

Thorium Regulation in the U.S.

From Rare Earths to Reactors...

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Overview of Thorium Regulation



U.S. Nuclear Regulatory Commission

- Regulates “source material”, which includes “uranium and thorium” in “any physical or chemical form”
- May transfer its authority to regulate source material to “Agreement States”
- Licenses construction and operation of civilian nuclear reactors, including thorium reactors
- Licenses export/import of thorium and thorium products



U.S. Department of Energy

- Since the Energy Reorganization Act, has responsibility for the promotion of nuclear energy
- Rare earths addressed in DOE’s Critical Materials Strategy
- Facilities and supports development of new nuclear technologies (e.g., advanced reactors)

Source Material Regulation

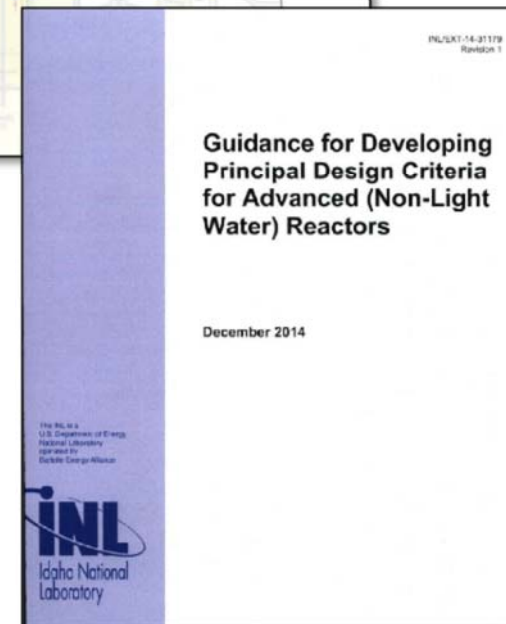
- **NRC jurisdiction** extends to processing of rare earth ores that contain $>0.05\%$ U+Th by weight
- **No license** required if processing ore $<0.05\%$ U+Th by weight
- But, if during processing, U+Th concentration exceeds **0.05% by weight**, triggers requirement to:
 - **Obtain license** to possess “source material”
 - **Obtain license** to use (i.e., process) “source material”
 - **Dispose of wastes** as “low-level radioactive waste” (unless exempted)
- Two exceptions:
 - **Exemption for unrefined and unprocessed ore** without regard to source material concentration
 - **Exemption for thorium contained in rare earth metals and compounds, mixtures, and products containing** not more than **0.25% by weight** U+Th.

Oversight of Rare Earth Facilities

- Historically, regulation of rare earth facilities has been problematic
 - Large quantities of thorium-contaminated waste
 - Not subject to same licensing/decommissioning requirements as other NRC-licensed facilities
 - Legacy clean-up issues at numerous facilities around U.S.
- Molycorp's Mountain Pass facility
 - Deposit contains 8%-12% rare earth oxides, mostly in the mineral bastnasite
 - Dominated worldwide REE production from the 1960s-1980s, ramping up again
 - Regulated by California, which is an NRC Agreement State
- Rare Element Resources' Bear Lodge Project
 - World-class deposit in Wyoming
 - Application submitted to NRC in May 2015

Advanced Reactors

- Recent interest in advanced reactors, including thorium reactors
 - But, NRC licensing processes focused on uranium-fueled, light water reactors
 - New NRC strategy for advanced reactor licensing
- DOE/NRC joint licensing initiative for advanced reactors
 - Establish guidance for advanced reactor applications
 - Support commercialization
 - Reduce regulatory uncertainty
 - Improve NRC Staff review guidance
 - Improve timeliness and efficiency of advanced reactor licensing



Import/Export Licensing Requirements

NRC Part 110

- Regulates export and import of nuclear reactors, facilities, equipment and material
 - Source material
 - Reactors and major components
 - Related fuel cycle components
- Exports of related technology and software subject to DOE control
- NRC issues two types of licenses:
 - General License authorizes selected exports or imports without the need to request written authorization
 - All other exports of items require Specific License

DOE Part 810

- Controls export of technology related to “special nuclear materials”
- Controlled exports include:
 - Technology, software, and assistance (including services/training) related to reactors, and related equipment and components
 - Technology, software, and assistance related to fuel cycle facilities and related equipment and components
 - Technology and assistance related to special nuclear materials
- Require General or Specific Authorization from DOE

Export Controls Apply Broadly

Part 810

Americanized technology

- Foreign technology modified or customized for use in the United States in a substantive way
- Includes modifications made to conform a foreign reactor to US codes, standards and practices

Deemed exports

- Providing any NSSS Data or Service to an individual who is a foreign person located in the US (even though the information did not cross a U.S. border, it effectively was shared with another country)
- A foreign person is an individual who is not a US citizen, green-card holder, asylee or refugee

Deemed re-exports

- Providing any NSSS Data or Service in a foreign country to a citizen of a third country (e.g., provision of U.S.-origin data in France to Chinese citizen)



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Tyson Smith is a partner in the firm's San Francisco and Washington, D.C. offices who has concentrated his legal practice in the area of nuclear energy regulation since 2003.

Mr. Smith represents and provides advice to clients throughout the nuclear industry on nuclear licensing, compliance, and litigation matters. He has been extensively involved in the renewal of licenses for existing nuclear facilities and in the licensing of new power reactors, enrichment facilities, and uranium recovery facilities. He regularly assists clients in compliance and enforcement matters, including internal, civil, and criminal investigations and nuclear export controls. Mr. Smith also advises clients on commercial issues, including nuclear insurance and liability and decommissioning. Mr. Smith represents clients in administrative and federal court litigation, including appeals to the United States Court of Appeals.

Prior to joining the firm, Mr. Smith served as an attorney for the U.S. Nuclear Regulatory Commission, where he represented the agency in litigation and provided counsel on licensing, rulemaking, and enforcement issues. Mr. Smith's nuclear energy career began as a hydrologist for the U.S. Geological Survey, where he researched the performance of low-level radioactive waste disposal sites.