

# "Ask the NRC"

## Question 1:

When calculating doses from vegetation, Table E-5 of RG 1.109 has usage factors Uap for two vegetation ingestion groups

- A) Fruits, vegetables, & grain and
- B) Leafy vegetables.

The foot note to Table E-5 states that category B) leafy vegetables are included in category A) "Fruits, vegetables, & grain." Therefore, if we use category A):

1. **Are we correct in not using the separate leafy vegetable category when determining the total dose from all pathways?**
2. **If we choose to use leafy vegetables, is it ok to subtract the leafy vegetable consumption value from the A) category pathway?**
3. **Given that pathway category A) includes grains and fruit and that the footnote gives the percentage of each included in the consumption of this vegetation category, can we modify the A) consumption factor by the given percentages when grain and fruit are not present? If no, then why not?**

## Question 2:

Compliance to 40CFR190 for Total Body Dose of 25 mrem.

10CFR50, Appendix I annual dose limits per unit from Sec II.B.1 are:

- 10 millirads for gamma radiation noble gas
- 20 millirads for beta radiation. noble gas

B.2.(b)

- 5 millirems total body gaseous effluents
- 15 millirems skin gaseous effluents

C

- 15 millirems any organ particulates, iodines, tritium and C-14

Most effluent software packages calculate the following

- |                   |  |
|-------------------|--|
| Air gamma (mrad)  | noble gas                                      |
| Air beta (mrad)   | noble gas                                      |
| Total body (mrem) | particulates, iodines, tritium and C-14 (PIHC) |
| Organ (mrem)      | particulates, iodines, tritium and C-14 (PIHC) |

Typically the quick method for 40CFR190 compliance is to assume that the real individual drinks the river water and is the highest exposed individual from gaseous releases and direct shine. Therefore total whole body dose is:  
 $25 \text{ mrem} > \text{PIHC Total Body dose} + \text{Water Total Body dose} + \text{direct dose (TLD, skyshine, etc)}$

**Question: Should the noble gas total body dose (mrem) be calculated and added to this total dose?**

i.e.  $25 \text{ mrem} > \text{NG Total Body dose} + \text{PIHC Total Body dose} + \text{Water Total Body dose} + \text{direct dose (TLD, skyshine, etc)}$

## Question 2a:

Similar to the question above with regards to updated 10CFR20 requirement of 100 mrem in a year to an individual on site property (Section 1301 and 1302), this dose limit is inferred to be TEDE dose based upon ICRP-30 or later. However, all of our computations are ICRP-2 based. **How would the NRC like us to demonstrate compliance with 100 mrem TEDE dose?**

We can add up WB doses for Iod/Part/H3/C14 and liquid ... But what do we add for a noble gas component? A Part 20 calc with average uCi/sec and weighted average x/q, multiplied by the time in a year? This is outside the realm of our guidance and inappropriate without careful weighting of the "K" factor.

We could simply add in the 'mrad' from beta or gamma radiation we are determining for App I. This would certainly be very conservative if converted to actual mrem from noble gases.

Clearly we all easily comply with 10CFR20 new 100 mrem in a year criteria. How would the NRC like to see a demonstrated compliance? New plant's Tech Specs, as well as anyone going through license renewal, are expected to simply comply with part 20 with no questions asked.

Since we can't add ICRP-2 values and get an ICRP-30 value 'legally'.... **What's the best way?**

And much more to the point: **When will App I and Reg. Guide 1.109 be updated to ICRP-30 or later?**

**If never, what is the official requirement for current compliance with 10CFR20 100 mrem in a year, or for that matter, the 2 mrem/hr requirement, also in section 1301?**

### Question 3

**How should the radionuclides from Fukushima be handled in both the Effluent Radioactive Effluent Release Report and Radiological Environmental Operating Report?**

**Licensee insight and proposed answer:** The Fukushima emissions should be treated as "background" radiation. Although not naturally occurring, they should be subtracted from plant emissions prior to completing dose to public calculations for 2011.

