



生态环境部  
核与辐射安全中心  
Nuclear And Radiation Safety Center

# Some Proposals on Technical Requirement for Radiation Environmental Impact Assessment of Industrial Activities Involving NORM in China

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**目录**  
**contents**

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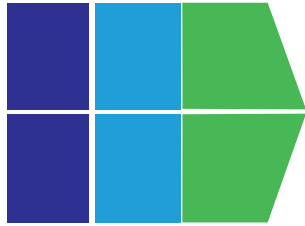
**1、 Current Situation and Regulatory System**

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**2、 Some technical requirement**

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**3、 Conclusion and Suggestion**



# Current Situation and Regulatory System about NORM

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## 1.1 Current situation about NORM

- **China Pollution Sources Census is conducted every 10 years. The first census was completed from 2007 to 2009**

Accompanying radioactive mineral resources are:

The rare earth; zircon and zirconium oxide; tin; lead/zinc; copper; iron and steel; phosphate; coal; Aluminum; Niobium/tantalum and vanadium.

**11** kinds of mineral resources;

Mining, smelting and processing of radioactive pollution source.

- **Based on the first census result, the Ministry of Environment Protection issued the notification that the industry refers to rare earth; zircon and zirconium oxide; Niobium/tantalum; Stone coal and vanadium** must be carried out the specialized Radiation Environmental Impact assessment, if any concentration of nuclide of the **uranium(thorium)** series in the ore、 intermediate product and tailings in these industry are greater than 1Bq/g.

## 1. 2 Regulatory system about NORM

### Law

- Law of the People's Republic of China on Prevention and Control of Radioactive Pollution

### Regulation

- At present there are NO Regulations specifically concerning NORM.

### Guidelines(normative document or Department Rules)

Notification of Directories of radioactive environment supervision and administration (The first batch ) of the development and utilization of ore resources

**Ministry of Environment Protection 2013**

- The format and content of the radioactive environment impact assessment of the development and utilization of ore resources

