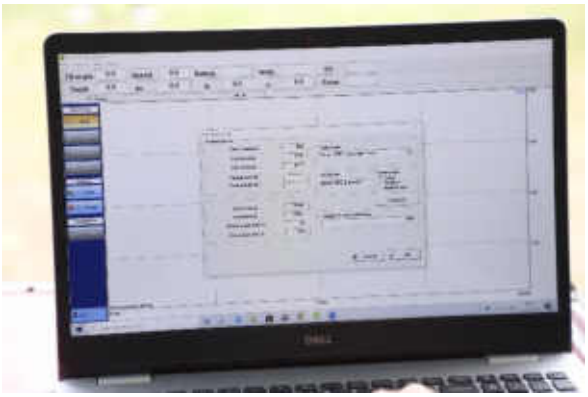
(b) Saturating the Piezocone

(b) Setting up the Cone

(d) Attaching the Cables

(g) Connecting Cone, CPT Controller and Laptop

(h) Connecting Cone, CPT Controller and Laptop



(i) Initialising Data Acquisition on Laptop

(j) Alignment Check

(k) Cone Penetration

(l) Output on screen

(m) Pulling Out Rods and Cone

(n) Removing Anchors

4.4.8 Samplers

Manufacturer: AMS Inc. (USA); CEL Scientific Corp. (USA); Geotech Env. Equip. (USA), others

Rep.: Complete Instrumentation Solutions P. Ltd., Gurgaon

Plastic and stainless-steel liners with end caps and swatches for safe transportation of environmental soil samples. Core catchers to minimize the sample loss when sampling dry, loose soils and wet, unconsolidated soils. Tedlar bags for collecting gas samples. Automatic vacuum gas sampling chamber for sampling gas to Tedlar bags at a contaminated site. Peristaltic pump for taking groundwater samples. Environmental soil sampling and head-space gas sampling syringes for easy sampling in a small quantity from already sampled soil (in liners) and gas (in Tedlar bags).

(a) Plastic Liners with End Caps

(b) Stainless Steel Liners with End Caps

(e) Environmental Soil Sampling Syringes

(f) Demonstration of Environmental Soil Syringes

(g) Automatic Vacuum Gas Sampling Box

(h) Gas Sampling in a Tedlar Bag in the Sampling Box

4.4.9 Landfill Gas Analyzer

Manufacturer: Geotech, UK Rep.: Neetel Ltd., Mumbai

Geotech GA5000 is a portable gas analyser for landfills and contaminated sites. It is used to measure the concentration of landfill gases (CH_4, CO_2, O_2, H_2S, and CO). It measures CO_2 and CH_4 by dual wavelength infrared sensor while CO, O_2, and H_2S are measured by an internal electrochemical sensor. It has a wide range applicability in landfill gas monitoring, waste to energy plants, investigation of contaminated sites. It has the facilities of measurement of temperature from -10°C to +75°C and barometric / relative pressure measurement with an optional probe for gas flow measurement from boreholes / pipes in a range of 0-20 l/hr.

(a) Installing Gas Vapour Probe at MSW Dumpsite

(b) Recording Concentrations of Landfill Gas Constituents

4.4.10 VOC Detector

Manufacturer: Ion Science Ltd., UK Rep.: Ion Science India P. Ltd.

Volatile Organic Compound (VOC) Detector from Ion Science is a field screening tool with the help of which presence of VOCs at any site can be rapidly identified. The instrument works on the principle of photoionization detector (PID) technology. The molecules of VOC gas sucked into the instrument are broken by high energy UV photons emitted by a 10.6eV PID lamp inside and the electric current produced is detected by patented fence electrode technology to report the concentration in ppm or ppb. Over 700 gases can be detected in the range from 0 to 5000 ppm with minimum sensitivity of 0.1 ppm. To prevent the entry of any debris into the equipment, it is always used with a 0.5 micron polytetrafluorethylene (PTFE) filter disc. For calibration, the equipment uses isobutylene gas with a response factor of 1.0. Data can be stored in the instrument and also downloaded on to the laptop.

