The situation and mining prospect of kaolinitic clays in Romania

Dr. Valentina Cetean
geologist engineer
ROMANIA

ICerS
SASSUOLO
29th, January 2015
CONINDUSTRIA CERAMICA
I  Romania in Europe
   I.1  Basic administrative information
   I.2  Geological map of Romania

II  Legislative frame for mining operations
   II.1 National regulatory body
   II.2 Prospecting, exploration
   II.3 Mining (exploitation)

III Type of deposits for ceramic industry (deposits / potential areas, geological
features, qualitative characteristics, resources / reserves
   III.1 Ball clay, kaolinitic rocks
   III.2 Fireclay
   III.3 Red clay
   III.4 Feldspar
   III.5 Talc

IV  Aspects concerning to mining operators and ceramic producers
   IV.1 Medium or small enterprises?
   IV.2 Products, productions
   IV.3 Imports vs. exports (?)
   IV.4 Economical potential for Romanian ceramic industry
Romania:
- Located in Central Europe, north of the Balkan Peninsula, on the western shore of the Black Sea.
- It borders Hungary, Serbia, Ukraine, Moldova, and Bulgaria;
- 238,391 square kilometres (92,043 sq mi);

http://www.nationsonline.org/oneworld/europe_map.htm
Romania:
- With 20 mil. Inhabitants - the seventh most populous member of the European Union.
- The capital and largest city, Bucharest, is the sixth largest city in the European Union.
I Romania in Europe
   I.1 Basic administrative information
   I.2 Geological map of Romania

II Legislative frame for mining operations
   II.1 National regulatory body
   II.2 Prospecting, exploration
   II.3 Mining (exploitation)

III Type of deposits for ceramic industry (deposits / potential areas, geological features, qualitative characteristics, resources / reserves)
   III.1 Ball clay, kaolinitic rocks
   III.2 Fireclay
   III.3 Red clay
   III.4 Feldspar
   III.5 Talc

IV Aspects concerning to mining operators and ceramic producers
   IV.1 Medium or small enterprises?
   IV.2 Products, productions
   IV.3 Imports vs. exports (?)
   IV.4 Economical potential for Romanian ceramic industry
**Legislative frame for mining operations**

**NARM = National Agency for Mineral Resources =** The Romanian Competent Authority which regulate the mining activity - [www.namr.ro](http://www.namr.ro)

**Prospecting** conducted on the basis of a non exclusive *permit*, defined by topo-geodezical coordinates. (3) The prospecting permit shall be issued for a period of maximum 3 years.

**Exploration:**
- shall be conducted on the basis of an exclusive *license*, issued at the request, to the interested Romanian or foreign legal persons selected through a public offering by the Competent Authority, based on a work program and an adequate bank guaranty to be applied for environmental restoration purpose.
- shall be issued, according to the law, for all the mineral resources existent in the perimeter.
- The exploration license shall be granted for a maximum period of 5 years, with a renewal right of no more than 3 years, paying in advance an annual fee.
EXPLOITATION - The *exploitation license* shall be granted to:

a) the title holder of the exploration license, on its request;

b) the winner of a public offering, organized by the Competent Authority

The exploitation license shall be granted, through negotiation, based on an application, accompanied by:

- feasibility study which ensures the capitalization of the mineral resources and the deposit protection;
- development plan of the exploitation;
- the environmental impact study, approved according to the law;
- environmental rehabilitation plan accompanied by a bank guaranty, based on the value of the development plan and the environmental impact study, and calculated according to norms for applying the present law.
- shall be granted for maximum 20 years.
I Romania in Europe
   I.1 Basic administrative information
   I.2 Geological map of Romania

II Legislative frame for mining operations
   II.1 National regulatory body
   II.2 Prospecting, exploration
   II.3 Mining (exploitation)

III Type of deposits for ceramic industry (deposits / potential areas, geological features, qualitative characteristics, resources / reserves)
   III.1 Ball clay, kaolinitic rocks
   III.2 Fireclay
   III.3 Red clay
   III.4 Feldspar
   III.5 Talc

IV Aspects concerning to mining operators and ceramic producers
   IV.1 Medium or small enterprises?
   IV.2 Products, productions
   IV.3 Imports vs. exports (?)
   IV.4 Economical potential for Romanian ceramic industry
Type of deposits for ceramic industry

