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Dan Codrut Petrilean and Daniel Andronache and Traian Vasiu and Aronel Matei

University of Petrosani, CEO, C.E. Hunedoara

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COMPARATIVE STUDY ON ENERGY GROUPS OF CONTINUOUS EMISSIONS FROM CET MINTIA DEVA S.A.

Dan Codrut PETRILEAN - Asistent profesor at University of Petrosani
Daniel Andronache – Eng., CEO, C.E. Hunedoara
Traian VASIU - Ph.D., head of environment-quality department, C.E. Hunedoara
Aronel MATEI - Associate profesor at University of Petrosani

Abstract: It was determined, interpreted and compared continuous emissions from energy units from CET. Mintia. The values obtained are included in the amount specified under the rules of Romania.

Key words: emissions, energy groups, pollutant concentration

1. Generalities

SC CET MINTIA DEVA S.A. whose main activity is the production of electricity and heat as a central co-generation with a conversion efficiency of about 32%.

Cogeneration, the combined solution and simultaneous production of electricity and heat. the energy benefits, economic and ecological shows they qualify as 'clean' technologies of energy production.

Deva Mintia power plant site

It is situated in the south of Transylvania, on the river Mures, 9 km from the town of Deva. It has an installed capacity of 1,285 MW in six energy groups: five energy groups (1, 2, 4, 5, 6) of 210 MW and energy group no. 3, 235 MW. Main fuel used: coal basin is the Jiu Valley mining (coal power), and are used as auxiliary fuel gas and exceptionally oil. Household solid fuel has a total capacity of 530,000 tones (in two deposits of coal and two feed streams). Electricity is delivered S.E.N., voltages of 220 KV and 400 KV. The plant was commissioned in 1969 ÷ 1980 and 1984, thermal power and heat supplies for Deva. Evacuation of combustion gases is by three chimney (height 220 m).

Points where they have been measured

The main sources of environmental pollution in SC CET MINTIA DEVA S.A. are shown in the following scheme:
2. Measurements. Results. Emissions comparative values of energy groups

In this paper have been followed: the flow of gases and airborne pollutants discharged flow up the chimney. Gauges used were:

- a portable automatic isokinetic sampling emissions BASIC ISOSTACK HV;
- a portable gas analyzer TESTO 350, including a Pitot tube to determine the speed of the combustion gas.

The flow of combustion gas and the mass flow rate of energy discharged into the environment.

Airborne contaminant flow is a flow of toxic material (ash, nitrogen compounds with oxygen, NOx, sulfur compounds with oxygen SOx, hydrochloric acid, HCl, unburned hydrocarbons, HC, etc.) discharged into the atmosphere, with exhaust gases.

Emission measurement campaigns were carried out in points situated by electrostatic filters and accessible points located after flue gas fan (fig. 1).

In Table 1 the average values were centralized in pollutants targeted by the units of measurement for equipment used. Determination of the particulates was performed for total dust, realizing the tie based on the data from the literature.

Determinations aimed concentrations (%, ppm) for indicators: O₂, CO, CO₂, NOₓ, SO₂, particulate PM 10, PM 2.5 and total. The results are shown in Table 1. Values obtained from experimental determinations were corrected for atmospheric parameters (barometric pressure, temperature, relative humidity). Measurements were made at following energy groups: 3A, 3B and 5A, 5B.
Table 1. Experimentally determined concentrations on emissions from S.C. CET DEVA MINTIA S.A. during July-September 2012

