

**From:** "Collins, Steve" <Collins@iema.state.il.us>  
**To:** "ram2@nrc.gov" <ram2@nrc.gov> *RES R.Meck*  
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**Subject:** DS161 comments

> To: Bob Meck

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You can delete the sections II.C and II.D about foodstuffs and original assignment if that detracts from our goal or is off the point. Steve Collins of Illinois Emergency Management Agency, Division of Nuclear Safety.

> <<DS161Comments0703.doc>>

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To: Bob Meck

From: Steve Collins, IL

DS161 comments

## **I. General comments**

A guidance document should not change any of the concepts, definitions, or exclusions of the BSS. If the BSS needs changed, then work on the BSS in a straight-forward open manner.

The logic flow diagram presented is workable and should be incorporated.

NORM specific generic comments:

A single value for NORM is not workable. Any single value selected would likely result in NORM regulated above and below the value. Consider source material and some minerals, such as zircon as examples. The exemptions have been derived from exempt quantities (smaller amounts), but the scope defining levels would also apply to large bulk quantities. The scope defining levels have not been derived in a way that directly relates to radiation protection, and they do not allow for application of justification. A single value for NORM would introduce confusion into the regulatory situation rather than helping. DS161 appears to address items not intended by the original assignment.

## **II. Specific comments**

### **A. IAEA Avoided Regulation of Natural Materials and Ores in TS-R-1**

The history of IAEA's adoption of the 1996 ST-1 Regulations (later TS-R-1) confirms that the expert Working Group sought to exclude natural materials and ores from the classes of materials to be regulated as "radioactive" for transportation purposes.

Paragraph 107, limiting the scope of ST-1, provides:

107. The Regulations do not apply to:

\* \* \*

(e) natural material and ores containing naturally occurring radionuclides which are not intended to be processed for use of these radionuclides provided the activity concentration of the material does not exceed 10 times the values specified in paras 401-406.

Paragraph 107(e) appropriately emphasizes that natural materials and ores that are not part of the nuclear fuel cycle or otherwise processed for their radionuclide content are

outside the scope of the regulation. Because most minerals and natural materials contain detectable concentrations of natural radionuclides, the universe of materials that could be considered to be technically "radioactive" -- and potentially subject to regulation -- is very large. Importantly, IAEA recognized that the scope of regulatory control should be limited by excluding ores and natural materials that are not exploited for their radionuclide content, provided a certain activity level is not exceeded.

Second, Paragraph 107(e) expanded the exemption beyond ores to include ores and *natural materials* containing natural radionuclides. There are many materials of natural mineral origin that could not be strictly construed to be "ores," but rather are products made from ores. Examples include high performance refractories used in extreme temperature applications such as foundries or glass furnaces and zirconia specialty ceramics. Moreover, in today's environmentally conscious market, many spent refractory materials retain their value as recyclable natural materials. That IAEA saw fit not to limit the scope of the exemption to "ores" promotes environmentally sound recycling practices for natural materials that incidentally contain natural radionuclides.

The *Report From the Special Working Group on Exemption* clarified that:

The factor 10 was selected taking the following considerations into account:

- the exemption values refer to the activity of the parent radionuclide, if daughter products are involved

Notwithstanding the omission of this important clarification in ST-1, IAEA's subsequent *DRAFT ADVISORY MATERIAL FOR THE REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL (1996 Edition) IAEA Safety Standards Series No. ST-2* (Feb. 19, 1999) makes it clear that the exemptions of Para. 107 are determined on the basis of parent <sup>238</sup>U nuclide activity. The *Advisory Material* was published because "it became increasingly evident that, while the provisions of the [IAEA] Regulations might be essentially clear and unambiguous, nevertheless they would often also be highly technical in nature and unavoidably complex." *Id.* at page 2. The draft ST-2 provided the following important clarifications to ST-1 Section 107, as follows:

107.5. The scope of the Regulations includes those natural materials or ores which form part of the nuclear fuel cycle or which will be processed in order to use their radioactive properties. The Regulations do not apply to other ores which may contain naturally occurring radionuclides, but whose usefulness does not lie in the fissile, fertile or radioactive properties of those nuclides, provided that the activity concentration does not exceed 10 times the exempt activity concentration values. Natural material and ores containing natural

occurring radionuclides which are processed are also exempt from the Regulations (up to 10 times the exempt activity concentration values) where the physical and/or chemical processing is not for the purpose of extracting radionuclides, e.g., washed sands, tailings from alumina refining etc.

*Were this not the case, the Regulations would have to be applied to enormous quantities of material that present a very low hazard.* However, there are ores in nature where the activity concentration is much higher than the exemption values. The regular transport of these ores may require a consideration of radiation protection measures. Hence, a factor of 10 times the exemption values for activity concentration was chosen as providing an appropriate balance between the radiological protection concerns and the practical inconvenience of regulating large quantities of material with naturally occurring low activity concentration.

ST-2 at page 2 (emphasis supplied).

IAEA was clearly aware that the ST-1 regulations could be misapplied to broad classes of minerals and natural materials and sought to provide appropriate safeguards against over-regulation of useful minerals and natural products in commerce. DSG 161's lowering the regulatory threshold for natural materials would undermine the exemption provided by TS-R-1 and recapture vast quantities of natural materials and ores, contrary to the IAEA committee that drafted the exemption provisions of TS-R-1.

#### **B. Strict Implementation of "DS-161" Dramatically Expands the Universe of Regulated Materials**

IAEA should be made aware that vast quantities of natural materials and ores of critical importance to the U.S. economy exceed the DSG-161 "scope defining levels" for natural uranium and/or natural thorium. These important commodities could become "radioactive" materials if IAEA were to strictly implement the scope defining levels set forth in DSG-161.

