OCEMS- PROTOCOL -REPLY

Sr No	Protocols for Online Continuous Effluent & Emission Monitoring Systems	Comments/Suggestions/ Remarks by CMA	CPCB Reply
1.	The Industries are requested to fill-up the information and submit First Installation Report of CEMS installed and being installed at various discharge points of Effluent and Emission to CPCB. The details have to be submitted at cems.cpcb@nic.in and a hard copy to be forwarded to CPCB, In charge IT Division, 5th Floor, Parivesh Bhawan, East Arjun Nagar, Delhi -110032 within 15 days from the date of publishing of these Protocols after finalization on CPCB website for implementation. Submission of the required information is COMPULSORY for each category of Industry operating OCEMS.	Comments : Time period for submission of data may be at least 30 days from the date of publishing of these Protocols Justification: As, vast data/ information is required to be generated and submitted for each of the parameter.	Already 45 days time is given
	Procedure of Data Submission		
2.	Sections A, B, C, D shall be submitted by the industry once only once.	So there should be provision to resubmit after any modifications; Sections A must be resubmitted once in 6 months or as and when changes take place. Especially- · details of contact person responsible/ environmental specialist; and · raw materials **Justification:** Job responsibility may change ; Raw materials used per ton of product may	Yes it is there
3.	Section A: Point 6. Adhaar no. of Environmental Engineer has been asked for.	Adhaar number may not be asked for as so many Adhaar numbers are not available. As the person working in the Unit may be transferred or may leave the Unit.	Not Agreed
4.	Section C- Expected flue gas stream constituents at sample probe locations - Unit of reporting for SO2, NOx, CO, H2S, NH3, HCl, HF, Hydrocarbon is PPM	Unit of reporting may be mg/Nm3	Ok

5.	Section E: Protocol for selection & installation of PM CEMS Point No. 02, Classification of in-situ technologies provided.	Industry has installed the Opacity meters much before the issuance of guidelines. Thus, not possible to change accordingly.	Not Agreed. Industry is responsible for selection & installation of OCEMS. If industry has chosen a wrong methodology/technology then it has to rectify the mistake.
6.	Section E: Protocol for selection & installation of PM CEMS Point No. 10, mention Moisture meter installed or not.	Industry has installed CEMS as per CPCB circular dated 23 December 2016 for cement industries. Separate Moisture meter may not be required as the stacks are dry. Moisture meters are required only when water droplets are present in the gas stream.	Monitor the flue gas through MoEF & CC Empanelled laboratory & submit report.
7.	Section E: Protocol for selection & installation of PM CEMS: Point No. 11, For PM selection and installation the Flow meter details are to be provided.	Industry has installed CEMS as per CPCB circular dated 23 December 2016 for cement industries. Continuous Flow measurement may not be required during PM monitoring.	Not Agreed. For quantification of total PM emitted by industry, the parameter flow monitoring & continuous submission of data is compulsory.
8.	Section E: Protocol for selection & Installation of PM CEMS Point No. 13, 14 and 15-, asks if CO2, O2 and CO Sensors Installed or not.	These parameters are not relevant to Particulate Measurement in Part E.	Please follow Emission Regulation Part-III available at CPCB website under Icon "Technical Report" on Home Page at www.cpcb.nic.in As per Stack Monitoring Equipment and Testing Procedure the calculation requires Dry Molecular Weight for of flue gas. For the determination of Dry Molecular Weight, data of CO2, O2 & CO is required without which normalization of data is not possible. Copy of relevant pages of the document are attached.
9.	Section F: Protocol for operation &	To carryout calibration at different plant loads	It is proposed to carryout monitoring, at least once

	Calibration of PM CEMS Point No. 7 & 8, asks whether calibration was carried out for different load conditions.	is not possible as frequent changes in the plant load is not feasible.	in last three months before submitting data, on any day when load condition varies. The data will be used for linearity Check of the system.
10.	Section F - Protocol for operation & calibration of PM CEMS, Point No. 22 & 23 inquiries about calibration gas cylinders attached to the system.	Calibration gas is not required for calibration of PM analyzers.	Agreed
11.	Section F Protocol for operation & calibration of PM CEMS Point No. 21, inquires about daily zero adjustment.	Daily zero adjustment at same time is not possible as there are multiple stacks in the industry. Also, not all plants are working at same time.	Every system is capable of automatic zeroing at a given time every day through the command, which can be given in the software. Hence it is possible to run zero check of all the measurements.
12.	Section -G Protocol for selection, installation, operation and calibration of gaseous analyzer in stack Point No. 7 Measurement Technology	IR GFC option to be added in Situ measurement technology.	Agreed
13.	Section -G Protocol for selection, installation, operation and calibration of gaseous analyzer in stack Point No. 16 Date of First Multipoint calibration	As per Manufactures norms equipment calibration should be done at at least 70% of its range. Below 70% accuracy of the instrument is not achievable. It is not possible at various ranges such as 20%, 40%, 60% etc. Accuracy will be affected	Clarity is being given in the revision of guidelines which is expected soon.
14.	Section G Protocol for selection, installation, operation and calibration of gaseous analyzer in stack Point No. 22-, inquires about Weekly and Monthly zero drift check.	In the CEMS guidelines daily zero drift check has been suggested, more over monthly or fortnightly check is acceptable. Also zero correction may be allowed to up keep the analyzer performance without any drift or error.	Daily Zero Check is to be done through automatic mechanism. Correction is allowed only, when system calibration is done, but not at the time of zero/span check.
15.	Section G Protocol for selection, installation, operation and calibration of gaseous analyzer in stack Point No. 23, inquires about Weekly and Monthly zero drift check.	Zero correction may be allowed to up keep the analyzer performance without any drift or error	It is allowed only when calibration is done, but not at the time of zero/span check.