(a) VOC Analyzer Kit

(b) Demonstration at Geonevironment-2020

(c) Samples being checked for VOCs

(d) VOC reading from the sample

4.4.11 Handheld XRF

Manufacturer: Thermo Fisher Scientific Inc., USA Rep.: Multitech Enviro Analytical, Delhi

The Niton XL3t handheld X-ray fluorescence (XRF) analyzer from Thermo Fisher Scientific allows rapid assessment of heavy metals and other contaminants for in-situ screening of soils at contaminated sites. It yields rapid, qualitative and semi-quantitative results allowing similar samples to be sent to the laboratory for confirmatory testing. The portable (handheld) XRF works on the principle of X-ray emission from individual atoms after excitation by an external energy source. It is a qualitative tool to detect metal concentrations in dry solid samples. The X-rays can only penetrate upto 0.5 mm and hence the results are for the surface of the samples only. It can be used to delineate the areas of potential concern. The XL3t Niton XRF analyzer comprises of X-ray tube power (50 kV - 2 W) for heavy element detection, Si-SDD detector technology, and tilt screen display and the elemental range covered is magnesium to uranium.

(a) Hand Held XRF Kit

(b) Detection of Constituents in Various Samples

(c) Onsite Dislplay of Readings

(d) *Demonstration at Geoenvironment-2020*

4.4.12 Soil Digester

Manufacturer: Anton Paar, Austria Rep.: Anton Paar India Pvt. Ltd., Gurgaon

Multiwave GO from Anton Paar is a microwave digestion system used for digestion of soil, water, food or biological samples. It is suitable for analysis of total heavy metals in soils. After digestion, the samples can be analysed by techniques such as inductive coupled plasma, atomic absorption emission etc. Digestion of 12 samples (up to 3 g each) simultaneously is feasible within a small footprint. This is accomplished by exposing a sample to a strong acid in a closed vessel and raising the pressure and temperature through microwave radiation. The digester provides efficient turbo heating using directed microwaves to one or more samples and has a turbo system for rapid cooling. The Smart Vent Technology and HF resistant vessels allow for reliable and safe digestion.

(b) Fume Hood

4.4.13 TCLP Apparatus

Manufacturer: Cole-Parmer, USA Rep.: Cole-Parmer India P. Ltd., Mumbai

Toxicity characteristics leaching procedure (TCLP) is a leachate extraction method from solid waste / contaminated soil to simulate leaching through a landfill. It is used to determine if a waste is hazardous or not. The Cole-Palmer TCLP apparatus comprises of a heavy duty TCLP Rotator (max. speed 30 rpm), 12 borosilicate extraction bottles (2.2 L capacity) and extraction pads, maxfil pressure filtration device & TCLP filters and PVF sampling bags.

(a) TCLP Apparatus

(b) Inside View

(c) 2.2 Litre Bottles for TCLP Apparatus

4.4.14 Modular Shelter/ Container for Field Rig

Manufacturer: Local Fabricator

Description: A field shelter/ container has been fabricated for housing the rig and a separate field container has been acquired for storing the accessories.

(a) Field Shelter/ Container for Rig

(b) Rig Inside the Shelter/ Container

(c) Field Container for Rig Accessories

(d) Accessories Inside the Container

4.4.15 Contaminant Transport Software

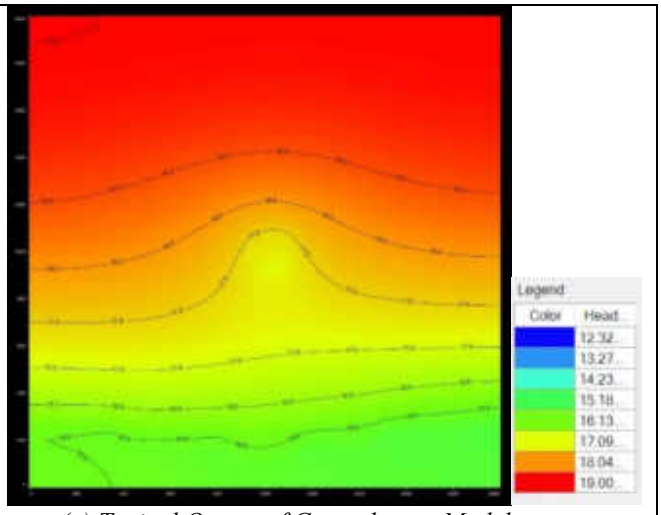
Software: **GMS** by Aquaveo,USA; **HYDRUS** by PC-PESD, Czech Republic; **MODFLOW** by Waterloo Hydrogeologic, Canada

