From: Victor McCree
To: Douglas Collins; RII DRP/DRS Senior Managers
Date: 06/20/2007 11:18:26 AM
Subject: Re: Fwd: EPA tritium risk plan

FYI.

----Original Message-----
From: radsafe-bounces@radlab.nl [mailto:radsafe-bounces@radlab.nl] On Behalf Of Franta, Jaroslav
Sent: Wednesday, June 20, 2007 9:10 AM
To: Radsafe (E-mail)
Subject: [RadSafe] " EPA Tritium Risk Plan May Force Tighter Nuclear PlantControls "

Comments welcome:

EPA Tritium Risk Plan May Force Tighter Nuclear Plant Controls
Energy Washington Week, Vol. 4, No. 25, 20 June 2007

EPA is considering a substantial increase in its estimates of the risks posed by human exposure to tritium, a controversial byproduct of nuclear power generation, in a move that could prompt nuclear regulatory agencies to tighten their risk-based approaches for regulating radiological releases from nuclear power plants.

However, sources say any effort by EPA to tighten the risk estimates for tritium would likely prompt opposition from the industry and nuclear regulators, who fear it would complicate industry efforts to present nuclear power as an alternative to coal-fired generation under any future climate change regime.

Informed sources say EPA is weighing whether to double the effectiveness factor it assigns for tritium, a risk estimate figure used in setting contamination and cleanup standards that represents a given radionuclide's potential to damage the human body. EPA and other federal regulators generally set this factor at 1.7 for tritium and similar radionuclides.

However, recent scientific findings from the International Commission on Radiological Protection and evidence accumulated by the National Institute for Occupational Safety and Health (NIOSH) have led some EPA regulators to consider increasing that factor to 2 or higher, the sources say.

Tritium is an isotope of hydrogen that produces relatively low levels of radiation. Nuclear power plants release tritium in water and steam discharges. Regulators in several instances have also dealt with tritium leaks from nuclear facilities in the form of contaminated water. Consequently the task of estimating the health risks associated with tritium is a highly contentious issue among nuclear experts, industry and environmentalists.

Observers say increasing the effectiveness factor for tritium could result in risk assessments that suggest human exposure to tritium is more harmful,

thereby giving federal regulators grounds to tighten tritium containment and release standards at nuclear power plants, research laboratories and places where nuclear fuel is stored. Additionally, a key activist source says the increased risk figures could encourage more severe federal enforcement actions should regulators discover tritium leaking at a nuclear facility.

Increasing the effectiveness factor for tritium would have little to no impact on EPA's radiation standards because the risk associated with tritium would still be within already regulated levels, which are based on calculated doses, the sources add. Nevertheless, the move could spur regulators in other agencies -- such as the NRC and the DOE-- to adopt a similar risk assessment approach, the sources say.

Sources say EPA efforts to tighten its risk estimates would likely prompt opposition from NRC and the industry, in part because it could stifle efforts to build as many as 27 new nuclear reactors in the United States over the next few years.

Nuclear industry officials are hoping for a so-called "renaissance" for nuclear power nationwide, arguing in part that the plants provide increased energy supplies without increasing harmful greenhouse gas emissions that contribute to climate change.

However, environmentalists and Democrats are calling for stricter safety and environmental controls on the industry before new plants can be built.

News that EPA is eyeing an increase in the tritium effectiveness factor could bolster anti-nuclear activists and prompt opposition from NRC and industry.

The expected growth in the nuclear energy sector, an informed federal source says, is one reason NRC would likely resist any effort to increase the risk factors connected to tritium. "The other agencies would try to stop it," the source says. "Not under this administration, it'll never make it through."

A radiological protection expert agrees, saying such an increase in tritium effectiveness factor could "make the NRC mad."

An NRC source downplays the significance of increasing the effectiveness factor for tritium, saying the agency would have to formulate its own technical opinion on the factor before adopting it. The source also takes issue with the suggestion that the factor could impact power plant standards, noting that new plants tend to use the most current methods to ensure radiation exposures remain well below regulated levels. A nuclear industry source agrees, noting that the deliberative nature of setting radiation standards could mean that any regulatory change may be years in the making.

One informed source cautions that it is "not a foregone conclusion" that increasing the factor will lead to stricter tritium regulations because those rules are most often based on specific dose calculations. However, an expert with a nuclear watchdog group suggests the increased factor would translate into tougher standards and regulators "would have to do something to undercut that" in their risk calculations for it to not have a

significant impact.

But despite potential efforts to block tighter risk factors for tritium, the federal source notes that EPA is slated to begin a review of its water contaminant limits for radionuclides in 2009. Increasing the effectiveness factor, the source adds, could encourage agency regulators to impose stricter maximum contaminant level (MCL) limits, which the agency also uses to set cleanup standards, during this review. The tritium MCL is currently set at 20,000 picocuries per liter of water, roughly 4 millirems of exposure per year.