Reply to the queries raised by CMA Dated Thu, feb15, 2018, at 5:16pm

Others	CPCB Reply
Provision must be made in the protocol to submit details of non-continuous operating units with CEMS installed, like cement mills, & coal mills etc.	All the units have to submit data for Compliance Reporting Protocol (CRP) irrespective of continuous or non-continuous operations.
It is also suggested that in Part E & F feedback shall be submitted once in a year instead of quarterly.	Not Agreed

In that case, particles are selectively drawn into the probe in a size distribution different from that existing in the duct or flue. It has been observed that, if sampling velocity is greater than the isokinetic rate, the sampling will have a lower mass concentration of particulate material than the main stream because of greater percentage of fine particles. However, if the sampling velocity is less than the isokinetic rate, the particulate sample has a higher mass concentration than actually present, with lower concentration of fine particles. The sampling consists of several distinct steps as already described.

3.3.0 The specific formula for each is given below.

3.3.1 Determination of Molecular Weight

The average molecular weight of the gas mixture is described by the expression:

$$M = \sum_{i=1}^{n} x_i M_i$$

where x_i is the mole fraction and M_i the mole weight of each constituent in the mixture of n number of constituents.

3.3.2 Dry and Wet Molecular Weights

For the majority of sources, Equation 1 is used to calculate the dry molecular weight of the sample. This equation may be modified with additional terms if other gaseous constituents that will influence the molecular weight of the sample are present. Equation 2 is used to calculate the molecular weight of the stack gas on a wet basis.

$$M_d = 0.44\,(\%CO_2) + 0.32\,(\%O_2) + 0.28\,(\%N_2 + \%CO) \qquad 1$$

$$M_s = M_d\,(1 - B_{wo}) + 18\,B_{wo} \qquad 2$$

0.44 — molecular weight of carbon dioxide divided by 100, kg/kg-mole

0.32 — molecular weight of oxygen divided by 100, kg/kg-mole

0.28 — molecular weight of nitrogen and carbon monoxide divided by 100, kg/kg-mole

B_{wo} — proportion by volume of water vapour in stack gas

18 — molecular weight of water, kg/kg-mole

NOTE — % N_2 is calculated using the difference method. In the majority of cases the following equation may be used.

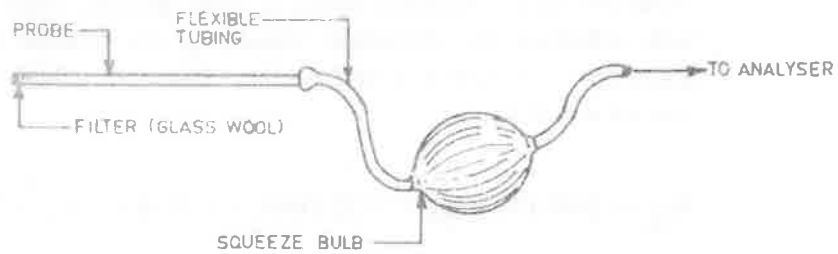$$\%N_2 = 100 - (\% CO_2 \text{ avg} + \% O_2 \text{ avg.} + \% CO \text{ avg.})$$

FIGURE 3.1 GRAB SAMPLE TRAIN

where

M_d = Molecular weight of stack gas on dry basis, kg/kg-mole

M_s = Molecular weight of stack gas on wet basis, kg/kg-mole

$\%CO_2$ = Percent carbon dioxide by volume, dry basis

$\%O_2$ = Percent oxygen by volume, dry basis

$\%N_2$ = Percent nitrogen by volume, dry basis

3.4.0 Stack Gas Velocity

$$U_s = K_p \, C_p \, (\Delta P)^{1/2} \, \frac{(T_s)^{1/2}}{(P_s \, M_s)}$$

where

U_s = Stack gas velocity, m/s

K_p = Constant, $33.5 \left[m/s \left(\dfrac{Kg.mm\ Hg}{Kg\text{-mole}^o\ KmmH_2O} \right)^{1/2} \right]$

