Regulations and Social Receptivity about Impurities in Copper Raw Material

Chilean situation at 2018

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Chilean Copper Commission

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Why to care about impurities in copper mineral?

- Chile apply to become OECD member.
- Environmental challenges to face reported in the Environmental Performance Review (2005).

**Recommendations:**

- make further progress with the implementation of air quality programmes including those concerning the mining sector and those focusing on PM$_{2.5}$, PM$_{10}$ and ozone, monitor progress and the programmes’ impact on health through appropriate indicators;
- develop nationwide emission standards (e.g. for a range of industrial sources and for toxic air pollutants);
- develop air monitoring in all major cities and an integrated air data management system;
- develop energy efficiency measures for all aspects of energy consumption;
- review the future energy supply mix (including contingency plans), taking into account environmental concerns (such as emissions of air pollutants and greenhouse gases);
- implement air, traffic and transport management plans in the Metropolitan Region, develop and implement improved plans to reduce emissions from transport in all cities.

- 2011: Thermoelectric Regulation (air pollution)
- 2013: Copper Smelters Emission Regulation (air pollution)
There are 7 smelters in Chile, and 3 of them also have refinery (Chuquicamata, Potrerillos, and Ventanas).

<table>
<thead>
<tr>
<th>Smelter</th>
<th>Owner</th>
<th>Stated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuquicamata</td>
<td>CODELCO</td>
<td>1952</td>
</tr>
<tr>
<td>Altonorte</td>
<td>Glencore-Xtrata</td>
<td>1993</td>
</tr>
<tr>
<td>Potrerillos</td>
<td>CODELCO</td>
<td>1927</td>
</tr>
<tr>
<td>Hernán Videla Lira</td>
<td>ENAMI</td>
<td>1952</td>
</tr>
<tr>
<td>Ventanas</td>
<td>CODELCO</td>
<td>1965</td>
</tr>
<tr>
<td>Chagres</td>
<td>Anglo American</td>
<td>1960</td>
</tr>
<tr>
<td>Caletones</td>
<td>CODELCO</td>
<td>1922</td>
</tr>
</tbody>
</table>
Copper Smelters Emission Regulation: process and criteria

- Emission standard in copper smelters and other arsenic emission sources (DS 28/2013).
- Principles behind this regulation:
  - Right to live in a sound environment.
  - Protect human health and environment.
  - Compliance graduality.
- Criteria to reach the final regulation:
  - Technical, Economic and Social assessment.
  - Status of existing smelters technology.
  - Emission elements toxicity and impacts.
  - Existing Environmental Instrument efficiency and effectiveness.
  - International benchmark of air emission regulations.
Environmental context: Emission standard in smelters

Emission standard in copper smelters and other arsenic emission sources (DS 28/2013)

Goals:
• To protect human and environmental health in all national territory.

Result of its implementation:
• Air emissions of particulate matter (PM), sulfur dioxide (SO₂), arsenic (As) and mercury (Hg) will be reduced.
Economic context: Chilean situation

Share by product in Chilean copper exports
Emission standard for existing facilities:

- Maximum limit of Arsenic emissions in existing smelters:

<table>
<thead>
<tr>
<th>Emission Source</th>
<th>As (ton/yr)</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuquicamata</td>
<td>476</td>
<td>2018</td>
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<tr>
<td>Altonorte</td>
<td>126</td>
<td>2016</td>
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<tr>
<td>Potrerillos</td>
<td>157</td>
<td>2018</td>
</tr>
<tr>
<td>Hernán Videla Lira</td>
<td>17</td>
<td>2018</td>
</tr>
<tr>
<td>Ventanas</td>
<td>48</td>
<td>2016</td>
</tr>
<tr>
<td>Chagres</td>
<td>35</td>
<td>2016</td>
</tr>
<tr>
<td>Caletones</td>
<td>130</td>
<td>2018</td>
</tr>
</tbody>
</table>

**Arsenic** capture must be at least **95%**

- Maximum limit of Arsenic emissions in existing smelting chimney:
  - Acid plant: 1mg/Nm$^3$ (monthly)
  - Slug cleaning furnace: 1mg/Nm$^3$ (monthly)
Emission standard for new facilities:

• Maximum limit of Arsenic emissions in new smelters: 2% in weight of As and capture at least 99,97%.

• Maximum limit of Arsenic emissions in new smelting chimney:
  ➢ Acid plant: 1mg/Nm$^3$ (monthly)
  ➢ Slug cleaning furnace: 1mg/Nm$^3$ (monthly)

• Starting compliance deadline: from the beginning of operation.
Future of smelters and refineries in Chile

Low tech & economic performance

+ 

Higher environmental standards requirements

= 

Need of a change in the smelter and refinery industry in Chile to reach:

→ Higher added value
→ More sustainable industry
→ Higher productivity and efficiency
→ Recovery of valuable materials from concentrates
Challenges

- Copper concentrate in Chile:
  - Comes from deeper and older mines.
  - Contains more complex substances that the market sanction in price or is not accepting them at all.
- Additionally, new regulations may affect the management, storage, transport of certain substances.
Challenges

- International initiatives targeting several substances that are risky to Human health and/or Environment:
  - Minamata Convention
  - IMO
  - Basel Convention
- This tendency affect not only producers but consumers.
- Access to minerals is becoming more challenging.
- National regulations are more restrictive and international commitments (OECD).
- Stakeholders are more empowered.
Opportunities

- Copper demand is still growing.
- Chile has the capacity and expertise to supply that demand.
- DS 28/2013 has started a great discussion regarding the role of Chile in smelting and refinery market.
- Changes in the copper production structure involves new challenges for Chilean industry.
Opportunities

- The answer would be:
  - Compliance with environmental rules is not under discussion. Either national or international.
  - New exploration campaigns are a must.
  - Technology and innovation should be a big focus for industry to face complex minerals.
  - Big financial and technical efforts to achieve new regulations (local and global).
  - Jump up to the new standards of production: copper concentrates are not a commodity anymore.
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