EPA has already seen pressure from nuclear watchdog groups to impose significantly stricter water standards for plutonium in the pending review.

EPA is also in the midst of a Science Advisory Board panel review examining the agency's risk approach to radiation that will likely prompt the agency to adjust its risk calculations for many radionuclides. A nuclear watchdog group has repeatedly urged the panel to increase the effectiveness factor for tritium to 3 or higher, citing several studies arguing it should be raised. A source with one group says the panel will soon receive formal written comments advocating such an increase.

The panel's most recent draft report, released Feb. 23, says tritium is among several issues the National Academy of Sciences most recent report evaluating radiation risks, which is the basis on the panel's work, did not address. EPA has a "need to derive a basis for risk estimates" for it, the report says.

The report also suggests EPA's effectiveness factor for tritium could be increased as the agency adopts its proposed radiation risk methods based on the NAS report. In its discussion of the risks associated with low-energy photons and electrons, the report says "an effectiveness factor for these low energy radiations in the range of 2 to 2.5 seems reasonable." The report includes the chemical symbol for tritium, 3H, among the particles that would fall within that category.

Additionally, tritium will likely be at issue in a June 21 meeting between officials with the NRC and the nuclear industry focused on a voluntary industry initiative begun last year to boost groundwater protection standards at power plants. The initiative was prompted by concerns over tritium leaks at several nuclear facilities.

However, the nuclear industry contends such leaks are not dangerous to public health and are generally contained within the facility in question. The radiological protection expert adds that concerns over tritium leaks would be better addressed by ensuring it is contained at a site, rather than increasing the risk factors associated with it. The source points out that NRC and the nuclear industry itself closely monitor tritium to ensure leaks and other unintentional releases are prevented.

CC: William Travers

BACKGROUND
Tritium and Nuclear Power Plants
July 20, 2006

The discovery of tritium in drinking water wells around some U. S. nuclear power plants has caused increased attention on the issue of tritium and nuclear power plants. The Nuclear Regulatory Commission also recently requested that nuclear power plant licensees respond to a survey about tritium releases, including a survey of each site's history regarding such releases. An NRC tritium task force has been organized to research the issue in greater depth. The task force will report its results to NRC management in August, 2006.

Facts about Tritium

- Tritium is an isotope of hydrogen and is found everywhere in nature. It is most commonly found as "tritiated" water because it reacts with oxygen to form water. People are exposed to small amounts of tritium every day, since it is widely dispersed in the environment and in the food chain. The absorbed dose an individual receives from a given amount of tritium is small because it emits low energy beta particles when it decays.

- In addition to being produced in nature, tritium is a by-product of nuclear power plant operations. It is produced commercially in concentrated quantities for use in various devices such as exit signs in buildings, luminous paints and dials in wristwatches. Tritium also is used in life science research and in studies investigating the safety of potential new drugs.

- Both the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) have thoroughly reviewed possible health effects to employees and residents near nuclear plants from potential tritium releases and have concurred there is no danger to these publics.

- The Nuclear Regulatory Commission regulates tritium at U.S. nuclear plants. Incidental releases of small amounts of tritium from nuclear systems and components are possible. In the amounts released by nuclear plants, tritium poses no risk to the health and safety of the public. The potential for any public impact is evaluated in the initial plant licensing process. Routine tritium releases to the environment are monitored by all nuclear plant licensees and reported annually to the NRC and the public.

- EPA has established a drinking water standard for tritium of 20,000 picoCuries per liter. In comparison, background river water concentrations are typically in the range of 150 to 300 picoCuries per liter in North America. PicoCuries per liter refers to concentrations in units of activity per liter.
- *(A picoCurie is 1 x 10 $^{-12}$Ci or a millionth of a millionth of one Curie.)* Many self-luminous doorway emergency signs in schools and commercial and industrial buildings contain approximately 10 million to 20 million microcuries of tritium which is 30 to 100 billion times greater than background.

- The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources is a state agency charged with protecting Georgia's air, land, and water resources through the

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authority of state and federal environmental statues. Southern Nuclear provides environmental data and information to EPD on a routine basis to keep them fully informed.

Southern Nuclear and Tritium

Southern Nuclear Environmental Affairs recently evaluated tritium in groundwater for Georgia Power's Alvin W. Vogtle Electric Generating Plant near Waynesboro, Ga.; at Georgia Power's Edwin I. Hatch Nuclear Plant near Baxley, Ga.; and at Alabama Power's Joseph M. Farley Nuclear Plant near Dothan, Ala. in response to issues identified by the U.S. Nuclear Regulatory Commission at other nuclear facilities.

We discovered that a small volume of water containing tritium is being released into the Altamaha River from surface drains collecting shallow groundwater at Plant Hatch. These releases are safe, below any regulated limits, and pose no threat to public health and safety~~; however, we want to fully inform the community about this situation~~. We have taken immediate steps at Plant Hatch to evaluate and eliminate unpermitted offsite releases. No evidence of tritium in groundwater was found at our other facilities-.