Perimeters included in the **List of active licenses** emitted by the National Agency for Mineral Resources (NAMR)

<table>
<thead>
<tr>
<th>National Agency for Mineral Resources' evidence</th>
<th>Fireclay</th>
<th>Ball clays / Kaolinitic rocks</th>
<th>Feldspar</th>
<th>Talc</th>
<th>Red &amp; gray clays (for tiles &amp; bricks)</th>
<th>Wollastonit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploitation permits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploitation licenses</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td></td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>To be approved</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>6</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Other perimeters with raw materials for ceramic industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from witch old quarries (reserves)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
<td>21</td>
<td>6</td>
<td>4</td>
<td>131</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>39</td>
</tr>
<tr>
<td><strong>TOTAL Romania (2013)</strong></td>
<td>11</td>
<td>29</td>
<td>10</td>
<td>10</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>237</td>
</tr>
</tbody>
</table>
## Type of deposits for ceramic industry

### Perimeters included in the List of active licenses emitted by the National Agency for Mineral Resources (NAMR)

<table>
<thead>
<tr>
<th>Type of rock / deposit</th>
<th>Perimeters</th>
<th>County</th>
<th>Exploitation licenses</th>
<th>Exploration license</th>
<th>To be approved</th>
<th>Owner</th>
<th>Real status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire clay</td>
<td>Şuncuiuş (Balnaca-Recea)</td>
<td>BH</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Fire clay</td>
<td>Şuncuiuş (D1 Simion)</td>
<td>BH</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Fire clay</td>
<td>Botesti</td>
<td>TM</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>Cuza Vodă-Medgidia</td>
<td>CT</td>
<td>x</td>
<td>x</td>
<td></td>
<td>MINIERA MEDGIDIA</td>
<td>stopped the activity</td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>Deftea</td>
<td>CT</td>
<td>x</td>
<td>x</td>
<td></td>
<td>MINIERA MEDGIDIA</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>Țibrinu</td>
<td>CT</td>
<td>x</td>
<td>x</td>
<td></td>
<td>MINIERA MEDGIDIA</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic sand</td>
<td>Aghires-Sector Aghires</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic sand</td>
<td>Aghires-Sector Stoguri</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic sand</td>
<td>Mihalciști-Dealul Varului</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>COMINEX NEMETALIFERE S.A. CLUJ</td>
<td>temporary activity, small qty</td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>Carmazan 4</td>
<td>BH</td>
<td>x</td>
<td>x</td>
<td></td>
<td>MILANO LOGISTIC S.R.L. SUNCUIUS</td>
<td></td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>Parva</td>
<td>BN</td>
<td>x</td>
<td>x</td>
<td></td>
<td>COMINEX NEMETALIFERE S.A. CLUJ</td>
<td></td>
</tr>
<tr>
<td>Feldspatic pegmatite</td>
<td>Brezoii Vaslău</td>
<td>VL</td>
<td>x</td>
<td>x</td>
<td></td>
<td>SOC. NAT. A SARI S.A.</td>
<td>stopped the activity</td>
</tr>
<tr>
<td>Feldspatic pegmatite</td>
<td>Muntele-Rece</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>COMINEX NEMETALIFERE S.A. CLUJ</td>
<td></td>
</tr>
<tr>
<td>Feldspatic pegmatite</td>
<td>Valea Bodeaului</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>COMINEX NEMETALIFERE S.A. CLUJ</td>
<td></td>
</tr>
<tr>
<td>Feldspatic pegmatite</td>
<td>Cornu</td>
<td>CJ</td>
<td>x</td>
<td>x</td>
<td></td>
<td>SEBANA SRL</td>
<td></td>
</tr>
<tr>
<td>Talc</td>
<td>Marga</td>
<td>CS</td>
<td>x</td>
<td>x</td>
<td></td>
<td>BEGA MINIERALE INDUSTRIALE S.A.</td>
<td></td>
</tr>
<tr>
<td>Talc</td>
<td>Careișor</td>
<td>HD</td>
<td>x</td>
<td>x</td>
<td></td>
<td>TALC DOLOMITA S.A. HUNEDOARAN</td>
<td>procedure for closing</td>
</tr>
<tr>
<td>Talc</td>
<td>Lelese central și vest</td>
<td>HD</td>
<td>x</td>
<td>x</td>
<td></td>
<td>TALC DOLOMITA S.A. HUNEDOARAN</td>
<td>temporary work, exploitation cost</td>
</tr>
<tr>
<td>Talc</td>
<td>Lelese Central</td>
<td>HD</td>
<td>x</td>
<td>x</td>
<td></td>
<td>TALC DOLOMITA S.A. HUNEDOARAN</td>
<td></td>
</tr>
<tr>
<td>Talc</td>
<td>Lelese vest 2-extindere</td>
<td>HD</td>
<td>x</td>
<td>x</td>
<td></td>
<td>TALC DOLOMITA S.A. HUNEDOARAN</td>
<td></td>
</tr>
<tr>
<td>Talc</td>
<td>Lelese-1 Mai</td>
<td>HD</td>
<td>x</td>
<td>x</td>
<td></td>
<td>TALC DOLOMITA S.A. HUNEDOARAN</td>
<td>bigger than revenues</td>
</tr>
</tbody>
</table>

