

International Conference on  
**Management of  
Naturally Occurring  
Radioactive Material  
(NORM) in Industry**

**19–30 October 2020  
(Virtual Event)**



# Phosphates for Sustainable Development: Fertilisers and Phosphogypsum in the Circular Economy

## **Leadership, Innovation, Partnership – Setting the Scene**

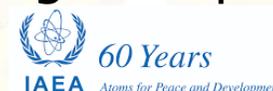
**Julian Hilton**

Chairman, *AleffGroup*

Convenor, International Fertilizer Association  
NORM/ Phosphogypsum Working Group



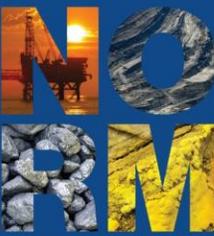
Consultant, IAEA



Chair, UNECE SDG Delivery Working Group



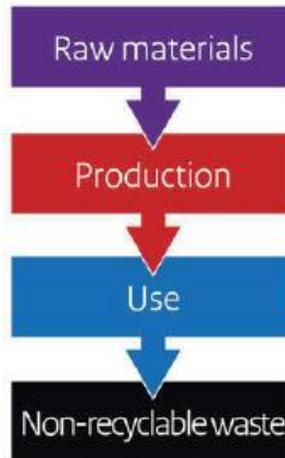
# End of “Waste” in the Circular Economy: Time to reboot



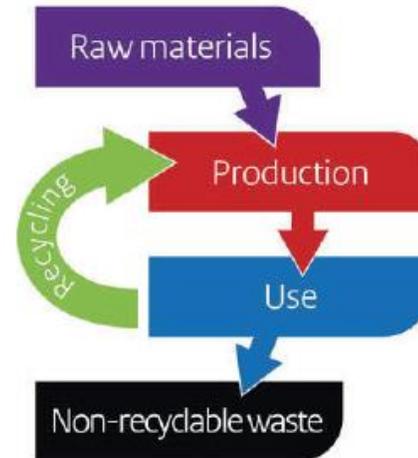
A (the?) defining principle of the circular economy is conservation (Zero Waste):

- The default condition is that accessing “primary” resources is necessary only when “secondary (reusable)” resources are not sufficiently available
- Linear “Extractive” industries require a new, “circular” narrative, based on redefined “life-cycles” for all resources
- All resources stay within the system boundary, even if no foreseeable solution to their current status as “waste” is available
- Risk/benefit models and algorithms need to be fundamentally rethought

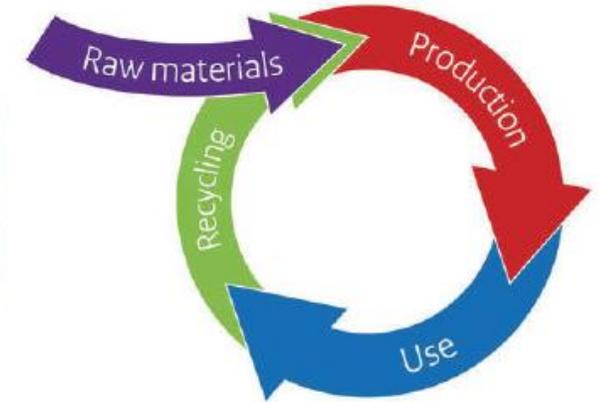
Linear economy



Reuse economy



Circular economy



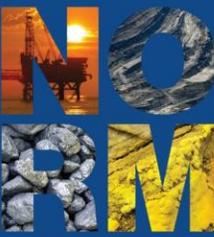
NORM regulation must pivot away from defining itself as exclusively about “safe” waste management and disposal.

Adopt and apply Sustainable Development Goals as an essential condition for resource management.

The regulator has to create the conditions for NORM industries to serve equally and equitably the needs of People: Planet: Prosperity. This means it must accompany the entire resource life-cycle, and in its new circular form.

Is it investing in making the necessary tools and instruments to do this?

# The long and winding road but It can be done...



- Hypothesis: misconceived regulation of Europe's phosphate industries in regard to management of its NORM residues – phosphogypsum – led to its near extinction, resulting in phosphate rock now being included in the EU list of critical materials and the wider industry always on the edge of bankruptcy. Result: wholly avoidable negative outcomes.
- 1989: US Environmental Protection Agency declares PG a “hazardous waste” on radiological grounds, with mandatory “stacking” (ie disposal) on land – has set the US industry off on a similar path
  - Now some 4-5 billion tonnes have accumulated on land, with stacks in 50+ countries
- 2013: IAEA publishes Safety Report 78 on NORM residues in the Phosphate Industry
- 2015: Sustainable Development Goals adopted by 193 UN member countries
- 2016: International Fertilizer Association (IFA) publishes first PG Report on Sustainable Management and Use – PG reuse rising to 25-20 mt/y
- 2020: IFA publishes second PG Report – PG reuse now at 60mt/y
- 2020: China reaffirms strategic goal of “comprehensive utilization” (100%) of PG both current (70-80mt/y) and legacy 450mt
- 2020: October 14, USEPA approves use of PG for road-building

# Safety Reports Series

No. 78

## Radiation Protection and Management of NORM Residues in the Phosphate Industry



2013

# PHOSPHOGYPSUM

*Sustainable Management and Use*



A Report for IFA Members  
AE "Johnny" Johnston, General Editor  
Paris, January 2016