- Southern Nuclear monitors tritium discharges into the rivers from its nuclear facilities. These discharges are reported to the NRC in semi-annual effluent monitoring reports and are available to the public. Tritium released by Southern Company's nuclear plants, in accordance with their permits, is well below the safety standards established by the NRC and the EPA and the company is certain that these releases are safe and pose no threat to public health and safety.

- Tritium in surface water is monitored both upstream and downstream of the facilities operated by SNC. Surface water monitoring is conducted under the Radiological Environmental Monitoring Programs for these facilities and results are reported to the NRC annually. These results are available as public documents.

- Surface water samples collected in the Altamaha River downstream of Plant Hatch have ranged from less than measurable concentrations to a maximum of 275 picoCuries of tritium per liter during 2005, indicating that the small volume of groundwater released is not increasing the surface water concentrations by a measurable amount.

- Tritium has been found in some groundwater wells and surface drains located on the Hatch plant site, but no tritium has migrated into onsite drinking water wells. In 1978, when onsite releases were detected at the plant, Southern Nuclear began monitoring site groundwater for tritium through wells and surface drains. The majority of the groundwater wells were established during the construction of Plant Hatch per NRC requirements to characterize the site and map the site hydrology. Seventeen additional observation wells were installed after tritium was identified in groundwater.

Southern Nuclear is committed to fulfilling its obligation to protect public health and safety. We have responded to the NRC tritium survey request and are continuing communications with the commission and all involved agencies.

Q&A on tritium issues at Plant Hatch

When did Southern Nuclear discover unpermitted releases of tritium to the environment at Plant Hatch?
We have monitored tritium in groundwater since releases at Plant Hatch in 1978. We re-evaluated this data in light of recent information provided by the Nuclear Regulatory Commission regarding tritium at other nuclear facilities.

Other background: After releases of potentially contaminated water to the soil near buildings and tanks in the main power block, the first of which occurred in 1978, we commissioned an independent outside consultant to perform a hydrology study in 1979-1980. This study concluded that small amounts of tritium were seeping into the groundwater around the release areas and could be migrating into subsurface drain systems which discharge through surface drains that lead to the Altamaha River. We implemented a groundwater and surface drain tritium sampling program.

In 1986, an unplanned release of contaminated water at Plant Hatch was thoroughly investigated by the NRC and corrective actions were implemented to remedy the release. The details of this release and actions taken by Southern Nuclear and the NRC were published at the time and placed in the public domain.

All radionuclides in the water except for tritium are filtered out by the first few feet of soil. The tritium, because it is part of the water molecule, moves with the water down into deeper levels of the soil. A small amount of this tritium migrates to the subsurface drainage system and discharges to the river.

How is the groundwater tritium measured?
A series of wells around known release areas are sampled on a routine basis. Surface and subsurface drains are also sampled. These samples are sent offsite to the Georgia Power Environmental Lab for analysis by liquid scintillation counting. The Georgia EPD Environmental Radiation Program conducts independent groundwater sampling and analysis and we routinely compare results.

How do you know there are no impacts to the environment from these unpermitted releases?
The amount of tritium released from the plant through these unpermitted discharges is very small. A hypothetical person living at the edge of the plant site who drank one-half gallon of the discharged water a day would receive a calculated dose that is a small fraction of one millirem per year. The NRC radiation dose limit from liquid releases for all radioactivity is three millirem per year. A millirem is a unit of dose or absorbed energy, calculated knowing the concentration and appropriate conversion factors.

In addition, we conduct a Radiological Environmental Monitoring Program that evaluates radioactivity from plant releases in surface water, sediment, fish and other media. This program shares samples and results with the Georgia EPD Environmental Radiation Program, which also conducts independent sampling and measurements. The results of this monitoring are provided to the NRC annually and are available to the public.

How do you know these unpermitted releases are not getting into local drinking water?
The closest offsite drinking water well in the direction of groundwater movement is 2.1 miles from the plant. Hydrology studies show it would take more than 200 years for water to move through the deep

groundwater aquifer to the site boundary (i.e. 1,200 feet from the location of the test wells). In this amount of time, the tritium would have radioactively decayed away to background levels.

Have you tested any drinking water wells?
Yes. There are three possible drinking water wells onsite. One of them is not used and the two other drinking water wells that are used have been sampled and the results show no tritium above background levels. Southern Nuclear has not tested any off-site drinking water. However, the Georgia EPD Environmental Radiation Program collects water samples from offsite wells and analyzes for tritium. EPD results show no tritium in groundwater from offsite locations.

Are unpermitted releases of tritium still occurring?

Yes, during our evaluation we discovered two very small unpermitted discharges. One has been included as a permitted release and the other is being evaluated. Appropriate actions will be taken and at no point have these posed a threat to the public or the environment.