### Question 4

**Is there a requirement to maintain ventilation over the spent fuel pool 24x7? Regarding the associated OE, is operating ventilation only during fuel movements adequate, or would other sampling efforts be required to characterize releases, especially for tritium?**

OE33480 - Characterizing Tritium Release When Fuel Storage Building (FSB) Fans are secured: Licensee detected tritium in the storm drain near the fuel storage building, resulting from Fuel Storage Building ventilation being secured for an extended period of time. The dose consequences were negligible. Awareness of the phenomenon and its effluent program implications is worth noting. Surface water around nuclear power plant spent fuel pool buildings can become contaminated with airborne tritium diffusing from the atmosphere of the building. If ventilation is interrupted or secured in this building for long periods of time, tritium in the water vapor escaping out tiny holes or roof supply fan ducts can condense and be directed to storm drains. Presence of tritium in local storm drains is much more likely when the fuel storage building ventilation is secured, or if roof drains are piped directly into a storm drain. In this configuration, more frequent sampling/monitoring may be warranted per IE Bulletin 80-10.

### **Licensee insight and proposed answer:**

Unless constant ventilation is maintained at all times, it becomes difficult to argue that gaseous radioactivity, especially tritium is being controlled and releases are accurately assessed. One cannot argue that just because the ventilation is off, that releases are not occurring. It is difficult to model or predict escaping gaseous activity (e.g., diffusion) during periods when ventilation is secured, where the releases are occurring, and at what rates. This uncertainty raises the follow-up question -- Would the licensee be at risk for a NRC violation if a good-faith attempt is made to technically bound the situation, or would the licensee be expected/required to resort to detailed studies and assessments to measure and quantify the uncontrolled releases? The logical solution would be to maintain constant ventilation, and eliminate the uncertainty.

### Question 5

- A. **What is the NRC position/guidance on dose to public calculations for the 2011 calendar year in order to address Fukushima emissions?**
- B. **Has the NRC ERI MAPC and the DOE Office of Nuclear Energy collaborated with the NNSA Office of Emergency Response to initiate routine baseline aerial radiological surveys over aging reactors, decommissioning reactors, or new reactors before they are approved to go on line?**
- C. **Is the NRC planning to include in their future exercise planning scenarios a longer duration airborne release (not a "puff" release) or a scenario with multiple airborne releases?**
- D. **Has changing events over the years prompt the NRC to consider revising RTM-96: Response Technical Manual(NUREG/BR-0150, Vol. 1, Rev. 4)?**

- E. Does the NRC have sufficient radiation background information within their Emergency Planning Zone (EPZ) to document changes due to a release?
- F. Does the NRC have or need sufficient background information beyond the EPZ for the most probable plume directions?

## Question 6 – Service Water Radiation Monitor Setpoints

Given the following information from NUREG 1301/1302 and NUREG-0133 regarding Setpoints:

NUREG 1301/1302:

3.3.3.10 In accordance with [plant name] TS 6.8.4.g.l), the radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-12 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Control 3.11.1.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

NUREG 0133

### 4.1.1 Setpoint Determination to be Provided in ODCM

The alarm and trip setpoints (s) for each instrument channel ... should be provided and should correspond to a value(s) which represents a safe margin of assurance that the instantaneous liquid release limit of 10CFR Part 20 is not exceeded...For setpoint calculations, see the Addendum to this manual.

**Given that the formula in the Addendum for service water radiation monitors setpoint calculation do not include any calculation for beta emitters such as tritium or HTD nuclides Fe-55, Ni-63, Sr-89 and Sr-90; how should the HTD radionuclides be addressed in the Setpoint Methodology?**

### Licensee insight and proposed answer:

My station uses Cs-137 as the calibration source and for the Hi-Hi setpoint determination. The use of a setpoint based on the Cs-137 ECL is reasonable, because its photon abundance at energy of 662 keV is high (85%). In addition Cs-137 has a low ECL limit of 1.0E-05 µCi/ml, which results in a low CPM rad monitor setpoint being established. The percent abundance of Cs-137 to other principal radionuclides in the reactor is less than 1%; therefore, the service water setpoint is conservative. Thus the pure beta emitters can be ignored in the setpoint calculation.

## Question 7

C-14 is now considered a principal radionuclide based upon dose, since its dose may represent more than 90% of the organ dose from gaseous effluent releases.