2016

# PHOSPHOGYPSUM LEADERSHIP INNOVATION PARTNERSHIP



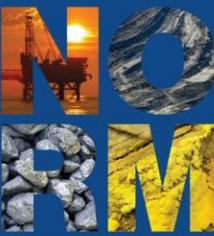
GENERAL EDITOR  
Julian Hilton, Alaff Group, Convenor,  
IFA Phosphogypsum Working Group

STRATEGIC ADVISORY TEAM  
Cannic Nichol, Nutrition, Co-Convenor,  
IFA Phosphogypsum Working Group  
Ranjit Misra, Paradoop Phosphate Ltd.  
Tibout Thoms, Prayon  
Volker Andersen, IFA

IFA, PARIS, JUNE 2020

2020

*Zero Waste* →



## News Releases

### News Releases from Headquarters > Air and Radiation (OAR)

# EPA Approves Use of Phosphogypsum in Road Construction

10/14/2020

Contact Information:

EPA Press Office ([press@epa.gov](mailto:press@epa.gov))

**WASHINGTON (October 14, 2020)** — Today, U.S. Environmental Protection Agency (EPA) Administrator Andrew Wheeler approved a request from The Fertilizer Institute (TFI) to allow phosphogypsum to be used in government road construction projects.

“Allowing the reuse of phosphogypsum shows EPA’s commitment to working with industry in a way that both reduces environmental waste and protects public health,” said EPA Administrator Andrew Wheeler. “The approval of this request means that phosphogypsum, which already requires significant engineering and regulatory controls to be disposed of in stacks, can now be put to productive use rebuilding our nation’s infrastructure. This demonstrates President Trump’s commitment to “win-win” environmental solutions.”

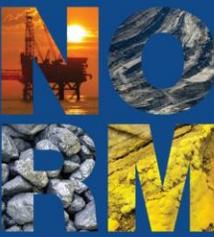
“TFI strongly supports and appreciates EPA’s science-based review and decision to allow the limited use of phosphogypsum, a by-product of phosphate fertilizer manufacturing. This decision strengthens the industry’s sustainability efforts and long term environmental stewardship,” said TFI President & CEO Corey Rosenbusch.

Phosphogypsum, a byproduct material of phosphate fertilizer production, is by regulation disposed of in massive, above-ground piles, commonly called “stacks.” Each “stack” can span thousands of yards, be higher than a football field, and contain approximately 70 million tons of phosphogypsum. By finding a new way to use phosphogypsum, EPA is helping create a sustainable path to improve the environment while allowing for responsible reuse and recycling of a valuable byproduct.

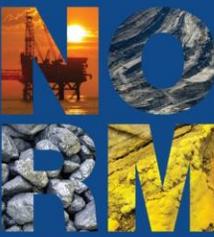
The U.S. produces approximately 20% of the world’s phosphogypsum. In countries where reuse is practiced – such as road building, construction material, fertilizer, and landfill cover – up to 20% of annual phosphogypsum production is diverted from stacking to other uses. While the approval of TFI’s request does not mean that phosphogypsum will become widespread in roads, it allows state and local governments to investigate the opportunity to use phosphogypsum in appropriate road construction projects.

- Origins of the scientific effort behind the TFI petition in project Stack Free by '53 (2005-2011) funded by Florida Industrial and Phosphate Research Institute (FIPRI), Florida Polytechnic University
- Supported by IAEA from 2006 including dedicated PG Working Group with funded special meetings 2006, 2007 hosted by FIPRI
- Led to close collaboration on IAEA SR 78 notably on Phosphogypsum chapter
- Regular participation in NORM conference series following invitation from Rafael Garcia Tenorio, Seville 2007
- 2012 - IAEA presented draft SR78 at first meeting of IFA PG NORM Working Group, Tashkent and attends subsequent meetings
- 2013 – IAEA SR 78 NORM residues in phosphate industry
- 2014 – IFA Leadership commissions industry response to SR 78
- 2014 – Arab Fertiliser Association holds first 3 day dedicated industry workshop on PG
- 2016 – IFA publishes Sustainable Management and Use of PG
- 2017 - UNECE begins cooperation with IFA PG NORM WG on behalf of UNECE
- 2019 UNECE recognises PG as “anthropogenic resource”
- 2020 – IFA published PG 2
- 2020 – a good time to start IAEA SR78 2.0!
- A case study in why SDG 17 – Partnership - works

# Resulting Tasks: The PG Reboot



- 1. Leadership:** PG as “classical” pivot in rebalancing environmental-economic equilibrium within which NORM industries are regulated, including all aspects of Health, Safety and Environment
- 2. Innovation:** Redefine the terminology with which we describe and regulate NORM industries within the circular economic approach – a new normal
- 3. Innovation:** Reverse engineer a new, circular NORM resource life-cycle management paradigm from agreed beneficial outcomes for People: Planet: Prosperity –
  - Zero Waste and an end to dumping wastes and associated negative externalities on future generations
  - Security, access and affordability of essential resources - food, energy, water etc...
- 4. Partnership:** Build new “common good” algorithms for risk/ benefit and risk/risk analysis to match the “new normal” of balanced, integrated management of all resources (UN SDGs).
- 5.** Time for IAEA SR 78 version 2.0 – PG goes circular with SDG 12 at the hub ....



**Thank you!**

**Julian Hilton,  
Chairman, Aleff Group**

*AleffGroup*