C_p = S-type pitot tube coefficient

T_s = Absolute stack gas temperature, ^oK

ΔP = Stack gas velocity pressure, mm water column

P_s = Absolute stack gas pressure, mm Hg

M_s = Molecular weight of stack gas on wet basis, Kg/kg-mole

3.4.1 Stack Gas Volumetric Flow Rate

The following equation is used to calculate the stack gas volumetric flow rate, Qs (m3/hr)

$$Qs = 3600 \, (U_s) \times As \, (1 - B_{wo}) \times \left[\frac{Tref}{Ts} \right] \left[\frac{Ps}{Pref} \right]$$

Comments from IPMA	Remarks/Reply
1. In some cases, the consent norms of the State Pollution Control Boards are different from the proposed norms of the State Pollution Control Boards are different from the proposed norms of CPCB. For Example the consent effluent norms at which an industry is operating are BOD-30, COD-250 and SS-50, while the proposed norms of CPCB are BOD-20, COD-150 and SS-30 which are being used for alerts. This is resulting in generation of multiple alerts.	Alerts are based on the consent to operate conditions only.
2. Online data access is not yet being provided to industries by the Vendor/CPCB	Already Provided
3. Failure due to third party communication network should not be considered/ accounted for in the industry's name until rectification of the issue. Past experience has shown that the rectification of proper communication to CPCB can take a week's time to resolve.	This matter can be resolved on case to case basis.
4. Delay in lag for data transmission is not resolved yet by any of the vendors/ equipment suppliers since no specific reason has been pointed out except for change of SIM to dedicated LAN, which is also not proven and reliable. In case of connectivity failure, data of that period stored in the equipment can be transmitted when net services are restored.	Delay in data transmission should be addressed by vendor/ equipment suppliers. Adequate care to be taken by industry for connectivity of the data.
5. No vendor / supplier is giving guarantee for real time data transmission. How these issues will be resolved if nothing is on stake for the vendor/ supplier while industry has to keep on investing for creating all infrastructure for data transmission all together. Representation should be taken from proven vendors / equipment suppliers for latest technology and solution for real time data	Real time data is being transmitted currently. No Technology Provider can provides guarantee. It is the responsibility of the industry to ensure leased line connectivity 99.99% reliability.

6. AMC for online monitoring data transmission has already increased which has financial implications, and nothing to do with environment protection.	It has created a mechanism of reaction by industry on 15 min basis which is a basic achievement - that alert get generated - Action gets initiated within short period of time.
7. Online logs, in the form of printouts, should be allowed to be maintained instead of manual logs for recording deviations and corrective action on the online monitoring parameters as informed by CPCB.	Can Be maintained Electronically, industry is free to demand from the technology provider.
8. Presently, alerts are being sent to industries for deviations in the values - 15 minutes average of any parameter. It would be better if alerts come on the basis of hourly (60 minutes) average.	Already decided at the highest level and correct for immediate action.
9. Significant number of alerts are being generated due to less than 5% deviation in parameter(s). Alerts should be generated only in the case of exceedance over the permissible limit as earlier or in case of no deviation continuously.	5% deviations are applicable to effluent, 2% deviations are applicable to air emissions
10. Deviation occurs when internet / power connectivity / sensor error of equipment fails continuously for 4 hours. Minor problems (i.e. internet / power connectivity) can be rectified within the time frame, but it may not be possible always to rectify major problems (sensor error) within 4 hours because vendors/ equipment suppliers are involved. Therefore, in such cases, there should be a provision for notifying CPCB seeking adequate time for rectification.	It is already practiced and industries are informing at cems.cpcb@nic.in
11. Online monitoring of SOx and NOx is not sought by State Pollution Control Boards and not implemented by industries yet.	Data monitoring is based on the consent to operate document, direction issued by CPCB & MoEFCC EC condition.

12. The implementation of the framework will be challenging and CPCB should organise training sessions for regulators, vendors / equipment suppliers and industries.	Shall be organised in due course of time

