

JOGMEC 銅原料中不純物に関する国際セミナー
製錬業における銅原料中の不純物処理の現状

Current Arsenic situation

- JX Nippon Mining & Metals -

JX Nippon Mining & Metals
Technology Development Center
Kensaku Nakamura



JX Nippon Mining & Metals Corporation

Overviews of JX Nippon Mining & Metals

Upstream Resource Development



Midstream Smelting and Refining



Downstream Recycling



**JX Nippon Mining &
Metals Corporation**

**The Overall Flow of
Our Business
Activities**

Downstream Electronic Materials



Smelting sites of JX-Nippon



- *1 Annual production capacity of refined copper
- *2 Including refining process at Hitachi Works
- *3 Pro-rata share of capital participation

Operation site	Capacity ^{*1}	JX NMM's share
Saganoseki (Oita, Japan)	450 kt ^{*2}	66%
Tamano (Okayama, Japan)	200 kt ^{*3}	41.9%
LS-Nikko Copper (Onsan, South Korea)	680 kt	39.9%
Total	1,330 kt	

More As Input causes

1) Environmental Issue ; Hard Regulation

2) Slag Quality

3) Cost Issue; Removal cost up in plant

- Smelter side faces problem of business continuity in long term viewpoint.
- There is not enough incentive to remove As for Mining side. (Ex. Value of copper in Enargite is more than As -penalty)

1) Environmental Issue

- Not to mention compliance with environmental regulations, we will strive to further reduce impact of our operations on the environment.

Japanese Waste Water Standard (mg/L)

As	Cd	Pb	Se	Cu	Zn	Cr
0.1	0.03	0.1	0.1	3	2	2

extract

Japanese guidelines on Air pollutant(ng/m³)

