

Comments are invited on draft protocol on "Framework for regulatory use of continuous real time effluent quality & air emission monitoring data" at akvidyarthi@gmail.com and psms.cpcb@nic.in latest by 02.01.2017

Framework for Regulatory Control through Use of Continuous Real Time Effluent Quality & Air Emission Monitoring Data

Proposed Alert System for EQMS & CEMS Compliance

Preamble

Most of the industries under the 17 categories have installed online effluent quality monitoring system and air emission monitoring systems. The equipment is connected to SPCB and CPCB sever and data is being received at specific interval. Presently SMS alerts are being sent to board and the industry by the server whenever there is deviation in the measuring value. However, there is no system by which we can ascertain the failure frequency and severity of the problem of online monitoring systems.

All industries are taking due care to operate and maintain the equipment to perform well, but due to one or the other reason, there are chances that false data may get transmitted which may result into wrong interpretation of the values.

To avoid such incidences, a suggestive protocol has been prepared. The precaution has been taken to cover all aspects related to online effluent monitoring system. As ETP operations are dynamic in nature and may deviate with respect to various changes, flow variation, deviation in the operations of ETP, power failure related problems, equipment maintenance related problems, net connectivity related problems etc. The methodology has been developed considering all these issues faced by the industries.

The same methodology is applicable to air emissions also. The air emissions, particularly, SPM plays vital role in the air pollution and industries have provided adequate control systems to achieve the consented norms of SPM. Industries have also provided online SPM monitoring systems which are connected to SPCB/CPCB servers. These continuous emission monitoring systems (CEMS) for PM does not provide a direct measure of mass and is sensitive to particle size, density, or color, which are characteristics most of the PM CEMS cannot provide. The methodology has been developed considering all these facts.

Particulate Matter measures a parameter with either Opacity, scattered light or Triboelectric technologies which can be correlated to dust concentration by comparison to a gravimetric sample taken under iso-kinetic conditions (e.g. European Directives EN-13284-1) rather than the mass concentration directly. The performance and suitability of any particulate monitor is mostly dependent on applications.

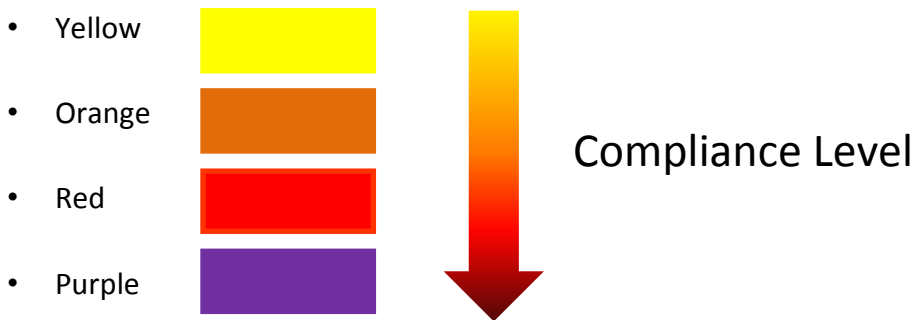
Limitations of PM measurement: Opacity PM cannot monitor particulate levels below $25\text{mg}/\text{m}^3$ per meter path-length, since at low concentrations the reduction in the light beam caused by the particles is indistinguishable from the zero drift of the source/detector. The system is sensitive to dust & moisture contamination hence needs continuous air purge cleaning of optics. System is sensitive to misalignment between the transmitter and receiver. The calibration of the instrument changes with changes in application characteristics such as particle type, particle color, shape and size. Triboelectric method has the device's inherent reliability, repeatability and self-check capability but still consideration should be taken when selecting due to limitations such as charge error due to electrostatic charges in stack which causes errors in readings. High humidity and application characteristics usually affects the accuracy and needs isokinetic sampling to avoid such drifts.


