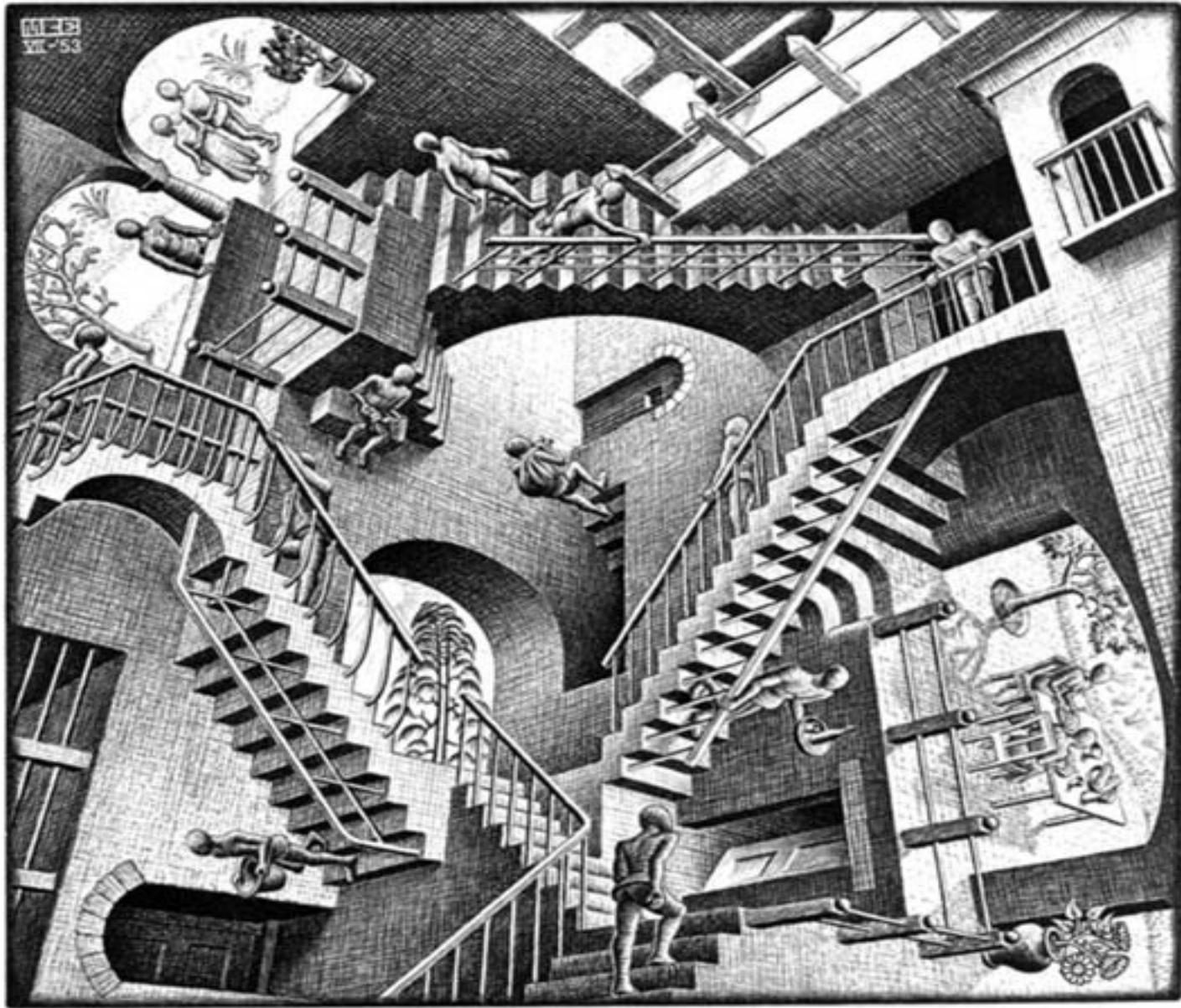


*Legal Aspects of
NORM/TENORM Regulation
in the United States*

Charles T. Simmons

OCTOBER 28, 2009



Jurisdiction

- ◆ Legal authority over something
- ◆ Congress makes Federal Law (Art.I, Sec. 1)
- ◆ U.S. Federal law trumps State law (Art VI, Cl.2)
- ◆ Powers not delegated to Congress are reserved to the States (Amendment X)
- ◆ State: "Police Power" to protect health, safety

