

# Management of Phosphate Tailings

(last updated 16 Aug 2002)

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## ISSUES

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### Revision of U.S. air emission standards for phosphate tailings

Federal Register: February 3, 1999 (Vol. 64, No. 22) p. 5573-5580 ([download full rule](#) 

40 CFR Part 61 - National Emission Standard for Hazardous Air Pollutants; National Emission Standards for Radon Emissions From Phosphogypsum Stacks

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

"SUMMARY: The Environmental Protection Agency (EPA) is promulgating revisions to the National Emission Standard for Hazardous Air Pollutants (NESHAP) that sets limits on radon emissions from phosphogypsum stacks, codified as subpart R of [40 CFR part 61](#). The Agency is taking today's action in response to a petition for reconsideration from The Fertilizer Institute (TFI), which critiqued the risk assessment EPA performed in support of the version of subpart R promulgated in 1992. Today's action raises the limit on the quantity of phosphogypsum that may be used for indoor research and development from 700 to 7,000 pounds, eliminates current sampling requirements for phosphogypsum used in indoor research and development, and clarifies sampling procedures for phosphogypsum removed from stacks for other purposes."

## National Emission Standard for Radon Emissions From Phosphogypsum Stacks - U.S. EPA Proposed rule; Notice of Reconsideration.

U.S. Environmental Protection Agency: 40 CFR Part 61 National Emission Standards for Hazardous Air Pollutants; National Emission Standard for Radon Emissions From Phosphogypsum Stacks - Proposed rule; Notice of Reconsideration

In: Federal Register: May 8, 1996 (Volume 61, Number 90), Proposed Rules, p.20775-20779, download via [GPO Access](#)

"SUMMARY: On March 24, 1994, EPA announced its decision concerning a petition by The Fertilizer Institute (TFI) seeking reconsideration of a June 3, 1992 final rule revising the National Emission Standard for Radon Emissions from Phosphogypsum Stacks, 40 CFR Part 61, Subpart R. EPA partially granted and partially denied the TFI petition for reconsideration. Pursuant to that decision, EPA is convening a rulemaking to reconsider 40 CFR 61.205, the provision of the final rule which governs distribution and use of phosphogypsum for research and development, and the methodology utilized under 40 CFR 61.207 to establish the average radium-226 concentration for phosphogypsum removed from a phosphogypsum stack. This document identifies proposed changes to be considered as part of this reconsideration and specific underlying issues on which EPA seeks further comment."

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## Phosphogypsum tailings dam failure in Huelva, Spain

50,000 cubic meters of acidic (pH 1.5) and toxic liquid spilled from a phosphogypsum stack at Huelva in Southern Spain at 3 p.m. on December 31, 1998. The 75-hectares tailings dam, operated by the companies [Fertiberia](#) and FMC Foret, is located in the salt marshes of Rincón in the outskirts of Huelva, and it contained 1 million cubic meters of liquid. It failed during a storm, when waves of four meters height damaged the embankment. The liquid spilled into Ría de Huelva, a tributary to Río Tinto. The director of the Fertiberia plant in Huelva indicated that the dam was constructed "following the guideline of a North American company of great experience and prestige", and that Ría de Huelva will not suffer damages since those remainders were spilled there directly until 1997.

Ecologists claim that 400,000 cubic meters spilled, instead of 50,000.

(El Mundo / El País / La Vanguardia Jan. 2 & 3, 1999)

> see also: [Safety of Tailings Dams](#)


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# LITERATURE

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## Feasibility Analysis: A Comparison of Phosphogypsum and Uranium Mill Tailing Waste Unit Designs

by U.S. Environmental Protection Agency, Office of Solid Waste, January 1997, 33p.

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### Summarized Comparison between 1993 Florida Phosphogypsum Management Regulations, New/Proposed Gypsum Stacks in Florida, and Uranium Mill Tailings Management Standards

[...]

"There are some trends and differences that can be highlighted from Table 5-1, as follows:

- The 1993 Florida Phosphogypsum Management regulations are less stringent than the uranium mill tailings standards defined in 40 CFR 192 Subpart D in several important respects.
  - First, the uranium tailings standards require a *double composite liner* with two geomembranes and an underlying layer of 3 feet of compacted soil with minimum hydraulic conductivity of  $1 \times 10^{-7}$  cm/sec. The gypsum standards require only one geomembrane and 2 feet of compacted gypsum with minimum hydraulic conductivity of  $1 \times 10^{-4}$  cm/sec (or an underlying 18-inch layer of compacted soil with maximum hydraulic conductivity of  $1 \times 10^{-7}$  cm/sec, which has not been used in any of the four cases analyzed in Section 4).
  - Second, the uranium tailings standards require a *leachate collection system* that is also used as detection system. If the measured volume of liquids recovered exceeds a pre-determined action leakage rate, a response action plan is set in motion to mitigate or stop any leaks. In the gypsum case, leakage through the liner is expected and it is actually calculated in the technical reports presented in the permitting process.
- All three gypsum stacks constructed or proposed since the enactment of the 1993 Florida Phosphogypsum Management regulations have followed or exceeded the Florida standards but none of the designs approach the protectiveness of the uranium mill tailings standards.
- The Plant City gypsum stack proposal goes beyond the Florida standards due to the environmental sensitivity of the area (i.e., proximity of a potential future wellhead area) and, quite likely, because of increased public concern in Florida after recent environmental incidents in the phosphoric acid industry.
- A trend that is clearly noticeable in the technical reports presented to support the Florida permit applications is an increasing level of detail and analysis. For example, a new topic that is receiving more attention (both in field work efforts and proposed

preventive measures) is sinkhole potential.

- The approach at the Nichols plant of a modified gypsum stack is interesting, as it allows usage of an old stack for the remaining years of its useful life, fulfilling at the same time the 1993 Florida regulation's closure requirements. Furthermore, it is a potential solution for those situations with land availability restrictions; it does not have to go through the DRI process as it does not change the footprint of the original gypsum stack; and the ZOD is not reduced, but remains within a horizontal range to the property boundary."

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## Handling of radium and uranium contaminated waste piles and other wastes from phosphate ore processing

by G.Schmidt, C.Küppers; annex by P.Robinson

Nuclear Science and Technology, Report EUR 15448 EN. 121 p. ISBN 92-827-4076-5, published by the European Commission, Luxembourg 1995.

### ABSTRACT

"Natural phosphate ores contain radionuclides of the uranium series. In this report, calculations and evaluations of radiation doses for the public and for workers from the phosphate industry are performed. From these findings, it is evaluated whether established radiation protection procedures should also apply to certain facilities, occupations and waste management practices in the phosphate industry. Measures for improvement and remediation are discussed and evaluated, and recommendations given."

### CONCLUSIONS

"The findings in this report are summarized with the following statements:

- Processing and waste handling in the phosphate industry is associated with radiation levels of **concern** for workers and the public. The level of protection for these groups should be more similar to the level of protection that is state of the art in other industries, particularly the nuclear industry.
- Radiation protection measures for **workers** are necessary, especially for certain areas of the facility and for repair jobs, because potential radiation doses reach a relatively high level of concern compared to protection levels in other industrial branches.
- Some waste management practices still found in the phosphate industry of today deliver relatively high individual and/or collective doses to the **public**, that can be substantially reduced by shifting to alternative management strategies.
- Environmental risks from phosphogypsum piles can be reduced using relatively simple and cheap **measures** such as covers, liners or a more sophisticated wastewater treatment. These are in place and working well at other facilities in and outside Europe.
- The **unrestricted reuse** of materials from phosphate processing facilities and of

waste materials creates potential hazards to man that exceed established limits for radiation protection."

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## Phosphate and Molybdenite - Extraction and Beneficiation of Ores and Minerals

Technical Resource Document: Other Mining Sectors, Volume 7. U.S. Environmental Protection Agency, Office of Solid Waste, EPA/530-R-94-034, NTIS/PB94-201001, November 1994, 135 pages. *[Report summarizes EPA site visits to phosphate and molybdenite mines. Includes reports of EPA site visit to IMC Fertilizer's Four Corners (phosphate) Mine near Duette, Florida and Cyprus Minerals Corporation's Thompson Creek (molybdenite) Mine near Challis, Idaho. Discusses the extraction and beneficiation activities at each site. The report includes a description of mine operations, mine waste generation and management practices, and regulatory status on a site-specific basis; The information was gathered from State and Federal agency files, as well as observations made during the site visits.]*

Available from: [National Technical Information Service](#) , 5285 Port Royal Road, Springfield, VA 22161, USA, Tel. +1-703-487-4650, Fax: +1-703- 321-8547

Also available by [Download \(1366k PDF\)](#) 

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## [Radiological Considerations of Phosphogypsum Utilization in Agriculture](#)

by C.L.Lindeken, U.S. DOE, UCRL-84927, 1980, 22 p.


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# REGULATIONS

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U.S. EPA: **40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants:** [Select for Download](#)  (PDF format)

Subparts of interest:

- [Subpart K](#)  - National Emission Standards for Radionuclide Emissions From Elemental Phosphorous Plants

- [Subpart R](#)  - National Emission Standards for Radon Emissions From Phosphogypsum Stacks
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