

**Declaration of Michael E. Ketterer, PhD**  
**October 26, 2022**

I am a PhD chemist and hold the position of Professor Emeritus of Chemistry and Biochemistry at Northern Arizona University. I have more than 20 years of experience in studies of environmental radioactivity, with emphasis on long-lived radionuclides such as isotopes of uranium, thorium, plutonium and neptunium. I have investigated/characterized environmental sources, transport and fate of these elements in natural environments and contaminated sites across the world. I have published and lectured extensively in this subject matter in the scientific community. Some examples of my relevant peer-reviewed scientific publications in the field may be viewed at:

[https://scholar.google.com/scholar?hl=en&as\\_sdt=0%2C14&q=ketterer+plutonium&oq=ketterer](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C14&q=ketterer+plutonium&oq=ketterer)

Commencing in 2010, I have studied off-site environmental contamination in the proximity of the BWXT Nuclear Fuel Services (NFS) site at Erwin, Tennessee. I have personally visited the Erwin area on multiple occasions and, with assistance of community members and Christian Peacemaker Teams (CPT) delegates, I have collected extensive sets of environmental samples of water, soil, sediment, and mollusks. I have personally conducted laboratory measurements that unequivocally demonstrate the offsite presence of NFS-derived contamination of the surroundings, as well as the entire Nolichucky River downstream of NFS.


I hereby declare as follows:

1. Extensive evidence conclusively demonstrates releases of enriched uranium (U) and plutonium (Pu) from NFS's operations into the ambient environment. The impact of NFS on environmental media is easily observed by finding perturbations in the atom ratio  $^{235}\text{U}/^{238}\text{U}$ , which is nearly constant in Nature at 0.00725. In contrast, NFS-impacted media exhibit U atom ratios consistently elevated vs. the 0.00725 natural value.
2. Nolichucky River water, downstream of NFS, exhibits U contamination from NFS, as the  $^{235}\text{U}/^{238}\text{U}$  is elevated; this finding cannot be explained by any other causes besides NFS.
3. The Nolichucky River is receiving contamination from NFS through two principal pathways: the permitted outfall at River Mile 94.6, and nonpoint source recharge of groundwater into the river. A June 2010 grab sample collected from the Mile 94.6 outfall revealed the presence of enriched U consisting of ~ 20%  $^{235}\text{U}$  (refer to Attachment 1).
4. Nonpoint sources of uranium are also entering the Nolichucky River through subterranean pathways. Mass balance considerations dictate that not all of the enriched U present in the Nolichucky River can be accounted for via the Mile 94.6 outfall. Moreover, in August 2011, I personally observed the discharge of an underground spring into the river, known locally as Whaley Spring. A local resident, Alvin Higgins, assisted me

in locating this spring, and on a warm, humid afternoon when the temperature was in the mid-80's Fahrenheit, we collected a water sample that had a temperature of approximately 58 degrees Fahrenheit. Condensation began immediately forming on the exterior of the plastic sample container. The sample was found to contain enriched U. These observations indicate the undisputable presence of subterranean pathways for entry of NFS-contaminated groundwater into the Nolichucky River. It is clear that the NFS facility is having a definite, observable negative impact on local groundwater quality, ultimately spreading contamination in water underlying NFS and neighboring properties, before discharging to the river.

5. In August 2012, a sinkhole formed in the proximity of Love Chapel Elementary School. Local officials placed a fluorescent dye in the sinkhole, and within a matter of days, the dye was evident in ponds along the Erwin Linear Trail. These observations point to the unpredictable nature of the local karst hydrology, and indicate that the rate of groundwater transport toward the Nolichucky River is very rapid.
6. The transport of enriched U, in dissolved form, has occurred throughout the Nolichucky River system. In May 2011, I collected sediment cores from the mouth of the Nolichucky where it enters Douglas Lake; these sediment cores were found to exhibit enriched uranium (refer to Attachment 2). It is apparent that dissolved U is present, from groundwater discharges near NFS, in the river water and subsequently, the U is being incorporated into the sediments at the sediment-water interface.
7. Sediments, water, and mollusks found at Davy Crockett Lake, downstream of NFS, have also been found to contain enriched U. This has also occurred as a result of discharges of NFS-affected contaminated groundwater into the Nolichucky River.
8. The NFS plant has also released plutonium into the environment as a result of past plant operations. Plutonium, of non-fallout origin has been found in sediments of the pond adjacent to the Erwin Linear Trail, sediments of Davy Crockett Lake, and in sediments at North Indian Creek. These locations also exhibit enriched U. Attachment 3 summarizes the evidence for the specific association between the Pu encountered in Erwin-proximity sediments, and materials handled by NFS. This material is clearly incongruent with weapons testing fallout, and could only have plausibly originated from NFS.
9. Additional water-soluble hazard substances such as per- and polyfluorinated alkyl substances (PFAS) are likely present in contaminated groundwater underlying NFS, and would be expected to be following the same water transport pathways, into the Nolichucky as the enriched U. To the best of my knowledge, this potential scenario has not been investigated by NFS nor regulatory agencies. There is an urgent need to evaluate this possible PFAS contamination scenario.

