NORM – A SPECIAL CASE IN THE U.S.?

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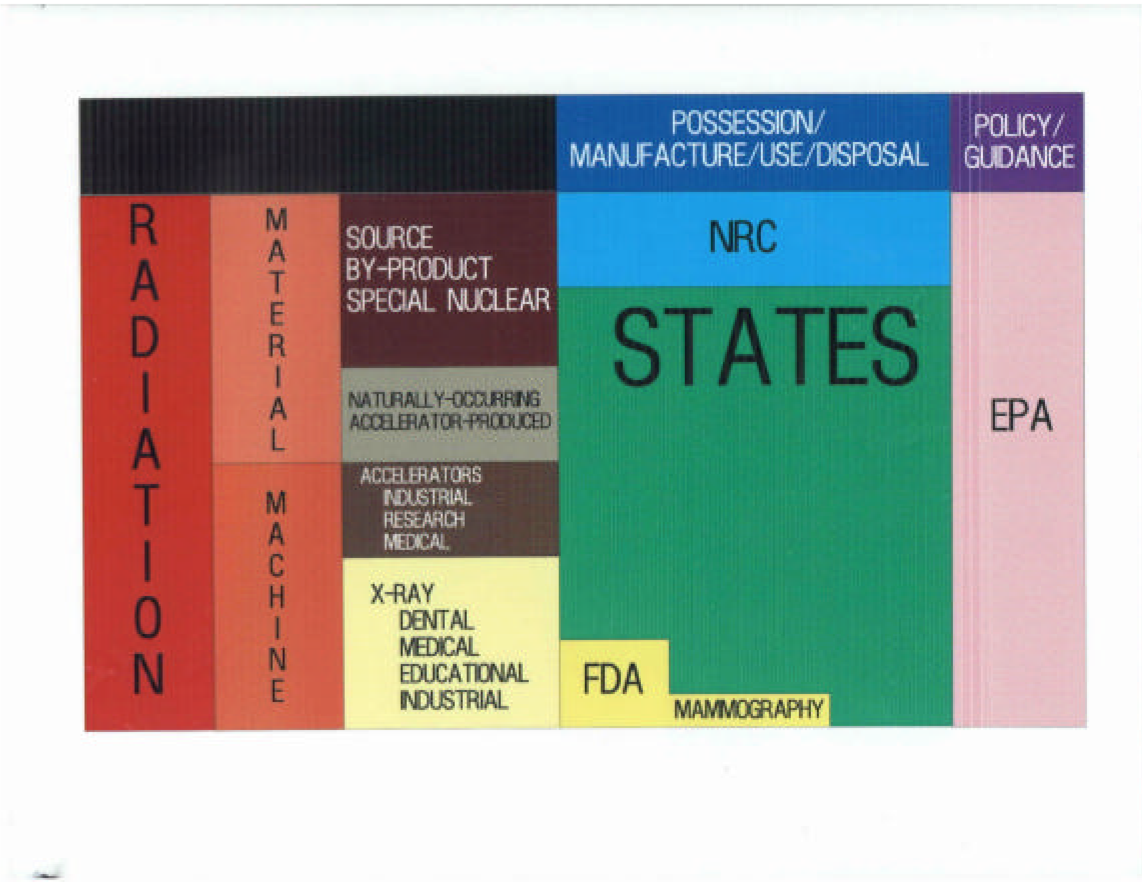
ABSTRACT

Based on 32 years of experience in a state radiation regulatory program this paper will examine the many differences that exist in the United States in the manner in which naturally occurring radioactive material (NORM) is regulated versus the manner in which other radioactive material is regulated. In particular it will highlight the wide disparity in the risks allowed to the public from technologically enhanced naturally occurring radioactive material (TENORM) waste versus Atomic Energy Act (AEA) regulated radioactive material. In addition some comparisons will be made between the level of acceptable risk from machine sources of radiation and AEA radioactive material. The differences in the Conference of Radiation Control Program Directors Suggested State Regulations Part N for TENORM and the accepted national standards for release of surface contaminated materials will be highlighted. Specific references will be made to the recent decision of the Secretary of the Department of Energy to restrict the release of decontaminated nickel to the metals market. In addition the dramatic differences in the level of protection provided by the new standard promulgated by the Environmental Protection agency for radionuclides in drinking water will also be highlighted.

In the United States today TENORM is only regulated by the states. It is a subset of the non-AEA radioactive material, which is not regulated at the federal level. Accelerator produced radioactive material is another subset of the non-AEA radioactive material. TENORM is important because it is associated with numerous activities of man and has a greater potential for exposing the public than most other radioactive material. This is one of the major dichotomies with this issue, the radioactive material with the most potential to expose the public is the one with the least regulation and even where there is regulation it does not provide the same level of protection that is provided for AEA regulated radioactive materials. Radium, one of the most dangerous radioactive materials known, is a major component of TENORM. Numerous instances have occurred involving TENORM in which the public has received significant exposures. Table I below generally depicts the regulatory scheme in the United States.

Table I.



