



Global Cement and Concrete
Association

Utilizing Spent Pot Lining of Aluminium industry in Cement Industry

Perspective from GCCA India members

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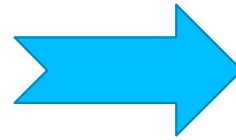
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Committed to Sustainability

Building a sustainable future for cement and concrete and demonstrate how our product can help build a better world



World Business Council for Sustainable Development
Cement Sustainability initiative



Global Cement and Concrete
Association

- Longstanding sustainability commitment from companies, including through CSI
- Ongoing relationship – strategic partnership
- CSI – transitioned to GCCA – transition completed

80%

GCCA members account for 80% of the global cement industry volume outside of China - and includes some key Chinese manufacturers.



85%

GCCA India members account for +85% of the Indian cement industry volume and major RMC manufacturers



Background: Spent Pot Lining

Spent Pot Liner (SPL) is a hazardous waste falling under category 11.2 of Haz. Waste Management Rules, 2016.

Source of
generation



During production of primary aluminium
from Alumina smelting industries

Heat treated SPL is also known as carbon mineral fuel which
can be used for resource/ energy recovery in cement kiln

Fluoride content: **3% to 7% (Plant specific)**

Cyanide (Sodium cyanide / Sodium ferro cyanide)

100 ppm to 250 ppm

Usually, SPL in a mix of carbon and refractory portion

Refractory portion: **CV = 0**

Carbon portion: **CV > 4000 kcal/kg**

Challenges for using SPL in Cement Kiln

Utilization of SPL in cement kiln requires developing a operationally convenient, environmentally sound and occupationally safe infrastructure that includes:

- Transportation in covered (spill proof) containers
- Covered storage having impervious RCC surface with dyke walls/ garland drains
- Suitably designed crusher (if it has to be crushed within cement plant. SPL is usually difficult to crush than coal)

Cement plants requires authorization from the State Pollution Control Boards (SPCBs) and the waste generator must have valid authorization from the SPCB

As per SOP defined by CPCB, SPL must be detoxified using the defined process before taking it for co-processing.

However, the fluoride content is good for the cement kiln and cyanide gets completely decomposed during co-processing.

Hence, co-processing of SPL as such (without detoxifying) is more beneficial to both cement plants and the Alumina plants (environmental & commercial considerations)

Challenges for using SPL in Cement Kiln

Operational challenges

- The toxic constituents of fluoride and cyanide compounds are leachable in water and can pollute soil and groundwater
- Creation of environmentally sound appropriate infrastructure to avoid the leaching of dissolved fluorides and cyanides from SPL into water
- Ensuring environmentally safe storage and handling (Incur capex and opex)
- Ensuring storage away from acids so that release of toxic HCN gas can be avoided
- Cement plants' can only co-process crushed SPL and installing a dedicated crusher for only SPL may be un-viable.
- Desired that the Aluminum company provides crushed material
- Cement plants cautious of CN contamination & with lack of prevailing practice tend to avoid co-processing

Challenges for using SPL in Cement Kiln

Process challenge

- SPL usage is required to be monitored to the optimum fluoride levels to ensure desired level of liquid phase & clinker quality
- Alkali and fluoride content vary in SPL (from lot to lot) and hence homogenization is desired to ensure optimum usage
- Quality of SPL: Hard to grind, high Fluoride and Sodium content, High Silica and lower Calorific Value (mixed form)

Challenges for using SPL in Cement Kiln

For waste generators (storage, handling and transportation)

- Permission of Interstate movement, most of the times, is restricted by SPCBs
- Due to SOP of CPCB, SPCB's mandate Aluminum companies to send it to detoxification agencies
- States lack environmentally sound SPL handling facilities including in the cement plants
- **Storage** – Require elaborate storage arrangements handling requirements, due to Cyanide (Health & Safety issues in handling SPL from source to feed point)

Regulatory aspects

- Prefer storing it in at generation points/CHWTSDF
- Inclined for **detoxification only** (which may not be a sustainable solution)

Opportunities

Historical stock (lakh tons) underlying either in big sheds or landfilled in smelter units & associated risks with it

Waste generators, able to dispose off historical hazardous wastes stockpiled within the plants

Historical waste may have no /less / traces of CN. As waste is decades old, weathered & mixed. No proper segregation of Carbon (1st Cut) & Refractory (2nd Cut)

Cement plants can take benefits from its mineralizing effects and decide the proper raw mix designing (Al, Fe, Ca & Si benefits as per the requirements) provided there is a consistent supply

Way forward

As per Hazardous Waste Management Rules 2016, the material should meet the following limits

- Cyanide = 20 mg/L (based on TCLP); Fluoride = 180 mg/L (based on TCLP)

Development of in-house testing facilities or through 3rd party NABL accredited laboratories for

- Quarterly monitoring of fugitive emission in the work zone for PM-10, Ammonia, Cyanide, Fluoride.
- Quarterly monitoring of stack emissions (from rotary kiln and crusher stack) for PM, Total Fluoride, HF, Ammonia and Hydrogen Cyanide.

**Detoxified SPL or via detoxification units (secondary source) can be avoided.
SPCBs should encourage cement plants' & generators for its sustainable co-processing directly**

In case, pre-treated material with test certificates is delivered to Cement plant at a negative cost, it can be used provided it doesn't affect the clinker quality or operational parameters.

Way forward

- Form a task force of members from cement plant and Aluminum industry, the activities can include
 - Promote the cause of co-processing of SPL by clarifying concerns and queries with appropriate clarifications.
 - Define the appropriate SOPs for safe transportation, storage and handling of SPL
 - Organize visit of cement plant representatives to Aluminium smelting unit to see how SPL is generated, stored & handled
 - Organize visit of cement industry representatives and Aluminum industry representatives to existing cement plants who are implementing SPL co-processing
 - Defining the transportation and storage requirements

Way forward

- Need to adopt a cluster approach (as Aluminium units are situated in few pockets only)
- SPCBs should act as facilitator for obtaining authorization (including interstate movement) & ensuring disposal with compliance
- Need investment on infrastructure, testing, monitoring, transportation in compliance with regulatory requirements and along with Failsafe procedures (Health and Safety) at workplace



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Thank you



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