I declare, under potential penalty of perjury, that the statements above are true to the best of my belief, and that I have no competing financial interest. I have not been retained or compensated by any party in association with this evaluation.

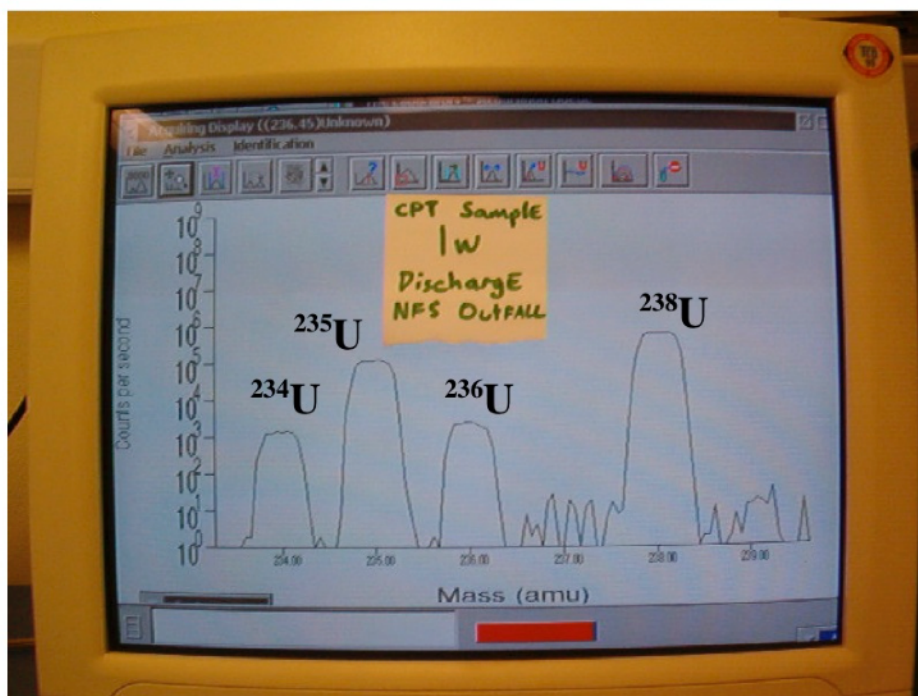
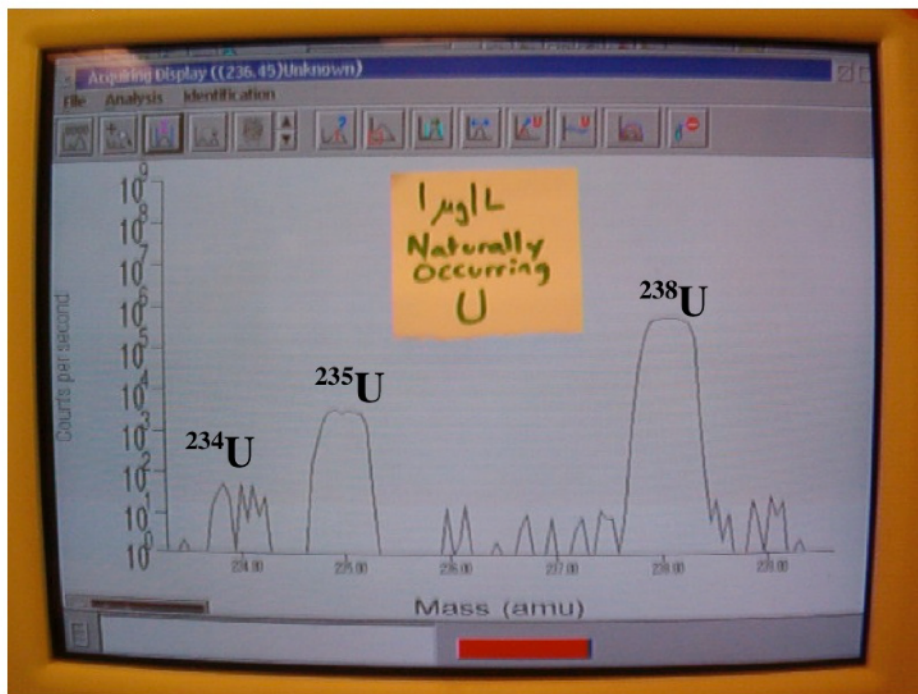