As can be seen, in the United States the majority of the sources of radiation are regulated by the states and many are regulated without direct federal support. The source of radiation most heavily regulated is the so-called AEA regulated radioactive materials, which were originally developed out of the atomic weapons program of the United States government. In the intervening years there has been recognition within the state regulatory community that the regulation of sources is out of sync with the risk presented by the source. The primary reason that the states recognize this is that states are given a broad mandate to protect the public from the hazards of radiation. Thus all sources, machine-produced and radioactive material are regulated to protect the public not just a select subset. In attempting to manage these programs one wishes to maximize the available resources to effect the greatest reduction in exposure to the public. It is quickly apparent to any competent manager that it is a huge waste of resources to regulate miniscule risk from one source while ignoring the larger risk posed by another source. In addition it is difficult in some instances to determine the origination of some sources of radiation. For example a steel beam contaminated with uranium; did it come from the dangerous nuclear cycle or the harmless NORM cycle? If radiation protection is the goal then it matters not from which cycle it originated but only matters in the amount and type of radiation that is present and what radiation risks it presents.

The states, for the most part, believe that TENORM should be regulated just as AEA radioactive material is. No more, no less. However that has not been done in the United

States. Through the Conference of Radiation Control Program Directors (CRCPD) the states have developed a standard for the specific regulation of TENORM. Some states regulate TENORM under the standards used for AEA radioactive material. While this standard is a great first step there are some problem areas. During the development of the standard the states with the most interest were the states with major generators of TENORM waste. Some of the generators of TENORM are very large companies that wield great influence in certain states. As a result the Suggested State Regulations developed by the CRCPD for TENORM provide better protection than was being provided in those states however they do not provide the same level of protection to the public as the AEA regulations.

The specific areas of difference are the development of a volumetric standard/exemption level of 5 pCi/gm (^{226}Ra or ^{228}Ra, any combination) for materials, a surface gamma radiation level for the release of internally contaminated equipment, a provision allowing a general licensee to possess a specifically licensed device without a specific license, and release limits for surface contamination that are much higher than REG GUIDE 1.86. Each of these is discussed in more detail below.

In Part N there is a volumetric standard established for materials. It's five picocuries per gram for materials contaminated with Ra 226 or Ra 228. It is assumed this is based on the EPA standard for the release of land with 5 pCi/g of radium in the first 15 cm and 15 pCi/g in the soil below 15 cm. One model calculates the dose from this level of radium in soil an order of magnitude greater (~1000 mrem/y) than the 100 mrem/yr public protection standard and well above the cleanup limits proposed by the NRC or the EPA. In Part N the 5 pCi/g is expanded to allow the release of anything at this level. Part N also provides for the unrestricted release of internally contaminated equipment using a state determined level (usually 25 or 50 μR/hr) using only a gamma detection instrument outside the surface exterior of the equipment. There is no accounting for the thickness, density, or configuration of the equipment being surveyed.

Also in Part N acceptable surface contamination levels for alpha are 5000 dpm/100 sq cm for average, 15,000 for the maximum, and 1000 for removal versus the 1.86 Reg Guide levels for alpha of 100 for the average 300 for the maximum and 20 for removable contamination.

Table II.Acceptable Surface Contamination Limits Alpha, in Dpm/100 Sq Cm

	AVERAGE	MAXIMUM	REMOVABLE
PART N	5,000	15,000	1,000
1.86	100	300	20

A Part N general licensee is also allowed to possess a specifically licensed device without obtaining a specific license.

In the revised drinking water standard recently promulgated by the Environmental Protection Agency the differences between man-made radionuclides and naturally occurring radionuclides are even more dramatically emphasized. In this case the man-made beta and photon emitters continued to be regulated at the previous 4 mrem per year standard while radium maintains a separate standard. At least now there is a uranium standard, however, the uranium standard actually rose from the 1991 proposed 20 micrograms per liter to 30 micrograms per liter. At the 1991 proposed 20 micrograms per liter the projected dose from someone drinking different isotopes of uranium at this concentration range from 1.3 mrem per year for uranium U-238 with daughters to 410,000,000 mrem per year for U-232. Natural uranium comes in at 2.8 mrem per year. Obviously at 30 micrograms per liter the dose is half again as much. The new Drinking Water Standard ignores Pb-210, K-40, NORM beta-gamma emitters and other NORM alpha emitters. Thus instead of the four mrem per year standard we hear iterated by EPA for ground water, what really exists is a standard that addresses only certain manmade radionuclides at the four mrem per year limit while NORM isotopes are allowed a much greater dose or even unlimited dose. Similar examples exist in other EPA standards.

It is my belief that the human body cannot distinguish between a radiation from a manmade radioactive material and that from a naturally occurring radioactive material. That is radiation is radiation and a rem is a rem. We cannot continue to waste resources reducing miniscule risks to zero while ignoring the larger risks from the same hazard. It is even more ludicrous to expend resources trying to determine if a radioactive atom is a dangerous one or a good one all based on where it originated not on the actual level of hazard it presents. However, this is exactly what we are doing.