**TOTAL**                  | 21                           | 12     | 1                     | 8                  |
## Type of deposits for ceramic industry

<table>
<thead>
<tr>
<th>Type of deposits</th>
<th>Geological origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire clay</td>
<td>sedimentary deposits of platforms</td>
</tr>
<tr>
<td>Kaolinitic rock</td>
<td>sedimentary deposits of platforms</td>
</tr>
<tr>
<td>Feldspathic pegmatite</td>
<td>secondary mineras on rhyolitic rocks</td>
</tr>
<tr>
<td>Talc</td>
<td>crystalline deposits of Carpathian Mountains</td>
</tr>
<tr>
<td></td>
<td>associated cu carbonatic deposits from Poiana Rusca Mountains</td>
</tr>
</tbody>
</table>
Type of deposits for ceramic industry

- Fireclays
- Red & gray clay
- Kaolinitic rocks (incl. ball clay)
- Feldspar
- Talc

Map showing locations of different types of deposits in Romania, with symbols indicating the type of deposit.
Botesti – fireclay old quarry
Terracotta tiles, stoneware plates and tubes, majolica tiles, sanitary ware, electro technical ceramic, bricks and ceramic blocks, lightweight aggregate blocks of masonry

**Botesti – fireclay old quarry**

| Layers                      | kaolinite | illite | Montm. | Q  | Feldspar | %
|-----------------------------|-----------|--------|--------|----|----------|------
| *Layer I – up to 18 m.* yellow-reddish, sandy | 10-15     | 15-20  | 35-40  | 10-15 | 0-5      | SiO₂ - 57% Al₂O₃ - 17% |
| *Layer II – 1 to 10 m.* semi-refractory, plastic, gray | 50-60     | 10-15  | 5-15   | 5-10 | 10       | SiO₂ - 51% Al₂O₃ - 28% |
| *Layer III – 1 to 14 m.* white-yellowish, sandy | 15-20     | 10-15  | 20-30  | 15-20 | 5-10     | SiO₂ - 68% Al₂O₃ - 17% |
Medgidia – kaolinitic rocks, MINIERA MEDGIDIA S.A. quarry - http://www.minieramedgidia.ro/
Production capacity - 130,000 tons / year, of which 7,000 tons / year grounded clay
Cretacic continental – lacustrial deposits of Southern Dobrogean platform. 5 strata and/or lens of kaolinitic clay and/or kaolinitic-sandy clays

