

*Legal Aspects of
TENORM Regulation
in the United States*

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NORM VI

Core Concept = Jurisdiction

- ◆ **Legal authority over a person or thing**
- ◆ **U.S. Congress makes Federal Law (Art.I, Sec. 1 of U.S. Constitution)**
- ◆ **Federal law trumps State law (Art VI, Cl.2)**
- ◆ **Powers not delegated to Congress are reserved to the States (Amendment X)**
- ◆ **States retain general "Police Power" to protect health, safety (including radiation protection)**

Federal Preemption

State laws that interfere with or are contrary to Federal law are invalid (U.S. Constitution Art.VI, Cl.2)

Federal Preemption of State Regulation of Certain Radioactive Materials

- ◆ **Atomic Energy Act of 1954 ("AEA," 42 USC 2011, et seq.)**
- ◆ **AEA defines "Source, Byproduct, Special Nuclear Materials"**
- ◆ **State regulation of health & safety aspects of AEA materials held PREEMPTED**

Pacific Gas & Electric v. State Energy Res. Cons. & Dev. Comm'n., 461 US 190 (1983) [Held: State regulation of health & safety aspects of AEA materials preempted]

U.S. v. Kentucky Nat. Res. & Env. Prot. Cabinet, 252 F.3d. 816 (6th Cir. 2001) [Invalidated State law restricting DOE Landfill from accepting waste exhibiting radioactivity above de minimis level.]

NRC definition of source material

(1) Uranium or thorium, or any combination thereof, in any physical or chemical form or

(2) ores which contain by weight one twentieth of one percent (0.05%) or more of: (i) Uranium, (ii) thorium or (iii) any combination thereof.

Section 62 of the AEA

Unless authorized by a general or specific license issued by the [Nuclear Regulatory] Commission, which the Commission is authorized to issue, no person may transfer or receive in interstate commerce, transfer, deliver, receive possession of or title to, or import into or export from the United States any source material after removal from its place of deposit in nature, except that licenses shall not be required for quantities of source material which, in the opinion of the Commission, are unimportant (42 USC 2092)

Unimportant quantities of source material 10 CFR 40.13(a)

Any person is exempt from the regulations in this part and from the requirements for a license set forth in section 62 of the Act to the extent that such person receives, possesses, uses, transfers or delivers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than one-twentieth of 1 percent (0.05 percent) of the mixture, compound, solution or alloy.

Unimportant Quantities of Source Material 10 CFR 40.13(b)

(b) Any person is exempt from the regulations in this part and from the requirements for a license set forth in section 62 of the act to the extent that such person receives, possesses, uses, or transfers unrefined and unprocessed ore containing source material; provided, that, except as authorized in a specific license, such person shall not refine or process such ore.

Unimportant Quantities of Source Material 10 CFR 40.13(c)

Any person is exempt from the regulation in this part and from the requirements for a license set forth in section 62 of the Act to the extent that such person receives, possesses, uses, or transfers:

(1) (vi) rare earth metals and compounds, mixtures, and products containing not more than 0.25 percent by weight thorium, uranium, or any combination of these

Source Material vs. TENORM

- **<0.05% U+Th = Unimportant Quantity**
- **$\geq 0.05\%$ U+Th = Licensable Source Material**
- **ORE > 0.05% U+Th = Source Material, exempt unless PROCESSED**
- **ORE = undefined in the AEA or NRC Rules**

Definitions of TENORM

National Academy of Sciences (EPA):

Technologically enhanced naturally occurring radioactive materials are any naturally occurring radioactive material not subject to regulation under the Atomic Energy Act whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the natural state by human activities.

Definitions of TENORM

CRCPD Part N

Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) means naturally occurring radioactive material whose radionuclide concentrations are increased by or as a result of past or present human practices. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include “source material” and “byproduct material” as both are defined in the Atomic Energy Act of 1954, as amended (AEA 42 USC §2011 *et seq.*) and relevant regulations implemented by the NRC.