**Ministry of**

### Environment

**Protection 2015**

- Classification of radioactive waste

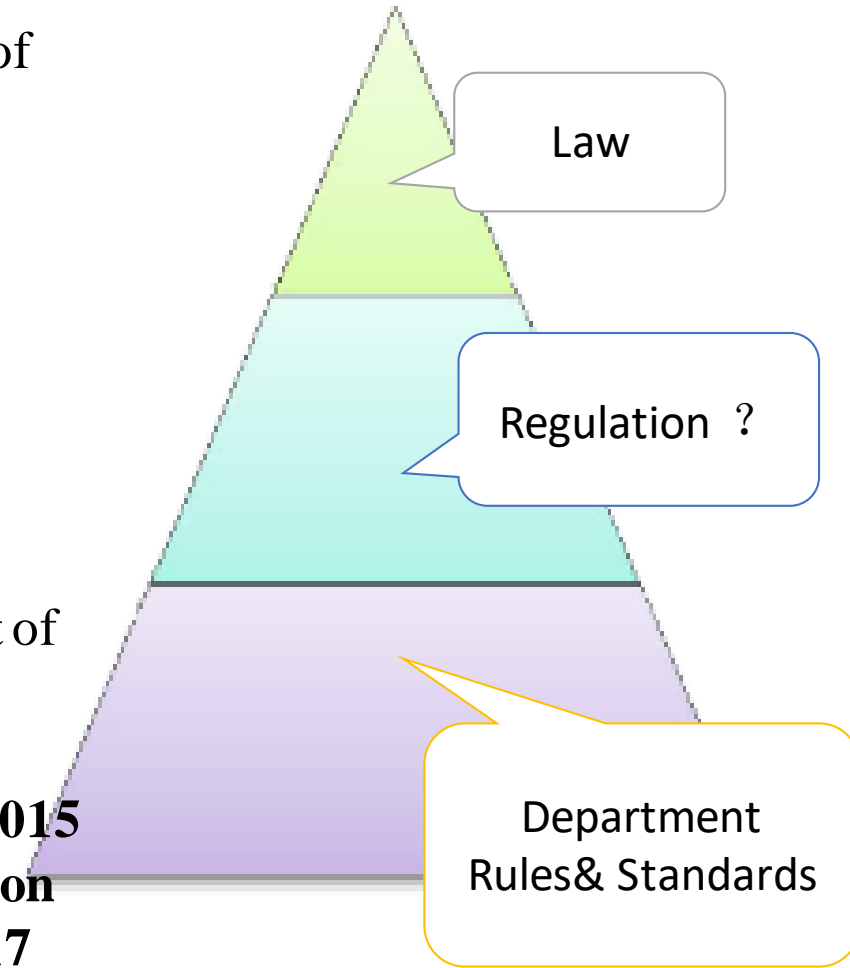
**Ministry of Environment Protection**

**2017**

- The rules of environmental radiation monitoring and information open about the enterprise Accompanying radioactive mines

**Ministry of Environment**

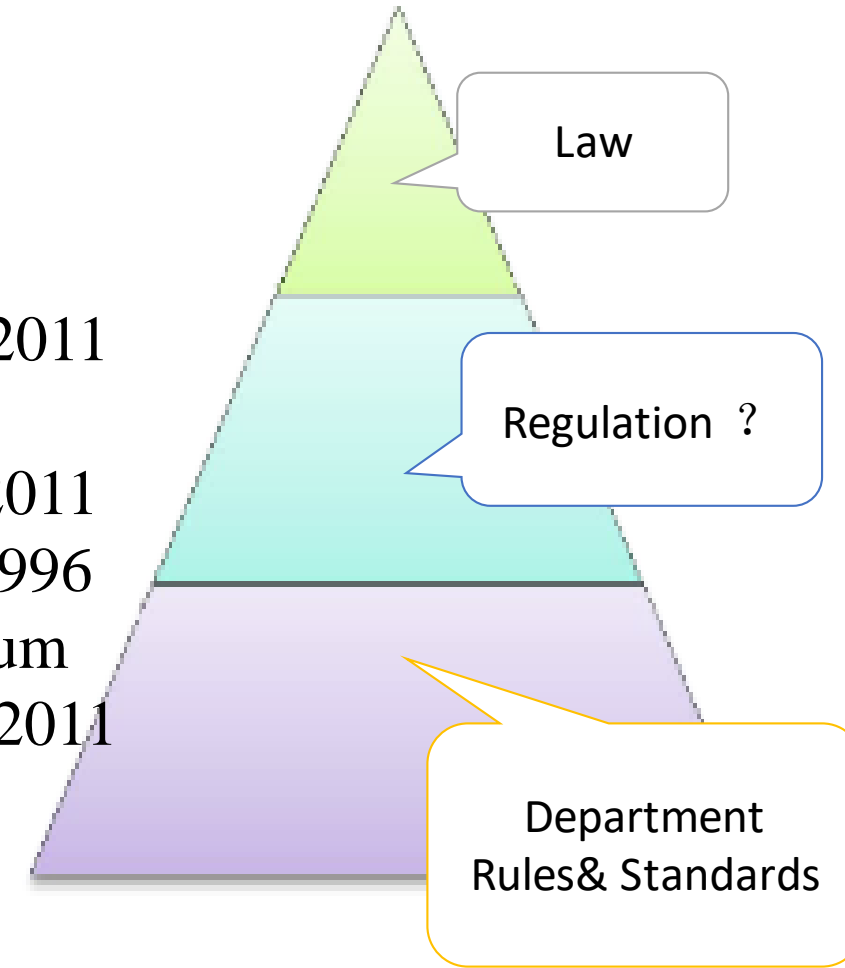
**Protection 2018**



## 1. 2 Regulatory system about Norm

### standard

- Activity concentration for material not requiring radiological regulation GB 27742-2011
- Emission standard of pollutants for rare earths industry GB26451-2011
- Integrated wastewater discharge standard GB 8978-1996
- Regulations for radiological environmental protection in uranium mining and milling GB23727-2011