**By:**

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Flagstaff, AZ  
October 26, 2022

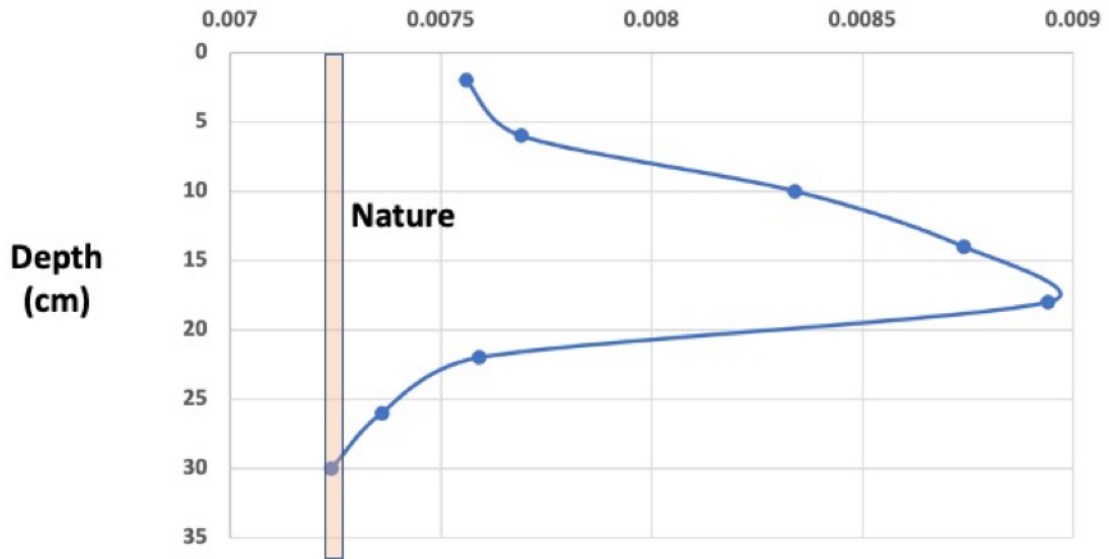
## Attachment 1



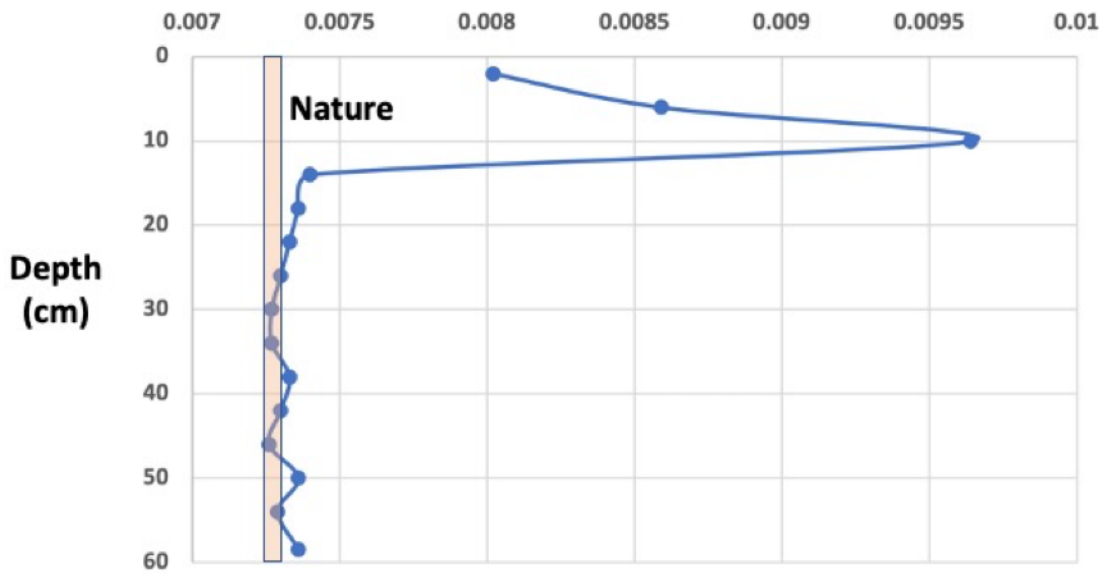
ICP mass spectra of a sample of naturally occurring uranium (top), as compared to a sample collected in 2010 by Christian Peacemaker Team delegates, from the NFS outfall at River Mile 94.6. Note that the vertical scale is logarithmic. The CPT Sample 1w clearly exhibits an enriched U isotope composition, with  $^{234}\text{U}/^{238}\text{U}$  and  $^{235}\text{U}/^{238}\text{U}$  greatly exceeding the natural U sample. The enriched U sample also exhibits the presence of  $^{236}\text{U}$ , which is specifically associated with NFS and is essentially absent in Nature.