- A. Can a licensee because of the lower dose impact use ICRP 72 dose factors instead of ICRP 2 dose factors?
- B. How would a licensee accomplish that- make an ODCM change to the new factors, obtain all the Station approvals, and then wait for the next NRC inspection to see if it is acceptable?

## Question 8

- A. What are NRC's plans and target schedule(s) for updating the air dispersion models? What will change? Will the updates be accompanied by revisions to the Reg. Guides (RG 1.145 and RG 1.111)?
  - a. PAVAN (offsite accident X/Q and D/Q)... I have heard that it is being revised to use 1 hour MET input data, instead of annual joint frequency distributions?
  - b. XOQDOQ (offsite routine release X/Q and D/Q)
- B. Any plans to automate the input of onsite meteorological data inputs into RACSAL4 from ERDS? Schedule?
- C. Any future changes planned to ERDS? Is a new data communications system being developed? Schedule?
- D. Does NRC plan to use or allow use of EPA models (e.g. AERMOD and CALPUFF) in the future for evaluation of air dispersion at a site and surrounding area?
- E. Does NRC utilize or have access to resources for running HYSPLIT in real-time events or post-accident?

## Question 9

Some sites have a specification to limit the curie content in unprotected outdoor storage tanks, excluding H-3 and dissolved or entrained noble gases, to less than a value (ex: 10 curies). It also requires that weekly sampling be performed when material is added to the tank. **Is it acceptable that only gamma emitters be analyzed for to determine compliance with this specification?**

### Licensee insight and proposed answer:

Since the early guidance/requirement specifically excluded tritium and noble gas, it would appear that the NRC felt it unnecessary to analyze for these nuclides and most likely HTDs as well. It would appear that the original requirement was based only on gamma-emitting fission and activation products, as those would be the nuclides that: 1) would be the most likely to be detected as an indicator of a problem; 2) are the only nuclides that carry an appreciable dose consequence; and 3) it would be unlikely to have sufficient tritium and HTDs to pose a significant dose consequence without being accompanied by gamma emitters. Therefore, analyzing only for gamma emitters should be sufficient to address the original tank limits.

## Question 10

**Please provide the definitions for following terms listed in NUREG 1301/1302 Table 3.12-1:**

Surface Water  
Ground Water  
Drinking Water

### Licensee insight and proposed answer:

Surface Water is unfinished water that includes fresh water from streams, rivers, ponds and lakes, and salt water including brackish, bays and oceans that receive radioactive liquid effluents from the plant.

Ground Water is well water that is used for consumption by humans. It may be processed (potable) or unprocessed (i.e. consumed directly as pumped from the well).

Drinking Water is potable water (i.e. water that is safe and palatable for human consumption), which is obtained from the same bodies of water that receive radioactive liquid effluents from the plant. Drinking water samples should be obtained after all processing and the water is available for distribution.

## Question 11

Per the requirements of NUREG 1301/1302 for drinking water, the analysis of I-131 must be performed when the dose calculated for the consumption of the water is greater than 1 mrem:

- A. **Is the calculated dose based upon all liquid effluents released or specifically I-131?**
- B. **If my calculated dose from consumption of drinking water is less than 1 mrem, then is a low level Iodine-131 analysis that achieves an LLD of <1 pCi/L required?**
- C. **If not, then is the LLD of 15 pCi/L via the gamma isotopic analysis the correct LLD to achieve?**

## Question 12

- A. **Is there any specific NRC guidance or regulation that covers the calibration and standards for environmental monitoring equipment - specifically air sampler flow meters and pumps?**
- B. **Is there any specific NRC guidance or regulation that requires an evaluation for any positive environmental monitoring result or only if the value exceeds a reporting level? For example Cs-137 found in broadleaf vegetation.**

## Question 13

**Do 40CFR302-Designation, Reportable Quantities, and Notification requirements apply to Nuclear Power Plants?** The reportable quantity for tritium is 100 Ci in a 24 hour period.

## Question 14

I have in mind a new air sampler location for our REMP. The location is in a "high-X/Q sector". However, there are quite a few trees and brush in this locale. I will not be able to cut down or trim any of these trees or brush.

- A. Should I install the new air sample station here?**
- B. Is there regulatory guidance that either prohibits or discourages REMP air sampling in the presence of trees?**