As	Ni	Hg
6	25	40

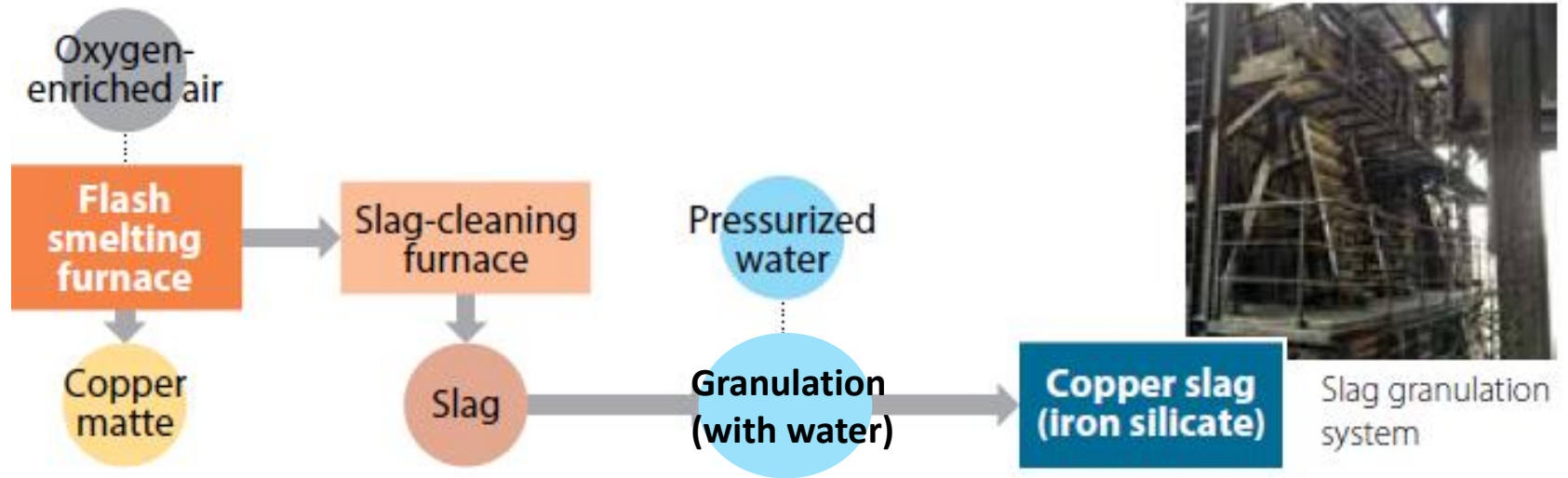
Extract



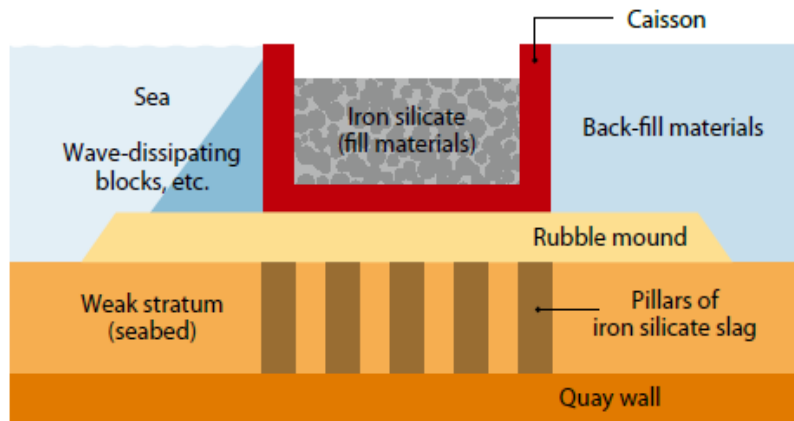
Waste water treatment plant

- More As-Input will make As management in operation difficult .
(in terms of the quantity of As which remains in process)

2) Slag Quality



Main use of Copper Slag



Filling a caisson with slag

Specific gravity

Copper Slag	3.6
Sand	2.6

- Slag must pass the test of quality for sale.

Quality Standard of As for Slag

Use for		Content Limit	Dissolve Limit	Recent Slag quality
General	Aggregate	$\leq 150\text{mg/kg}$	$\leq 0.01\text{mg/l}$	Not-satisfied
Seashore	Caisson	----	$\leq 0.03\text{mg/l}$	Satisfied

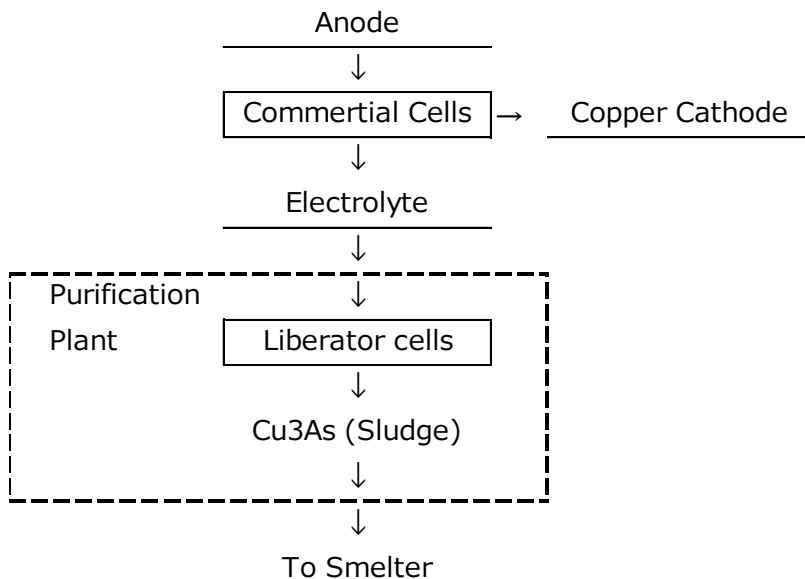
- More As-input causes more As in Slag and less Slag quality.
- Being out of limitation is serious problem.

3) Cost Issue

- Smelters have much inner As-returns.
- Increase of As -input makes us cost- up to recover As

such as

- Regents cost of waste acid treatment plant.
- Power cost of purification plant in tankhouse etc.



Power consumption of Purification process

2007	2016
100	121

Shown as a relative value against 2007 as 100

Developing technology

JX-Nippon is developing As treatment technology.

- Arsenic removal from Copper concentrate
 - Inert roasting
 - Arsenic sulfide leaching
- Removed Arsenic immobilization.
 - Arsenic sulfide for collected As from inert roasting
 - Biological scorodite

Summary

- As in concentrate is increasing and this trend will continue.
- It causes Environmental, Slag quality and Cost issues.
- JX-Nippon has been developing As treatment technology.