Federal Preemption

- ◆ **State laws that interfere with or are contrary to Federal law are invalid (Art.VI, Cl.2)**
- ◆ **Explicit Preemption**
- ◆ **Implicit Preemption**
 - **Field Preemption (entire field = Fed)**
 - **Conflict Preemption (Can't comply with both Fed and State)**

Federal Preemption of State Regulation of Radioactive Materials

- ◆ Atomic Energy Act of 1954 (AEA, 42 USC 2011, et seq.)
- ◆ “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) [Invalidated Cal. Law restricting nuclear power plant construction until permanent waste depository approved.]

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.]

The AEA and TENORM

AEA definition of Source Material

The term “source material” means (1) uranium, thorium, or any other material which is determined by the Commission pursuant to the provisions of section 61 to be source material; or (2) ores containing one or more of the foregoing materials, in such concentration as the Commission may by regulation determine from time to time (42 USC 2014(z)).

NRC's refined definition of source material

Source Material means: (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. Source material does not include special nuclear material

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. The exemption contained in this paragraph does not include byproduct material as defined in this part.

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.

Unrefined and Unprocessed Ore

Unrefined and unprocessed ore
means ore in its natural form
prior to any processing, such as
grinding, roasting or
beneficiating, or refining.

10 CFR 40.4

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. NORM

- **<0.05% U+Th = Unimportant Quantity**
- **≥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**

Source Material

Zircon $\geq 0.05\%$ U+Th = licensable source material, BUT-

If an unrefined/unprocessed ore, then can POSSESS without license

However, License needed to process.

**Zircon $< 0.05\%$ U+Th = "unimportant quantity"
no license required to possess or process**

Importation into the U.S.

Source material $>0.05\%$ U, Th may be imported into the U.S. under a "General License" 10 CFR 110.27, provided the consignee is licensed to possess.

Note: shipping paper declaration of general licensed import.

“Byproduct Material”

***11e1 Byproduct material* means—
Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or using special nuclear material (Anthropogenic radioactivity)**

11e2 Byproduct Material

the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content

11e3 Byproduct Material

any discrete source of radium-226 that is produced, extracted, or converted after extraction (before, on, or after the date of enactment of section 651(e) of the Energy Policy Act of 2005), for use for a commercial, medical, or research activity

What is a 'discrete source?'

Discrete source means a radionuclide that has been processed so that its concentration within a material has been purposely increased for use for commercial, medical, or research activities.

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.

Definitions of TENORM

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

"Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)" means, as used in Part XVI ([12VAC5-481-3460](#) et seq.) of this chapter, 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

Definitions of TENORM

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

Technologically Enhanced Naturally Occurring Radioactive Material (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 10 CFR 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

NRC conclusion: only by amending the AEA

The Heritage Minerals Case

- ◆ Mineral Sand Processing in Lakehurst, NJ
- ◆ Zircon, Ti ore (ilmenite, rutile) + Monazite
- ◆ Gravimetric, electromagnetic, electrostatic
- ◆ Monazite stream = separate pile
- ◆ NRC license attaches to Monazite $\geq 0.05\%$ U+Th
- ◆ NJ dispute: wants the whole place cleaned

Mineral Separation: ephemeral source material

- ◆ Rare Earths separation in CA
- ◆ Same technology: electromagnetic, electrostatic, gravimetric
- ◆ Th concentration $\geq 0.05\%$ 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**
- ◆ **BUT – Statutory Prohibition on disposal of Radioactive Waste in Oregon (ORS 469.525)**
- ◆ **PROBLEM: Lots of things are radioactive – case in point: investment casting “shell” (zircon, alumina)**

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 5 mSv [500 millirem] of external gamma radiation per year...