The technologies used for CEMS online monitoring gaseous pollutant such as SO_2 , NO_x & CO varies from Dilution system to hot extractive –heat analyser system. There are various technologies available with most commonly used Hot Extractive UV-NDIR, NDUV, FTIR & Electrochemical methods. These technologies are mostly user selectable and have limitations due to various technology gaps such as improper mounting, improper sampling system, cross interference, electrochemical cells failure and drifts. Due to technology limitations system needs frequent validation and calibration to be performed.

Note: Comments are invited to make the alert system more effective to achieve the compliance along with proper operation and maintenance of the ETP systems & air emission control systems.


Proposed Framework for Regulatory Controls through Online Effluent Monitoring System & Online SPM Monitoring System for stacks;


- Presently, SMS alerts are being sent to industries for deviations in the values (15 min average of any parameter)
- Online data transmission are categorized as – live, delay (no data transmission since last four hours), and offline (no data transmission since last 48 hours)
- Considering the online monitoring data, a monitoring protocol is being devised to enhance compliance level;
 - Based on deviations, connectivity and frequency, following alerts shall be generated
 - These alerts are used for achieving compliance by industries with more focus on the operation and maintenance of the ETP




<u>Deviation</u>	<u>Alert</u>	<u>Action by Industry</u>	<u>Regulator's Action</u>
<p style="text-align: center;"><u>ETP - EQMS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Exceedance by > average 40% of 15 minutes average parameter (s) from permissible limit for 8 times/day. (pH, COD, BOD & TSS) <input type="checkbox"/> When internet / power connectivity /sensor error of equipment failed for Four hour <input type="checkbox"/> When any parameter or all parameters have sudden spikes, Outliers, steps or noise is available <input type="checkbox"/> When any of the (BOD, COD, TSS) monitored quality parameters, except pH, of effluent discharge deviates from the norm by >100% for Eight (8) consecutive readings. <input type="checkbox"/> When parameters observed values are consistent and stable without even minimum deviation of +/- 5% continuously for > 48 hours. <input type="checkbox"/> When parameters observed values are continuously exceeding from permissible limits for > 48 hours. 	<p>Yellow</p>  <p>(Level-I)</p>	<p>Prepare logfile for alerts and the deviation.</p> <p>Investigate and record the apparent cause of the deviation and corrective action taken</p> <p>These records are required to produce to SPCB / CPCB during their inspections.</p> <p>Parameter(s) validation is required at stations.</p> <p>Record the observations on the influent characteristics during the past 24 hours.</p> <p>Check the Internet / Power connectivity /Sensor defect of the equipment and restore it accordingly.</p>	<p>No Action</p>

<p style="text-align: center;"><u>Stack Emission</u></p> <ul style="list-style-type: none"><input type="checkbox"/> Exceedance by >average 25% of 15 minutes average parameter (s) from permissible limit for 8 times/day. (PM, SO₂, NO_x, CO)<input type="checkbox"/> Alerts for Exceedance due to plant, boiler or equipment's start or Stop must be excluded (Logs must be recorded and special note to be sent to SPCB / CPCB in this regard after generation of yellow alert)<input type="checkbox"/> When emission deviates from the norm by >60% for Eight (8) consecutive readings (PM, SO₂, NO_x, CO)<input type="checkbox"/> When internet / power connectivity /sensor error of equipment failed for Four hour<input type="checkbox"/> When parameter has sudden spikes, Outliers, steps or noise due to instrument limitations			
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<u>Live Data Deviations</u>	<u>Alert</u>	<u>Action by Industry</u>	<u>Regulator's Action</u>
<p style="text-align: center;"><u>ETP - EQMS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When more than 36 (5%) Yellow alerts are issued during any 30-day moving period. <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for 72 hours <input type="checkbox"/> When any of the (BOD, COD, TSS,) monitored quality parameters, except pH of effluent discharge deviates from the norm by >100% for Thirty Two (32) consecutive readings. (4 Yellow alerts for >100% exceedance) <p style="text-align: center;"><u>Stack Emission</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When more than 36 (5%) Yellow alerts are issued during any 30-day moving period. <input type="checkbox"/> When emission deviates from the norm by >60% for Thirty-two (32) consecutive readings. (4) Yellow alerts for >60% exceedance) (PM, SO₂, NO_x, CO) <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for 72 hours 	<p>Orange</p>  <p>(Level-II)</p>	<p>Immediately take actions to correct the deviation during each Yellow alert in ETP / process correction required. Record deviation and keep for reference for SPCB / CPCB.</p> <p>Inform SPCB /CPCB about the deviation and corrective actions taken, if required.</p> <p>Check the Internet / Power connectivity /Sensor defect of the equipment and restore it accordingly. Inform CPCB / SPCB accordingly for the error in equipment / connectivity.</p>	<p>Auto generated Alert Letter/ E-mail. Reply to be submitted to CPCB / SPCB through Mail.</p>