## 1. 2 Regulatory system about Norm

### Law of the People's Republic of China on Prevention and Control of Radioactive Pollution

- **chapter v prevention and control of radioactive pollution during exploitation of uranium (thorium) and accompanying radioactive mines**
- any unit intends to exploit accompanying radioactive mines shall, before applying for a mining licence prepare an environmental impact report and submit it to the administrative department for environmental protection under the people's government at or above the provincial level for examination and approval.
- the facilities for prevention and control of radioactive pollution to built in support of a construction project for the exploitation of uranium (thorium) and accompanying radioactive mines shall be designed, constructed and put into operation simultaneously with the main part of the project.

## 1. 2 Regulatory system about Norm

- Notification of Directories of radioactive environment supervision and administration (mother batch) of the development and utilization of ore resources **Ministry of Environment Protection 2013**
- **Based on the first census result, the Ministry of Environment Protection issued the notification that the industry refers to rare earth; zircon and zirconium oxide; Niobium/tantalum; stone coal and vanadium** must be carried out the specialized Radiation Environmental Impact assessment, if any nuclide of the **uranium(thorium)series** in the ore、 intermediate product and tailings about these industry are greater than 1Bq/g.



## 1. 2 Regulatory system about Norm

- The format and content of the radioactive environment impact assessment of the development and utilization of ore resources **Ministry of Environment Protection 2015**
- Summarize
- Analysis of radioactive source
- Current situation of Radioactive environment
- Radioactive environment impact assessment
- Management of Radioactive waste and Radiation monitoring
- Conclusion and suggestion

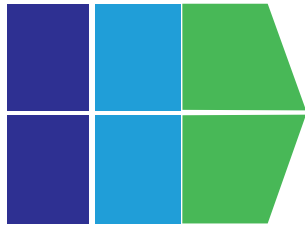
## 1. 2 Regulatory system about Norm

- The rules of environmental radiation monitoring and information open about the enterprises accompanying radioactive mines **Ministry of Ecology and Environment 2018**
- enterprise must carry out the Radiation monitoring and open the monitoring information to the public at regular interval.
- The Radiation monitoring consist of **effluent monitoring** and **Environment monitoring**
- **effluent monitoring aerosol: U、Th、<sup>222</sup>Rn; waste water : U、Th <sup>226</sup>Ra gross  $\alpha/\beta$**
- **Environment monitoring: refers to air、 water ( underground and surface) 、 soil、  $\gamma$  dose rate U、Th、<sup>226</sup>Ra、<sup>222</sup>Rn**
- **the frequency about the waste water are 1time per month, the rest of the monitoring items are 2 time a year .**

## 1. 2 Regulatory system about Norm

### standards

- Classification of radioactive waste: The exemption level for substances containing natural radionuclides is 1 mSv/a.
- GB27742 : The exemption level for natural radionuclides is 1Bq/g, which is consistent with IAEA RS-G-1.7
- GB26451-2011 The emission limits of radioactive concentration in waste gas and wastewater of rare earth industry are given.
- GB 8978-1996 Limits of radioactive concentration of wastewater discharged from general industries are given.
- GB23727-2011 Relevant regulations on radiation environmental protection in uranium mining and metallurgy are given, such as dose constraint, emission standards, environmental monitoring, waste treatment and disposal, etc., which can be used for reference by NORM industries.



## **2、 Technical Requirement**

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## 2.1 Dose constraint value of public

- The dose constraint value of public in NORM industry must meet the requirements of "Basic standards for protection against ionizing radiation and for the safety of radiant sources" (GB 18871-2002), less than 1mSv/a.
- Public dose constraints are not only related to source, but also to environmental characteristics. For different types of NORM facilities, public dose constraints should be reasonably determined according to facility and environmental characteristics, which can be divided into 0.3mSv/a, 0.3-0.5mSv/a and greater than 0.5 mSv/a.
- Usually, public dose in NORM industry is less than 0.3 mSv/a, which can be exempted from management.