Rep.: LaGa Systems Pvt. Ltd., Hyderabad

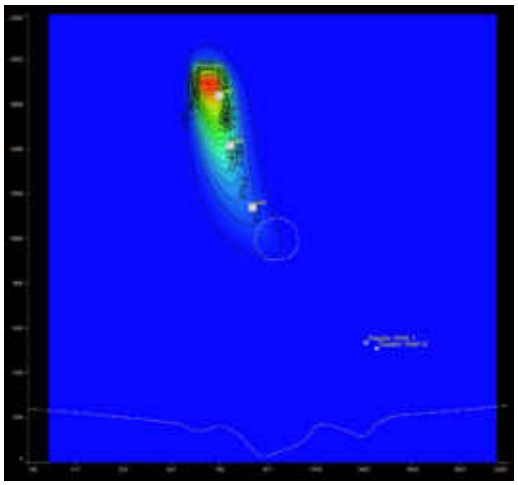
Groundwater Modelling System (GMS) is a groundwater and subsurface simulation software developed by Aquaveo, USA for performing groundwater simulations in a 3D environment. It supports a variety of ground water flow models with structured or unstructured grid options, native MODFLOW files and spreadsheet. The simulation results can be visualized in 2D plan, sectional and 3D views.

HYDRUS 2D/3D is a software package for simulating water, heat, and solute movement in two- and three-dimensional variably saturated media. It is developed by PC-Progress Engineering Software Developer, Prague, Czech Republic. It uses the Finite Element Method (FEM) for solving advection-dispersion equations, for modelling water & solute movement in partially or fully saturated homogenous or layered media.

Visual MODFLOW Flex is a groundwater flow & contaminant transport modelling software from Waterloo Hydrogeologic, Canada. This program has tools necessary for addressing water quality, groundwater supply, and source water protection initiatives. This program can model ground water flow in saturated/unsaturated subsurface and multi-species reactive contaminant transport simulations.



(a) Typical Output of Groundwater Model



(d) Typical Output of Contaminant Plume

4.5 Demonstration Project

Field demonstration of newly acquired state-of-the-art equipment was carried out to the participants of Geoenvironment-2020 in six demonstration sessions. In each session, the following equipment were demonstrated: (a) environmental direct push sampling, (b) profiling by optical imaging and hydraulic pressure testing, (c) shallow depth sampling, (d) electrical resistivity, (e) mapping by ground-penetrating radar as well as (f) rapid assessment by handheld X-ray fluorescence and volatile organic compounds detector. Brief details and photographs of demonstration of this equipment are shown in in the previous section.

In addition, the step by step demonstration of field sampling up to a depth of 15 m using medium depth Direct Push rig: DT-7822 was conducted. The following steps were explained:

(i) Moving the rig with mast in folded position and unfolding to vertical position;
(ii) Preparing inner tube and outer tube for direct push sampling;
(iii) Direct push sampling;
(iv) Retrieving sample in PVC liner;
(v) Cutting open the liner for specimen extraction
(vi) Sampling at various depths ant intervals of 1.5m
(vii) Backfilling of borehole.

16 photographs of the field demonstration are shown hereafter.

Various stages of environmental soil sampling by direct push method up to 15 m depth

a. Waste water drain adjacent to borehole

b. Environmental soil sampling using direct push rig at 50 m distance from the waste water drain

c. Environmental soil sampling rig with mast in folded position

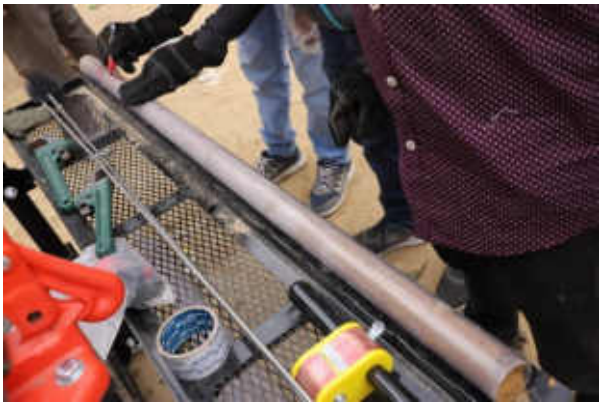
d. Mast in vertical position

e. Preparation of sample sheath (inner tube) for sampling

f.. Raising of outer casing (probe rod) for direct push sampling

g.. Direct push sampling underway

h.. Sample retrieved in sample sheath (inner tube)