OAR 345-050-0035

TENORM Case in State A

- ◆ **Ti Mineral processing facility**
- ◆ **~ 10 hectares x 3 m deep iron oxide (IOX) impoundment**
- ◆ **~ 1Bq/g U, in reasonable equilibrium**
- ◆ **Opportunity to sell IOX (export)**
- ◆ **Opportunity to clean up the site**

TENORM – cont'd

- ❖ State: says CRCPD Part N is followed as “guidance”
- ❖ $\text{IOX} > 0.185 \text{ Bq/g Ra-226+228} = \text{TENORM}$
- ❖ State is licensing Ra progeny, not U
- ❖ Specific License is required for all TENORM [but not in State's Rules]
- ❖ Only 2 kinds of TENORM licenses are issued: possession or disposal

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, or that describes the organization, procedure, or practice requirements of any agency....

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**

Administrative Appeal

- ◆ **State's TENORM licensing policy = a RULE**
- ◆ **TENORM licensing requirements not in Rules**
- ◆ **State engaged in rulemaking without following APA requirements = invalid**
- ◆ **Imposing licensing requirement on unimportant quantity of source material is preempted by Sect. 62 of the AEA**

Additional 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 in slag and dust**

Outcome

- ❖ **Settlement Agreement**
- ❖ **IOX < 1 Bq/g not licensed; free to export**
- ❖ **NORM Awareness Program Implemented**
- ❖ **Specific License issued for any Ra Scales on process equipment being decommissioned**
- **Survey to ID Ra scales**
- **Cleaning**
- **Package / Transport for disposal**
- **Site survey for unrestricted release**

TENORM and CERCLA

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

**Release or Threatened Release
Of a Hazardous Substance
From a Facility**

Causing Plaintiff to incur Response Costs

No statutory defenses (Act of God, War, 3rd party)

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

Amoco Oil Co. v. Borden

Private cost recovery action under CERCLA, on appeal

Amoco (P) purchased former phosphate processing facility
from Borden (D)

Phosphogypsum Pile (Ra-226 >5 pCi/g)

"Off-pile wastes" (Ra-226 scales in junk process
equipment) >>>5 pCi/g

Amoco sought recovery of response costs [entitled to
recover response costs consistent with National
Contingency Plan]

Borden's Arguments

All matter is radioactive to some degree

Without quantitative limit, CERCLA liability could attach to the release of any substance.

Remedial actions taken in response to hazardous substances as they occur naturally are excluded from the NCP and are therefore not recoverable.

Holding in Amoco v. Borden

Some 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.

Ra-226 = Hazardous Air Pollutant (CAA Sect. 112)

Hazardous Air Pollutants = CERCLA hazardous substances

Amoco v. Borden, Cont'd

The cleanup standard is any “Legally applicable or relevant and appropriate requirement” or “ARAR” set by law

Ra-226 exceeded limits set in Subpart B of the Inactive Uranium Mill Tailings Standard

ARAR = Ra-226 5 pCi/g [0.185 Bq/g]/15 cm; 15 pCi/g [2.8 Bq/g] below 15 cm

Other NORM Remediation Cases

Stauffer Chemical – Tampa, FL [elemental P; phosphoric acid]

Li Tungsten – Glen Cove, NY [tungsten recovery]

West Orange, NJ – Radium tailings in stucco

Pocatello, ID – [elemental phosphorous] notable because this case resolved under RCRA Consent Agreement using graded decision-making guidelines

Other Regulatory 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. Radionuclides = listed.

OSHA Hazard Communication Standard – does NOT apply to radionuclides (29 CFR 1910.1096 applies). BUT – if you've got NORM in your product, potential liability for failure to warn.

Insurance policy considerations: pollution exclusion; radioactive materials exclusion; save old policies

Resolution?

- ◆ **Distinguish “Fuel Cycle materials” from NORM**
- ◆ **Eliminate “TENORM” = misleading**
- ◆ **Uniform State NORM regulations**
- ◆ **Graded approach to regulation**
- ◆ **Better education: industry, regulators and the public**