## 2. 2 Effluent Limits for Radioactivity Concentration

- The concentration control standard of exhaust gas and wastewater is stipulated in the Emission Standard for Rare Earth Industrial Pollutants, which can be used as a reference for other NORM enterprise.
- For NORM facilities with particularly high environmental impact, i.e. NORM enterprise with public doses of 0.25-0.50mSv/a, the total and concentration control standards should be formulated with reference to Regulations for radiological environmental protection in uranium mining and milling (GB23727).



## 2.3 Classification and management of solid waste



Exemption level of solid waste : 1Bq/g from GB23727-2011 equal to IAEA RS-G-1.7

The waste beyond the exemption level in NORM industry is radioactive waste, which should be returned to the original mine or disposed of in the waste mine or tailings pond.

For those NORM waste can not be disposal, it should be stored carefully in specialized facilities.



## 2.4 Monitoring



### Monitoring of radiation protection

Generally the monitoring of radiation protection consist of site monitoring and individual monitoring, sometimes it also include process monitoring.

If the dose of workers is greater than  $1\text{mSv/a}$ , the work site monitoring should be made. The frequency may be adjust based on the situation of the site.

If the dose of workers is greater than  $5\text{mSv/a}$ , the work site monitoring must be made usually, and the individual monitoring should be made.





## 2.4 Monitoring



### **Effluent and Environment monitoring**

Requirements for effluent and environmental monitoring shall be specified in accordance with "The rules of environmental radiation monitoring and information open about the enterprises accompanying radioactive mines" and the characteristics of the project.

Effluent and environmental monitoring include two parts, one is the monitoring of effluent, the other is the monitoring of the environment around the facility, which particular emphasis on the monitoring of tailings reservoirs.

For the monitoring of tailings reservoir, the nuclide types should be adjusted according to the relevant provisions of GB23727; For tailings reservoirs with specific activity of solid waste less than 10 Bq/g, the monitoring frequency can be reduced appropriately.



## 2.4 Monitoring



### Solid waste monitoring

The purpose of solid waste monitoring is to exempt and classify waste.

Generally, the combination of dose rate inspection and sampling analysis can reduce the analysis time and improve the work efficiency.

In addition, monitoring should be particularly careful to ensure that the waste residue that meets the requirements of relevant standards can be used for building materials.



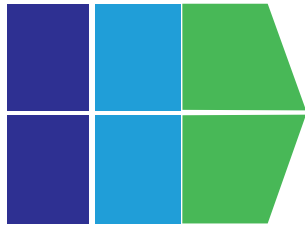
## 2. 5 Decommissioning



For the newly built NORM facilities, a reasonable preliminary decommissioning plan should be formulated. It is important to manage the waste generated and find suitable disposal sites.

The difficulty of decommissioning NORM facilities is the disposal of decommissioned wastes. If there are existing mines around, returning to mines is a preferred method.

If there is no tailings pond around NORM facilities or the conditions for landfilling waste mines, it will bring great difficulties to dispose of the waste generated in decommissioning.



## **3、 Conclusion and Suggestion**

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### 3、 Conclusion and Suggestion

At present, the regulations and standards for NORM industry are not perfect, but only the several relevant standards and management requirements for key NORM industries, such as rare earth, niobium, tantalum and vanadium, are effectively monitored.

In accordance with the requirements of IAEA and other countries, and based on the idea of graded management, the existing industries should be managed by graded management , and different management and technical requirements should be put forward.

It is suggested that further study on comprehensive utilization and disposal of residue should be carried out, and treatment and disposal methods of residue should be put forward to provide a way out for waste minimization and harmlessness.



### 3、 Conclusion and Suggestion



It is suggested that the environmental impact assessment of NORM facilities with occupational exposure dose greater than 5 mSv/a and specific activity of solid waste greater than 10 Bq/g, should be carried out to find out the weak links and to improve the measures.

Based on the results of radiation assessment and related research results of existing NORM facilities, it is suggested to speed up the formulation of regulations and standards for radiation protection and environmental protection of NORM facilities, that will provides the basis for standardizing the radiation environment supervision in the industry.



Thanks !