These materials include:

**i. Phosphate ore and fertilizer.** According to the U.S. Environmental Protection Agency ("EPA") *Diffuse NORM Wastes – Waste Characterization and Preliminary Risk Assessment(Draft)*(Contract No. 68-D20-155, April, 1993)(hereinafter, "EPA NORM Report"), phosphate ores range up to 10 Bq/g uranium. The U.S. Geological Survey (U.S.G.S.) reports that 32,800,000 metric tons of phosphate ore were mined in the United States in 2001. (See: U.S.G.S. Mineral Industry Surveys for Marketable Phosphate Rock, March 2002). EPA's NORM Report relates that "average"

phosphate fertilizer contains 4.2 Bq/g uranium isotopes.

ii. **Zirconium ores.** Zirconium ores in the form of zircon sand typically contain 2.5 to 3.5 Bq/g uranium and 0.5 to 1.0 Bq/g thorium, in equilibrium with decay progeny. U.S.G.S. reports that over 100,000 metric tons of zircon entered into commerce in 2001 (*Id.*).

iii. **Titanium minerals.** The titanium minerals (ilmenite, leucosene and rutile) are recognized to contain low, but measurable, concentrations of uranium and thorium, at up to 1 Bq/g. U.S.G.S. reports that 300,000 metric tons of titanium minerals were produced in the U.S. in 2001 (*Id.*).

iv. **Tungsten ores and concentrates.** Tungsten mineral ores and ore concentrates are known to contain naturally occurring uranium and thorium up to and, in some cases, exceeding 1 Bq/g concentration. Based on information reported by U.S.G.S., it is estimated that around 10,000 metric tons of tungsten ore entered into commerce in 2001 (*Id.*).

v. **Vanadium ores.** Vanadium ores may contain up to several Bq/g uranium. U.S.G.S. reports 2001 U.S. consumption of vanadium was 3,600 metric tons.

vi. **Yttrium and rare earths.** Rare earth minerals may contain several Bq/g uranium and thorium, with some exceeding "source material" levels of 10 C.F.R. 40. Data available from U.S.G.S. suggests that U.S. yttrium and rare earths ore production totaled less than 100 metric tons in 2001.

vii. **Bauxite and alumina.** EPA's NORM Report identified 2.13 Bq/g total activity concentration for bauxite. According to U.S.G.S., over 12,000,000 metric tons of bauxite and alumina were consumed in the U.S. in 2001.

viii. **Coal and coal fly ash.** U.S.G.S, in *Radioactive Elements in Coal and Fly Ash: Abundance, Forms, and Environmental Significance* (Fact Sheet FS-163-97, October, 1997), reports that while U.S. coals contain 1 to 5 ppm uranium, the element becomes concentrated by at least an order of magnitude in coal fly ash. It is estimated that hundreds of millions of tons of coal fly ash are transported annually in the U.S.

Materials not mentioned, but no less significant include: water treatment residuals that are recycled for use as soil amendment (up to 50 pCi/g activity concentration was noted by the State of Illinois in this practice); re-use or recycling of equipment and pipe contaminated with scales or Po-210 deposition; and the production and use of decorative stone (granite).

From the above discussion, it can be seen that an immense quantity of mineral ores and products containing low levels of uranium and/or thorium are transported

annually in commerce. Many of these materials exceed 1 Bq/g, and failure to implement IAEA's exemption for natural materials and ores would dramatically expand the universe of materials regulated as "radioactive" for transportation purposes.

### C. Foodstuffs

In discussion of the first incarnation of DS161 as a "scoping document," it became apparent that the Food and Agriculture Organization ("FAO") along with the World Health Organization ("WHO") and not IAEA exercised principal jurisdiction over foodstuffs. WHO, to our knowledge, has not participated in the drafting of DS161, and the document does not address radionuclides in foodstuffs. DS161 should not address foodstuffs.

### D. DS161 is inconsistent with Resolution GC(44)/RES/15

Referring to the above General Council Resolution, the IAEA General Council made a specific request to develop "radiological criteria for long-lived radionuclides in commodities, particularly foodstuffs and wood." The considerations recited by the GC as underlying this resolution include:

- Awareness of the impact of the *Chernobyl accident* on ...freedom of international trade"
- Recalling the UN General Assembly's resolving that "the *disaster at the Chernobyl nuclear power plant* ... was a major technological catastrophe ... and created humanitarian, environmental, social economic, and health consequences..."
- Awareness that the BSS "established special requirements for intervention in *emergency situations*"
- Concern that the BSS did not establish criteria "for exposure situations remaining for a long time *in areas affected by radiation accidents*

Resolution GC(44)/RES/15 (emphasis supplied). From the above recitations, it is clear that the General Council intended to establish guidance for managing certain materials ("commodities") that are radiologically affected by catastrophic events -- like the Chernobyl accident or a RDD. It is not, as the drafters of DS-161 would interpret it, a mandate to generally establish regulatory thresholds that are universally applicable to all commodities.

Materials affected by an accident or other radioactivity event bear a temporal, spatial, and isotopic nexus to the event itself: post-Chernobyl agricultural and timber commodities in Scandinavia, for example, were identified as potential concerns *because of their relationship to an event (or practice) requiring some level of intervention (or clearance)*. DS-161 -- particularly with regard to natural materials --

ignores the prerequisite *event or practice* and purports to establish *general regulatory standards* that would universally apply to all materials, *regardless of the need for intervention or clearance*. DS-161 confounds ICRP's concepts of intervention, clearance, and exemption. At a minimum, DS-161 is inconsistent with the GC Resolution. At most, DS-161 impermissibly usurps BSS authority, without any basis under Article III of the IAEA Statute.