i. Retrieved sample (1.5 m long) in PVC liner

j. PVC liner cut open to extract specimen for laboratory testing

k. Sample from 7.5 m depth

l. Sample from 10.5 m depth

m. Sample from 15 m depth

n. Borehole (15 m deep) after completion of direct push sampling

o. Backfilling of borehole

p. The field work team

4.6 Research Activities

Contamination studies on soil samples obtained from different depths (up to 15 m) in a borehole 50 m away from an open waste-water drain as well as in pore liquid of soils from four deep boreholes on the perimeter of a MSW dump/landfill were carried out and the results are summarized in Annexure F. In addition, study of contaminants in soil-like-material recovered from 4 boreholes at MSW dump was also undertaken.

4.6.1 Soil Samples from Boreholes near Waste-Water Drain (Annexure F.1)

11 soil samples were obtained from 0 to 15 m depth in a borehole which was drilled 50 m away from a waste-water drain as illustrated by photographs in Section 4.5. Total and leachable heavy metals as well as Total Dissolved Solids (TDS) were determined as per protocol listed in Table 8 of Annexure F. The variations of total heavy metals with depth are listed in Table 1 of Annexure F.1 and that of leachable heavy metals in Table 2. The concentration of total heavy metals and leachable heavy metals in borehole samples are compared with those in the sediments (at the bed of the waste-water drain) as well as in local soil well away from the drain in Tables 3 and 4 of Annexure F.1. TDS values are also compared in Table 4. The following is observed in various tables:

(a) Table 1: In general, no trend was found with depth except that the values of total heavy metals are elevated at shallow depth.
(b) Table 2: Slightly elevated concentration of leachable heavy metals is observed at 1.5 m depth.

(c) Table 3:
    (i) In sediment samples, Zn, Cu and Pb are found to be higher in comparison to the other heavy metals.
    (ii) BH samples have lower values of Zn, Cu and Pb in comparison to the sediments and other heavy metals are of the similar order of magnitude in BH and sediment samples.
    (iii) In borehole samples, Cu is marginally higher than the local soils. All other heavy metals have same order of magnitude as of the local soils.

(d) Table 4:
    (i) TDS in sediments lie in the range of 232-536 mg/L which is higher than the BH samples indicating that the salts have not migrated.
    (ii) Leachable Cu and Zn are high in comparison to the other heavy metals in the sediments.
    (iii) In borehole samples, leachable heavy metals are lower than the sediments and similar to the local soils.

The overall conclusion is that no contamination is detected up to 15 m depth in the borehole.

4.6.2 Pore-Liquid Samples from 4 Boreholes on Perimeter of a MSW dump/Landfill (Annexure F.2)

Four samples were obtained from depths in the range of 20 to 35 m from boreholes on the perimeter of a MSW dump/landfill. The results of physico-chemical parameters and heavy metal concentrations are presented in Table 5 of Annexure F.2 and compared with the permissible limits for drinking water and limits for discharge to land. The following is the observations from Table 5:

(a) Physicochemical parameters including TDS, COD, Ammonical nitrogen, chlorides, and sulfates are found to be much higher than the permissible limits for drinking water and discharge to land.
(b) Most of the heavy metals (except nickel and lead) are found to be below the permissible limits prescribed for drinking water and discharge to land

The overall conclusion is that leachate from landfill causes increase in TDS, COD, ammonical nitrogen, chlorides and sulphates to unacceptably high levels, but most of the heavy metals remain within permissible limits.

4.6.3 Contamination Studies on Soil like Material from Boreholes in MSW dump/Landfill (Annexure F.3)

Samples from different depths in 30 m deep boreholes were screened on 4 mm sieve and Soil Like Material (SLM) passing through them (i.e. 4 mm down) was analyzed for total heavy metals, leachable heavy metals as well as Total Dissolved Solids (TDS), sulphates and chlorides. The results are listed in Tables 6 and 7 of Annexure F.3 and these are compared with the levels observed in local soils collected at some distance (up to 5 km) from the borehole locations. The following is observed from the tables:

(a) Table 6:
    (i) In SLM from boreholes, all the heavy metals are found to be significantly higher than the local soils.
    (ii) No trend was observed on the concentration of total heavy metals with change in the depth of boreholes.