<table>
<thead>
<tr>
<th>Date/Sample</th>
<th>Energy Group/Discharge circuit</th>
<th>O₂ %</th>
<th>CO ppm</th>
<th>NOₓ ppm</th>
<th>CO₂ %</th>
<th>SO₂ %/ppm</th>
<th>T_gas °C</th>
<th>η₁ %</th>
<th>Air excess λ</th>
<th>Powder s mg/m³</th>
<th>PM 2.5</th>
<th>PM 10</th>
<th>Coarse particles &lt;10 μm</th>
<th>Coarse particles between 15 μm&lt;D&lt;10 μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.08.2012 A.M./1</td>
<td>5/A</td>
<td>9.4</td>
<td>9</td>
<td>437</td>
<td>9.0</td>
<td>0.19/1972</td>
<td>165</td>
<td>2</td>
<td>24</td>
<td>91</td>
<td>1.8</td>
<td>235</td>
<td>19</td>
<td>10</td>
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<tr>
<td>02.08.2012 P.M./2</td>
<td>5/A</td>
<td>10.69</td>
<td>4</td>
<td>483</td>
<td>8.45</td>
<td>0.19/1981</td>
<td>174</td>
<td>5</td>
<td>30</td>
<td>8</td>
<td>89</td>
<td>2.01</td>
<td>215</td>
<td>63</td>
</tr>
<tr>
<td>06.08.2012 A.M./3</td>
<td>5/A</td>
<td>8.4</td>
<td>7</td>
<td>521</td>
<td>11.1</td>
<td>0.28/2853</td>
<td>151</td>
<td>8</td>
<td>28</td>
<td>3</td>
<td>95</td>
<td>1.66</td>
<td>187</td>
<td>49</td>
</tr>
<tr>
<td>06.08.2012 P.M./4</td>
<td>5/A</td>
<td>10.77</td>
<td>3</td>
<td>469</td>
<td>8.16</td>
<td>0.19/1934</td>
<td>175</td>
<td>32</td>
<td>5</td>
<td>88</td>
<td>2.23</td>
<td>218</td>
<td>67</td>
<td>9</td>
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<tr>
<td>02.08.2012 A.M./1</td>
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<td>7.4</td>
<td>2</td>
<td>457</td>
<td>11.6</td>
<td>0.18/1895</td>
<td>163</td>
<td>9</td>
<td>23</td>
<td>3</td>
<td>92</td>
<td>1.53</td>
<td>220</td>
<td>52</td>
</tr>
<tr>
<td>02.08.2012 P.M./2</td>
<td>5/B</td>
<td>8.9</td>
<td>9</td>
<td>503</td>
<td>10.1</td>
<td>0.19/1979</td>
<td>176</td>
<td>1</td>
<td>32</td>
<td>1</td>
<td>91</td>
<td>1.73</td>
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<tr>
<td>06.08.2012 A.M./3</td>
<td>5/B</td>
<td>8.0</td>
<td>1</td>
<td>474</td>
<td>11.0</td>
<td>0.27/2768</td>
<td>193</td>
<td>5</td>
<td>34</td>
<td>5</td>
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<td>1.6</td>
<td>198</td>
<td>13</td>
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<tr>
<td>06.08.2012 P.M./4</td>
<td>5/B</td>
<td>8.2</td>
<td>2</td>
<td>420</td>
<td>10.4</td>
<td>0.19/1987</td>
<td>172</td>
<td>1</td>
<td>35</td>
<td>7</td>
<td>92</td>
<td>1.63</td>
<td>224</td>
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<tr>
<td>31.08.2012 A.M./1</td>
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<td>0.13/1381</td>
<td>152</td>
<td>1</td>
<td>27</td>
<td>3</td>
<td>92</td>
<td>1.79</td>
<td>202</td>
<td>64</td>
</tr>
<tr>
<td>31.08.2012 A.M./1</td>
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<td>9.2</td>
<td>9</td>
<td>207</td>
<td>11.6</td>
<td>0.12/1257</td>
<td>164</td>
<td>2</td>
<td>29</td>
<td>2</td>
<td>91</td>
<td>1.77</td>
<td>221</td>
<td>18</td>
</tr>
<tr>
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<td>4</td>
<td>182</td>
<td>8.56</td>
<td>0.06/665</td>
<td>155</td>
<td>1</td>
<td>30</td>
<td>5</td>
<td>91</td>
<td>2.68</td>
<td>168</td>
<td>43</td>
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<tr>
<td>26.09.2012 A.M./1</td>
<td>3/B</td>
<td>8.6</td>
<td>3</td>
<td>146</td>
<td>12.8</td>
<td>0.11/1116</td>
<td>154</td>
<td>2</td>
<td>30</td>
<td>5</td>
<td>92</td>
<td>1.7</td>
<td>152</td>
<td>86</td>
</tr>
</tbody>
</table>

* η₁ is the combustion efficiency

To determine the mass flow of pollutants we used the annual average values of hourly flue gas flow.
Comparative histograms were created for the emission energy groups analyzed, based on data in Table 1.

Fig. 2. Emission of energy group 5 - Exhaust A

Fig. 3. Emission of energy group 5 - Exhaust B
Fig. 4. Emission of energy group 2

Fig. 5. Emission of energy group 6 - Exhaust A

Fig. 6. Emission of energy group 3 - Exhaust B
3. **Conclusions**

Continuous emission measurement systems are certified according to current regulations. The sampling points, frequency measurement and calibration procedures were adequate measurement requirements. Therefore, the values obtained can be seen as a method of providing data for the validation of other semi-analytical analyzes and/or numerical methods.

Comparing the values obtained with the maximum permitted under the rules (PE-1001/1994, and Annexes 3-8, Section A of GD no. 541/2003, amended by GD no. 322/2005) pointed out a framed pollutant emissions at the upper limit of pollution standards.

**References**

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