<u>Live Data Deviations</u>	<u>Alert</u>	<u>Action by Industry</u>	<u>Regulator's Action</u>
<p style="text-align: center;"><u>ETP - EQMS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for 144 hours <input type="checkbox"/> When more than 72 (10%) Yellow alerts are issued during any 30-day moving period. <input type="checkbox"/> When any of the (BOD, COD, TSS) monitored quality parameters, except pH, of effluent discharge deviates from the norm by >100% for Ninety-Six (96) consecutive readings. (12 Yellow alerts for >100% exceedance) <p style="text-align: center;"><u>Stack Emission</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When more than 72 (10%) Yellow alerts are issued during any 30-day moving period. <input type="checkbox"/> When emission deviates from the norm by >60% for Ninety-six (96) consecutive readings (12 Yellow alerts for >60% exceedance) (PM, SO₂, NO_x, CO) <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for 144 hours 	<p>Red</p>  <p>(Level-III)</p>	<p>Check the Internet / Power connectivity /Sensor defect of the equipment and restore it accordingly. Inform CPCB / SPCB accordingly for the error in equipment / connectivity.</p> <p>Take corrective action and inform SPCB / CPCB for deviations. Record the observations on the influent characteristics during the past 24 hours.</p> <p>Submit the action taken report along with reasons for deviation in the ETP system</p>	<p>Auto generated Warning Letter/ Email. Reply to be submitted to CPCB / SPCB through Mail.</p>

<u>Live Data Deviations</u>	<u>Alert</u>	<u>Action by Industry</u>	<u>Regulator's Action</u>
<p style="text-align: center;"><u>ETP - EQMS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for >7 days <input type="checkbox"/> When more than One Red category alerts have issued during any 30 days moving period. <input type="checkbox"/> When any of the (BOD, COD, TSS) monitored quality parameters, except pH, of effluent discharge deviates from the norm by >100% for One hundred ninety two (192) consecutive readings. (24 Yellow alerts for >100% exceedance) <p style="text-align: center;"><u>Stack Emission</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When more than One Red category alerts have issued during any 30 days moving period. <input type="checkbox"/> When emission deviates from the norm by >60% for One hundred ninety-two (192) consecutive readings (24 Yellow alerts for >60% exceedance) (PM, SO₂, NO_x, CO) <input type="checkbox"/> When internet / power connectivity / sensor error of equipment failed for >7 days 	<p>Purple</p>  <p>(Level-IV)</p>	<p>Mill shall immediately impound any further discharge of treated effluent and suspend all process operations</p> <p>Root-Cause analysis shall be submitted to SPCB / CPCB</p> <p>If required, investigations by SPCBs and/or CPCB or any third party assigned by CPCB.</p>	<p>Auto generated letter seeking explanation within 15 days. Reply to be submitted to CPCB / SPCB through Mail, followed by physical verification by CPCB/ SPCB</p>