Attachment 2

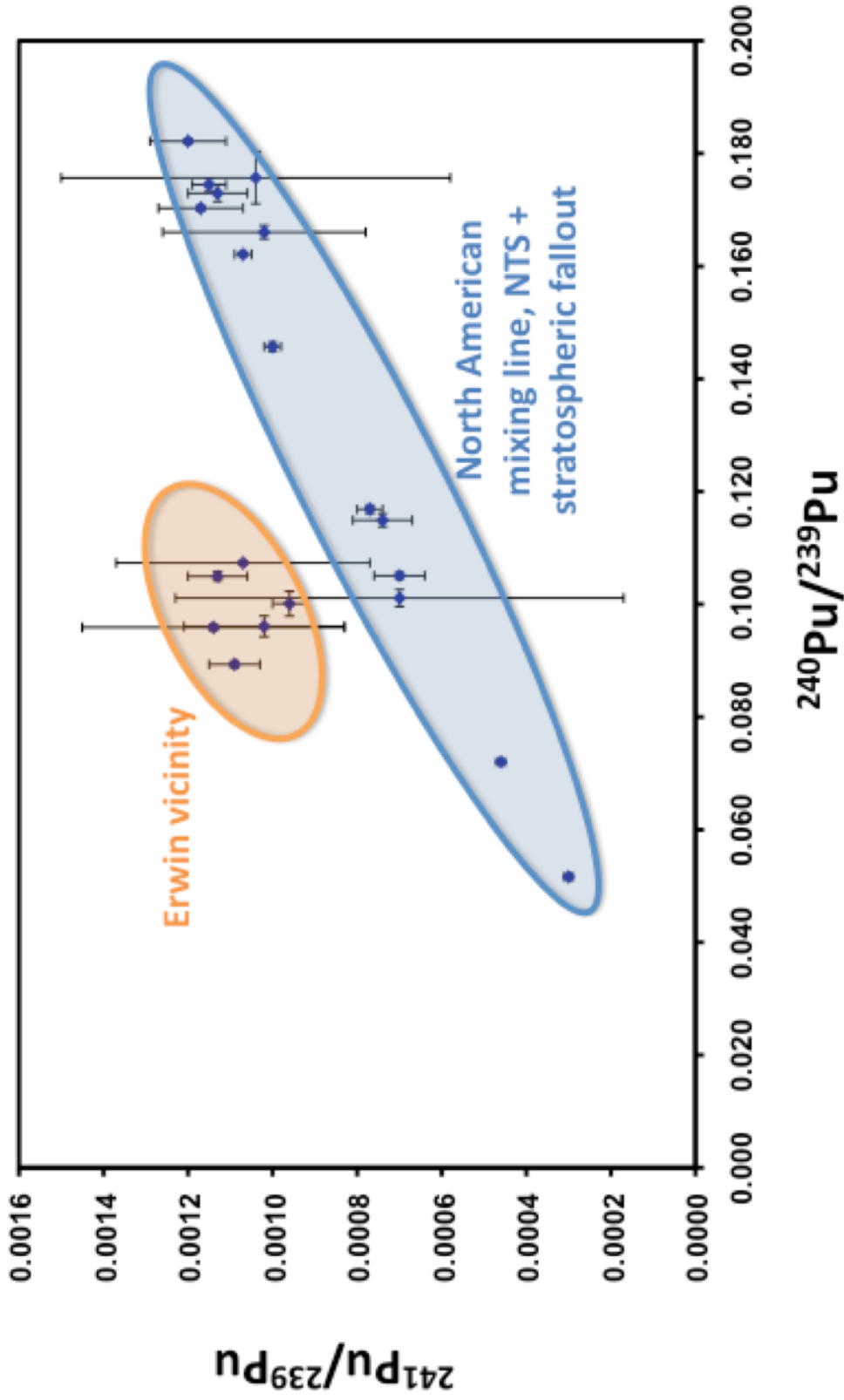
$^{235}\text{U}/^{238}\text{U}$  in Core Douglas-6



$^{235}\text{U}/^{238}\text{U}$  in Core Douglas-3



Attachment 3



A plot of  $^{241}\text{Pu}/^{239}\text{Pu}$  vs.  $^{240}\text{Pu}/^{239}\text{Pu}$  reveals the non-fallout signature of NFS emissions. The blue mixing domain represents the expected Pu isotope compositions found in North America, resulting from mixing between Nevada Test fallout and global “stratospheric” fallout.

NFS-derived Pu has been detected in sediments at the Erwin Linear Trail, North Indian Creek, and Davy Crockett Lake.