(b) Table 7:
    (i) All the parameters including heavy metals and soluble solids are found to be significantly higher in the SLM than the local soils.
    (ii) No specific trend was observed on the concentration of heavy metals and soluble solids with change in the depth of boreholes.

The overall observation is that soil-like-material has much higher level of contaminants (total heavy metals, leachable heavy metals as well as TDS, sulphates and chlorides) in comparison to local soils.

5.0 Statement of Expenditure and Utilization Certificate

The closure date of the project "Capacity Building of Academic Institutions IIT Delhi to Support Remediation Initiatives" (RP-03531G) as well as the sub-project "Procurement of Advanced Equipment" (RP-03614G) was 31st March 2020. The finalization of accounts and statement of expenditure was to be prepared after the closure date of the project. However, due to lockdown on account of COVID-19 in mid-March all activities relating to finalization of accounts have been temporarily suspended. Once the lockdown is over, it is expected that the finalization of the accounts will take 6 to 8 weeks. The statement of expenditure and utilization certificate will be submitted thereafter. It may be noted that statement of expenditure and utilization certificate up to 31st March 2019 was submitted to the sponsoring

agency (MoEF&CC) in July 2019. Now a statement of expenditure and utilization certificate till 31st March 2020 will be prepared and submitted independent of this report.

6.0 Concluding Remarks

(a) Under this sponsored project, for the first time in India an advanced equipment (3-in-1) has been acquired which enables environmental soil sampling at contaminated sites without any cross contamination – a facility which hitherto has not been available in the country.

(b) Capacity building through lectures, demonstrations and hands-on-experience on the new advanced machine and other associated state-of-the-art equipment has been conducted for almost 300 academicians, researchers and practitioners from 100+ institutions / organizations nation-wide including 20 central / state pollution control boards, 50 academic institutions, 13 research institutions and 25 industry organizations).

(c) A new website (www.nercs.in) has been created and a Network of Experts and Resources on Contaminated Sites (NERCS) has been compiled and uploaded on it. This network can provide technical assistance to MoEF&CC on problems relating to contaminated sites in the country, as and when so required.

NERCS

Network of Experts & Resources
for
Subsurface Investigations and Remediation of Contaminated

Coordinated by : Geotechnical and Geoenvironment Group, Civil Engineering Department, I

Geoenvironment-2020

1. Network (NERCS)

Under a project* sponsored by MoEF&CC at IIT Delhi, a National Network of Experts and Resources for Subsurface Investigations and Remediation of Contaminated Sites (NERCS) has been formed (and updated periodically). The Network connects experts and resource persons having experience and expertise in the areas of :

(i) Sources of Subsurface Contamination

(iii) Subsurface Investigations at Contaminated sites

(ii) Types of Contaminants

(iv) Remediation of Contamination Sites

NERCS is a virtual network and is accessible to all.

* ***Title :*** *"Capacity Building of Academic Institutions (IIT Delhi) to Support Remediation Initiatives"* ***Duration:*** *2018-2020*

2. Joining, Viewing or Modifying NERCS

To join or view NERCS Network or modify existing listing, please **CLICK HERE**

3. CBIPMP

MoEF&CC with assistance of the World Bank has implemented a project titled "Capacity Building for Industrial Pollution Management Project" (CBIPMP). Establishment of NERCS was initiated as an activity under CBIPMP.
To view CBIPMP reports on Contaminated Sites, please **CLICK HERE**

4. International Seminar-Cum-Workshop with Concurrent Conference (Geoenvironment - 2020)

Geoenvironment-2020: An international seminar-cum-workshop with concurrent conference and participation of global experts was held on February 17-21, 2020. To view summary/outcome, write-ups, presentations and photographs please **CLICK HERE**

5. National Networking Workshop (Geoenvironment-2018)

A workshop of the Experts was held at Delhi on 12th and 13th July 2018. To view the summary/outcome, write-ups, presentations and the photographs of the workshop, please **CLICK HERE**

6. Advanced Equipment for Subsurface Characterisation of Contaminated Sites

To view brochure of advanced equipment available at IIT Delhi. please **CLICK HERE**

Coordinated by:

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