Comments from CMA	Remarks *Reply*
1. The flow in the Clinker Cooler stack is almost nil or 10-20% of the total flow because of installation of Waste Heat Recovery (WHR) system. The emission level in clinker cooler is very low and generates almost consistent readings. In this case the 5% criteria may be revised to 2%.	For air emission, it is considered as 2% deviations
2. During scheduled shut - down / maintenance informed in advance or during sudden breakdowns informed afterwards, alerts may be avoided as CEMS will display consistent reading till the plant operation starts.	This issue shall be addressed during first six months of the operations. However industries are requested to provide information about breakdowns within 2 hours for the preparation of policy on the issue.
3. Frequent stoppages of Cement Mill and Coal Mill due to silo full condition/ maintenance etc. are regular practice and are not possible to inform in advance. Therefore, the CEMS readings of coal mill and cement mill stacks showing consistent/constant reading generating alerts must be avoided in the protocol.	This issue shall be addressed during first six months of the operations. Communication shall be made to CPCB.
4. For ZLD Units where 100% of recycling of waste water is practiced i.e. zero discharge on land, water body, river etc. should not be asked to install any CEMS for measurement of pH, temperature, TSS etc. as the readings will remain constant and will generate alerts. The guideline for installation of CEMS for effluent is only for discharge into land/ river/ pond etc. and not for recycling.	100% recycling of waste water means there is no ETP which is considered as ZLD. This is to be certified by State PCB/ PCC.

5. Presently, some plants are receiving the alerts for exceedance but physically there is no exceedance of data as per data available on Server. Such cases need to be reassessed.	Direct data access to industry is available and industry is free to communicate their issues through email at cems.cpcb@nic.in
6. Most of the time, plant is running smoothly and CEMS data are consistent. Therefore, the provision of 5% deviation should be revised to the tune of 2% for generation of alerts. Also, it should be cleared if 5% deviations are applicable to effluent, 2% deviations are 5% deviation is from threshold or from current emission readings. applicable to air emissions	It is from current emission readings. 5% deviations are applicable to effluent, 2% deviations are applicable to air emissions
7. The valid reason for delayed data, such as weak signal of internet, maintenance of leased line by service provider, damage of lines etc. should be considered to avoid alerts.	Industry is supposed to install leased line connectivity with 99.99% reliability. If still there are breakdowns shall be timely communicated to CPCB.
8 The protocol may be implemented with two year moratorium - period for the cases inviting extreme actions, i.e. where impounding of main production unit is provided. A two year period will be an appropriate time to gather valuable hands on experiences,that is required for refinement of this important protocol.	Project is operating from 2014 and four years time is more than sufficient.
9. 15 Minutes average is considered very less, sometimes machinery problems arise and plant has to be started and stopped many times. It takes time for the plant to stabilize. When starting the plant, emission level can exceed the permissible limit automatically for 1-2 hours. Therefore, 15 minutes interval be increase to 3 hours.	This system is in place since last 4 - 5 years
10. In a Grinding Unit, the average running hours of the plant are 12-14 hrs and 3-4 time plant start / stop may occur per day due to some reason, this shall be addressed in the protocol accordingly.	Please refer point No. 2.

11. Provision for cancellation of yellow alert is required, if alert is generated for exceedance due to plant start-stop.	If timely (within 2 Hours) communicated consideration will be done. A policy will be framed.
12. The protocol proposed may be applicable for only Integrated Cement Plant, that too the main stack, i.e., kiln & raw mill stack, which stacks, kiln stacks etc., further it will be applicable to all is operational continuously, other areas, such as the coal mill, cement stacks in the plant mill etc. are operational only as per the requirement and are not operating continuously. These areas may be exempted from this protocol.	CPCB has already identified the crucial discharge points where OCEMS have to be installed.
13. Initially, the protocol may focus on sending alerts for the PM emissions in Kiln stack and later take up the gaseous emissions as in a process industry, there is no control on the input material. Therefore, the process parameters vary every second, which have direct impact on the gaseous emissions. There is a need to have a study on the same for some time and then fix the time interval for these emissions.	Project is operating from 2014 and four years time is more than sufficient.
14. From industry server, data is transmitted smoothly to CPCB / Supplier server however sometimes data is not shown/ reflected on CPCB server. In these circumstances, industry may be allowed to send the proof of the same to CPCB through mail and it may be considered.	Submission of data on real time basis is the responsibility of the industry. Any delay due to any reason cannot be considered as an excuse. Make the provisions or direct TP to develop a facility for industry to generate SMS alerts in such cases and take immediate action.
15. SMS alert for internet/power failure should be configured in system.	Ask your TP to develop a facility.
16. Time period for log file maintenance should be specified.	It is 15 min interval/ as per existing system.
17. The protocol may identify industry specific parameters for sending alerts.	It is industry specific and based on consent to operate conditions

18. 2 hours is very less for identify & rectify the problem, especially in a process industry like ours. Therefore, the time should be 24 hrs for yellow alert.	No connect with the Yellow alert table.
19. Equipment calibration spike should not be considered for alerts.	Under calibration conditions a flag gets generated which segregates this data from the actual values automatically.
20. Sensor error of equipment to be excluded from alerts with prior intimation to CPCB.	Same as replied under point no. 19.
21. In case of purple notice issued, clarity is required for stopping & starting the operation period once corrective action is taken, when is the root-cause analysis required etc.	As per discussion, plant shall not be stopped, however after inspection of local PCB officials, as deemed fit, they can take the call on this matter.

18/4/18