State 1 Definition of TENORM

**Virginia Definition of TENORM in 12VAC5-481-10.
[corresponds to Part N]**

"Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)" means . . . naturally occurring radionuclides whose concentrations are increased by or as a result of past or present human practices. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include uranium or thorium in "source material" as defined in the AEA and NRC regulations

State 2 Definition of TENORM

Idaho TENORM Definition *IDAPA 58.01.10 - Rules Regulating the Disposal of Radioactive Materials*

TENORM. Any naturally occurring radioactive materials not subject to regulation under the Atomic Energy Act whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the natural state by human activities. TENORM does not include source, byproduct or special nuclear material licensed by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act of 1954.

NRC Consideration of TENORM

Hydro Resources, Inc. considered doses from uranium mine overburden in licensing

10 CFR 20 “Background Radiation” = “naturally occurring radioactive material” excluding “source, byproduct... not regulated by the Commission”

“NORM is equivalent to TENORM” both of which are NOT regulated by NRC

Doses from NORM and TENORM are NOT considered for NRC licensing purposes.

TENORM vs. Source Material Questions

- ◆ **HRI involved unrefined / unprocessed ore**
- ◆ **What if a State sought to regulate unimportant quantity source material as TENORM?**
- ◆ ***AEA Section 62: licenses shall not be required for quantities of source material which, in the opinion of the Commission, are unimportant***
- ◆ **Does AEA Section 62 preempt State regulation of unimportant quantities?**
- ◆ **State argument: regulatory jurisdiction attaches to Ra, not to U or Th parent isotope**

NRC's troubles with source material

NRC core mission = nuclear fuel cycle

Non-fuel cycle source material issues detract from the core mission

How can NRC transfer or limit its jurisdiction over source material?

Part 40 Working Group Studied this Issue

NRC conclusion: Legislative amendment of AEA necessary to limit NRC jurisdiction over source material

The Heritage Minerals Case

- ◆ **Mineral Sand Processing in Lakehurst, NJ**
- ◆ **Zircon, Ti ore (ilmenite, rutile) + Monazite**
- ◆ **Monazite stream = separate pile**
- ◆ **NRC license attaches to Monazite pile**
- ◆ **NJ dispute: the State wants the whole site cleaned**
- ◆ **Result: NRC jurisdiction limited to Monazite; State responsible for unimportant quantities**

Mineral Separation: The case of ephemeral source material

- ◆ **Rare Earths separation in CA**
- ◆ **Ore Separation: electromagnetic, electrostatic, gravimetric**
- ◆ **Th concentration $>0.05\%$ in the separation circuit**
- ◆ **Th concentration $<0.05\%$ as it exits**
- ◆ **NRC: transient creation of licensable source material is licensable activity**

Some Practical Examples



Investment Casting in Oregon



Oregon NORM Regulations

- ◆ **NORM Rules generally follow Part N Model TENORM Rule**
- ◆ **BUT – Statutory prohibition of disposal of Any Radioactive materials in Oregon (ORS 469.525)**
- ◆ **PROBLEM: Investment casting “shell” wastes contain zircon, alumina and therefore NORM**

Oregon's NORM disposal solution

The “Pathway Exemption”

Naturally occurring radioactive materials are exempt from the provisions of OAR 345-050-0006 if the Council or the Department of Energy finds that accumulation of material cannot result in exposures exceeding 500 millirem of external gamma radiation per year...

OAR 345-050-0035

TENORM Case in State A

- ◆ **Ti Mineral processing facility**
- ◆ **Vast quantity of iron oxide (IOX) on site**
- ◆ **~1Bq/g U, in reasonable equilibrium**
- ◆ **Opportunity to recycle IOX as iron ore**
- ◆ **Opportunity to clean up the site**

State A – cont'd

- ◆ **State: IOX > 0.185 Bq/g [5pCi/g] Ra-226+228 is TENORM**
- ◆ **Specific License is required for all TENORM [but not in State's Rules]**
- ◆ **Only 2 kinds of TENORM licenses are issued: possession or disposal**
- ◆ **State is licensing the Ra progeny, not U parent**

TENORM Cont'd

◆ **State Administrative Procedures Act:**

RULE. Each agency regulation, standard, or statement of general applicability that implements, interprets, or prescribes law or policy...

