June 2, 2010

Mr. Buzz Davies
P.O. Box 525
Erwin, TN 37650

Dear Mr. Davies:

On April 27, 2010, Kevin Ramsey and Manuel Crespo called you regarding concerns you raised with our calculation of hazards posed by a uranium hexafluoride (UF_6) release at Nuclear Fuel Services (NFS). This letter responds to your request for more information regarding our calculation.

First, we noted that the cylinders stored at NFS are at room temperature. Most UF_6 is a solid at room temperature and not available for release. Using an inventory of the actual contents in each UF_6 cylinder at NFS, we estimated the following quantities would be available for release if all 214 cylinders fail at the same time:

13.28 kg of UF6
1.45 kg of Fluorine Gas (F2)
3.50 kg of Chlorine Trifluoride (ClF3) – a chemical used at the enrichment plant

Our calculations started with curves from the Response Technical Manual for the Paducah enrichment plant. Then we used the CAMEO computer code to calculate the quantities needed to exceed Acute Exposure Guideline Levels (AEGLs) at 100 meters and F class weather stability. Our calculations produced the following results:

Quantities Needed for AEGL-1	Quantities Needed for AEGL-2
12.56 kg UF6	33.49 kg UF6
0.80 kg F2	2.36 kg F2
0.25 kg ClF3	4.22 kg ClF3

From these results, we concluded that exposure levels at the fence line could exceed AEGL-1, which is a concentration where the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

In addition, we concluded that the exposure levels at the fence line would be below AEGL-2, which is a concentration where the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects, or an impaired ability to escape.

We note that use of more realistic assumptions in the calculations indicates there would be no health impacts to the public because of the following:

- It is unlikely that all 214 cylinders would rupture at the same time.
- There is significant safety margin between the pressure required to rupture the cylinders and their present pressure.
- The cylinders are stored inside buildings that would mitigate any release to the environment.
- Worst case weather conditions were assumed (at night, partly cloudy, or no wind). Normal weather conditions would reduce the exposure levels.

A good history of UF_6 releases is provided in Section 2.2.3 of NUREG-1140, "A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees." A copy of this section is enclosed. There have been several UF_6 releases since 1944. The releases have caused three prompt fatalities and several injuries. Persons injured or killed have all been workers close to a UF_6 cylinder. The largest release of UF_6 occurred in 1986 when a cylinder filled with UF_6 beyond its 14-ton capacity ruptured while being heated at Sequoyah Fuels Corporation in Gore, Oklahoma. One worker was killed because of pulmonary edema caused by hydrofluoric acid (HF). Several others experienced skin burns, irritation to the eyes and mucous membranes, and respiratory tract irritation. No symptoms were found among people exposed offsite.

In the Sequoyah Fuels accident, approximately 14,000 kilograms (kg) of UF_6 was released from a single cylinder. Only natural UF_6 (uranium not enriched) is handled in such large quantities. The UF_6 at NFS is highly enriched. It is contained in 214 small cylinders. The total quantity of UF_6 at NFS is tens of kilograms, not thousands of kilograms. In addition, the cylinder in the Sequoyah Fuels accident was heated; but the cylinders stored at NFS are at room temperature. As we noted above, most UF_6 is a solid at room temperature and not available for release.

If you have questions about this information, please contact Kevin Ramsey of my staff at 301-492-3123 or by e-mail at Kevin.Ramsey@nrc.gov.

Sincerely,

/RA/

Peter J. Habighorst, Chief
Fuel Manufacturing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Enclosure:
Section 2.2.3 of NUREG-1140

If you have questions about this information, please contact Kevin Ramsey of my staff at 301-492-3123 or by e-mail at Kevin.Ramsey@nrc.gov.

Sincerely,

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Enclosure:
Section 2.2.3 of NUREG-1140

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