

United States Department of the Interior

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Dear Don:

At the CIRRPC briefing on the NRC policy statement on BRC, Bill Morris mentioned that there will be an extensive review of 10CFR40, and suggested that I communicate with you about some aspects of Part 40 that pose problems that may not have been considered previously.

In another life I am a practicing RSO and have primary responsibility for the Geological Survey's source material license. There have long been points of confusion about the extent of applicability of Parts 40, 19, 20, and 21 to rock cores and rock and mineral samples, particularly where the organization is an NRC licensee. As a result of differing points of view within the USGS, I recently telephoned Carol Connell, of your Region II office, who looked into the questions and promptly responded. The regulations do not give clear answers, so I suggest that they be considered for the review. These questions are of importance to Federal and State geological surveys, mineral exploration companies (although little exploration is currently being done), museums, and natural history suppliers such as Wards Natural Science Establishment.

Under 40.13(b), which exempts unprocessed ore containing source material, a person could have unlimited quantities of high-grade pitchblende (natural uraninite, usually impure) approaching 85 percent uranium by weight, or other uranium or thorium minerals having similarly significant concentrations of source material. Significant credible radiation hazards can arise from sizeable collections of such samples, which were popular back in the heyday periods of uranium exploration. Although I can see lots of problems in trying to control such hazards, they can be more serious than many of those controlled under Part 30. Most of the radiation hazards associated with such materials are from radium, actinium, lead, bismuth, and polonium decay products of uranium and thorium in the ore and ore minerals, including Bi-210 and Po-210, which are regulated under 30.18 (cf. 30.71). I know of no exemption of Bi-210 and Po-210 contained in ores and minerals; consequently, they might all be regulated under Part 30, if not Part 40. I'm sure that NRC has no such intention, but it can be a worrisome point to the RSO. In a memorandum to my CIRRPC Policy

Panel counterpart, who passed on the comments to CIRRPC on the draft NARM report, I pointed out that the States might pass NARM regulations that would wittingly or unwittingly bring uranium and thorium minerals and ores under control because of their decay products.

Assay of ores routinely involves grinding of split drill cores or hand specimens in order to adapt to a defined geometry from which the radiation intensity can be used to gauge the uranium or thorium concentration of the material. Concentration or refining of the contained source material does not necessarily accompany the grinding. Aside from a likely increase in the emanation of radon and thoron from the material, there is no basic radiological change. The grinding operation in itself, or the state of being ground up, does not seem to me to be a desirable guide to the reclassification of it from exempt status per 40.13(b) to covered status per the definition of "unrefined and unprocessed ore" in 40.4(k). I recommend that "grinding" be explicitly excluded as a beneficiation or refining process.

Concentrating operations for purposes of assay only usually involve very minor amounts of source material per sample, but for a major analytical laboratory the aggregate may well run above the amounts specified in the general license of 40.22(a). The analytical laboratory is then faced with the formal radiation protection requirements of Part 20, which are desirable and relatively easy to comply with, and the implied bookkeeping requirements of Part 40, which serve little purpose and require fairly costly accounting of weights and source material concentrations in different fractions of the samples, and whether the sample fractions are retained, returned to the client, or disposed of as NORM or radioactive waste. Uranium exploration in the 1950 and 1975-1982 resulted in several hundred thousand analyses by various means (fluorimeter, colorimeter, radioassay, neutron activation, etc.) that should have had a material balance accounting to comply with Part 40 fully.

In 40.22(a) the phrase, "...to use and transfer..." is quite difficult to apply to source material in the context of mineral exploration, assay, and examination. The exempt unprocessed ores, often as drill cores having variable uranium and thorium concentration, most of them below the source material definition, are transferred in. The core is often split down the middle ("processed"?), one half being retained as is, and the other ground and subjected to mechanical, radiometric, and/or chemical analysis. These steps could be interpreted as "use." Although some of the ground samples and core may at that point be returned to the submitter or disposed of (transferred out), they are often stored for future reference. I was informed that source material in storage is not to be counted in the quantity limits of 40.22(a), but what, for instance, if the samples or cores are again examined (usually physically)? Is that "use"? Museums would be affected. All these are pretty points, focusing on accounting, rather than radiation safety. I do not suggest that these basically analytical research uses of source material are below regulatory concern, because the radiation levels and radon-generating capacity of the materials can be significant. Rather, it is the material balance record keeping that should be below regulatory concern.

Another problem of perhaps limited extent, but important to the USGS, is the application of Part 40 to the holder of a source material license for specific operations that do not qualify for the general license in 40.22(a), but who also has small quantities of source material held in many locations. In our case we grind samples, use depleted uranium metal for reduction of water to hydrogen, and use barrels of uranium or thorium concentrated oxides for calibration of well-logging sondes, for which purposes we hold a source material license. We also have dozens of geologists who have unprocessed and processed (ground samples or mechanically separated fractions) source material in their offices or labs, and many other labs that have a few small bottles of uranium or thorium reagents. Individually these locations have insignificant amounts of source material, but because we hold significant amounts at two or three locations, the many small holdings appear to be subject collectively to control under Part 40, which implies keeping an inventory. Protection against radiation from these sources can be accomplished fairly easily by gamma-ray surveys and radon monitoring, but material accounting is tedious and costly. Samples must be weighed and analyzed for their source material content, whether necessary for research purposes or not, and reagents must be removed from their containers for weighing if the container tare weight is not known. From time to time I obtain inventories of uranium and thorium reagents from the various labs, but whenever a lab is discontinued a few more reagents and radioactive counting standards are discovered. It would be very helpful if NRC policy or the regulations themselves provided the accommodation of 40.22(a) to the individual locations on a licensee's premises. Such accommodation could be provided as a license condition, of course, if there were a waiver of the greater restrictions of the regulations.

If you have questions or comments about this letter, I'd be happy to discuss them by phone or at one of the CIRRPC Science Panel meetings.

Cordially,



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Copy to: Carol A. Connell
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CIRRPC Policy Panel