**Chemical composition of Medgidia kaolinitic rocks**

<table>
<thead>
<tr>
<th></th>
<th>Li</th>
<th>SiO₂</th>
<th>Al₂O₃</th>
<th>Fe₂O₃</th>
<th>CaO</th>
<th>MgO</th>
<th>Na₂O</th>
<th>K₂O</th>
<th>TiO₂</th>
<th>CaCO₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>brut</td>
<td>10,31</td>
<td>57,09</td>
<td>25,16</td>
<td>2,49</td>
<td>0,97</td>
<td>0,79</td>
<td>0,44</td>
<td>1,45</td>
<td>1,36</td>
<td>0,55</td>
</tr>
<tr>
<td>Medgidia Quarries</td>
<td>Al₂O₃ %</td>
<td>Fe₂O₃ %</td>
<td>Reserves mil. to. (70-80% degree of knowledge)</td>
<td>Utile / sterile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>---------</td>
<td>-----------------------------------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuza Voda quarry</td>
<td>15 - 21</td>
<td>2,5 - 7</td>
<td>1.5</td>
<td>3:1 mc/to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defcea quarry</td>
<td>19 - 21</td>
<td>2 - 3</td>
<td>0,6</td>
<td>5:1 mc/to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tibrinu quarry</td>
<td>18 - 22</td>
<td>2,3 - 4,5</td>
<td>5</td>
<td>3:1 mc/to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Medgidia – kaolinitic rocks*
Type of deposits for ceramic industry – Kaolinitic rocks

AGHIRES area:
Sedimentary rocks of epicontinental Paleogen.

- 40 mil. m³ kaolinitic sands, with max. 9% $\text{Al}_2\text{O}_3$, in deposits with siliceous sands layers (total 3-7 layers);

- Kaolin – 15-85%; Q – 10 - 60%; illite 7 - 25%, feldspar 5-15%, carbonates – up to 10-15%

- Kaolinitic deposits have 10-60 m, from each the kaolinitic layers (1-4) are varying up to 30 m the utile thickness.

- *The big problem*: 5 up to 50 m from surface
Aghires - Stogori – kaolinitic sands
Type of deposits for ceramic industry – Kaolinitic rocks

SUNCUIUS area:
In Suncuius area, official evidence from included 98 mil. to kaolinitic clay, from each half with calculated reserves, at different knowledge degree.

Source of information: Public research 2004 and official website of producers
Type of deposits for ceramic industry – FELDSPAHIC ROCKS

• 2 areas of interest

**VOINEASA area - abandoned**

2 km long, a few hundred meters wide and 600 meters thick, having a high content of useful substances

High mountains, low temperatures, prolonged winters

**MUNTELE RECE - CORNU area**

Temporally small extraction activity
Type of deposits for ceramic industry - TALC

- 2 ares of interest

LELESE - CERISOR
- Epimetamorphic deposits of Poiana Ruscă unit, which comprises accumulation of talc in the form of lenses with a length of 50 - 150 m and a thickness of 0.5 - 10 m, in general consistent with the structure dolomites;
- Talc levels are associated with carbonate breccia layers and lenses, finely laminated black or gray limestone - yellow compact siliceous and other crystalline rocks
- 5 perimeters, 1.8 mil.to recorded reserves with different degree of knowledge, with exploitation licenses, only underground now (production cost bigger than revenues) 1 owner

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxid de calciu (CaO)</td>
<td>20-23 %</td>
</tr>
<tr>
<td>Oxid de magneziu (MgO)</td>
<td>18-20 %</td>
</tr>
<tr>
<td>Dioxid de siliciu (SiO₂)</td>
<td>32-35 %</td>
</tr>
</tbody>
</table>

MARGA
- No information available
I Romania in Europe  
I.1 Basic administrative information  
I.2 Geological map of Romania  

II Legislative frame for mining operations  
II.1 National regulatory body  
II.2 Prospecting, exploration  
II.3 Mining (exploitation)  

III Type of deposits for ceramic industry (deposits / potential areas, geological features, qualitative characteristics, resources / reserves)  
III.1 Ball clay, kaolinitic rocks  
III.2 Fireclay  
III.3 Red clay  
III.4 Feldspar  
III.5 Talc  

IV Aspects concerning to mining operators and ceramic producers  
IV.1 Medium or small enterprises?  
IV.2 Products, productions  
IV.3 Imports vs. exports (?)  
IV.4 Economical potential for Romanian ceramic industry
Aspects concerning to mining operators and ceramic producers

In the official evidence of NAMR, for ALL ceramic industry, are recorded:

Only one company use as raw material kaolinitic materials (from Ukraine): **SANEX Cluj, part of Lasselsberger Group**

Italia represent one of the most famous supplier for finish products for Romania
THANK YOU

Detailed information and source of them will be found in the magazine.