State A's TENORM policy = A RULE

TENORM, Cont'd

- ◆ **State Administrative Procedure Act:**
- ◆ **Each Rule shall be Published in the State Register**
- ◆ **Reasonable period of time for public comment**
- ◆ **Failure to follow APA = invalidates agency action**

Legal Challenge to State A

- ◆ **State engaged in rulemaking without following APA requirements, thus the State action is invalid**
- ◆ **Imposing licensing requirement on unimportant quantity of source material is preempted by Sect. 62 of the AEA**

Additional Persuasive Information

**IAEA SAFETY STANDARDS SERIES
Application of the Concepts of Exclusion,
Exemption and Clearance, SAFETY GUIDE
No. RS-G-1.7**

- ◆ **“It is usually unnecessary to regulate radioactive material in activity concentrations below” 1 Bq/g (10Bq/g for K-40)**

Additional Information, Cont'd

Partitioning of NORM during ferrous metal smelting:

- **U, Th, Ra reports to SLAG**
- **Pb-210, Bi-214, Po-210 reports to FURNACE DUST**
- **Mass-balance for typical smelter throughput show very high dilution of NORM nuclides**

Outcome

- ❖ **Settlement Agreement**
- ❖ **IOX < 1 Bq/g not licensed; free to export**
- ❖ **NORM Awareness Program Implemented**
- ❖ **Specific License issued for Ra Scales on process equipment being decommissioned**
- **Survey to identify Ra scales**
- **Final site survey for license termination**

TENORM and CERCLA

**Comprehensive Environmental Response,
Compensation and Liability Act (CERCLA or
Superfund):**

Release or Threatened Release

Of a Hazardous Substance (including all radionuclides)

From a Facility

Causing Plaintiff to incur Response Costs

**All Potentially Responsible Parties (PRPs) jointly and
severally liable**

Amoco Oil Co. v. Borden

Private cost recovery action under CERCLA, on appeal

**Amoco purchased former phosphate processing facility
from Borden**

Phosphogypsum (Ra-226 >0.185 Bq/g (5 pCi/g))

**“Off-pile wastes” (Ra-226 scales in junk process
equipment) >>>0.185 Bq/g (5 pCi/g)**

Amoco sought recovery of environmental cleanup costs

Holding in Amoco v. Borden

A standard of justification is useful for determining whether a release of a “hazardous substance” has caused the incurrence of response costs

Response costs are justifiable for any release that violates any applicable state or federal standard, including the most stringent.

If Radium concentrations exceed an applicable or relevant and appropriate standard (ARAR), then cleanup is justified. Uranium Mill Tailings Standard of 0.185 Bq/g (5 pCi/g) selected as the ARAR.

Other NORM CERCLA cases

Stauffer Chemical – Tampa, FL [phosphoric acid]

Li Tungsten – Glen Cove, NY [tungsten recovery]

West Orange, NJ – Radium tailings in stucco

Other Considerations

California Safe Drinking Water and Toxics Enforcement Act of 1986 ("Proposition 65"): clear and reasonable warning for product causing exposure to chemical known to the State of California to cause cancer or reproductive harm. All radionuclides = Prop. 65 listed substances.

OSHA Hazard Communication Standard – does NOT apply to radionuclides. BUT – if you've got NORM in your product, potential liability for failure to warn.

Conclusions

- **US Regulation of natural radionuclides complicated by jurisdictional boundaries of the Atomic Energy Act**
- **No definition of “TENORM” at the federal level**
- **TENORM defined differently by the States**
- **The situation may only change if Congress amends the AEA to limit NRC’s source material jurisdiction to uranium, thorium that is “purposely extracted.”**
- **The distinction between NORM and TENORM creates unnecessary complexity and should be avoided. Regulatory consideration of natural radioactivity should be based on realistic assessment of occupational and public dose.**