prebaked gel to dilute the relatively small amount of sampled moisture; thereby, significantly lowering the "true" tritium concentration in the soil gas. This paper provides an evaluation of the magnitude of the bias from dilution, provides methods to correct past measurements by applying a correction factor (CF), and evaluates the uncertainty of the CF values. For this, ten-thousand Monte Carlo calculations were performed and distribution parameters of CF values were determined and evaluated. The mean and standard deviation of the distribution of CF values were 1.53 ± 0.36, and the minimum, median, and maximum values were 1.14, 1.43, and 5.27, respectively.

TAM-E.7

TRITIUM UNCERTAINTY ANALYSIS FOR SURFACE WATER SAMPLES AT THE SAVANNAH RIVER SITE. R. Atkinson,[1] T. Eddy,[2] W. Kuhne,[3] T. Jannik,[3] and A. Brandl[1] ([1]Colorado State University Department of Environmental & Radiological Health Sciences, Ft Collins, CO 80526; [2]Savannah River Nuclear Solutions; [3]Savannah River National Laboratory)

Radiochemical analysis of surface water samples in the framework of Environmental Monitoring have associated uncertainties for the radioisotopic results reported. This uncertainty analysis pertains to the tritium results from surface water samples collected at five locations on the Savannah River near the U.S. Department of Energy's Savannah River Site (SRS). Uncertainties can result from the field-sampling routine, can be incurred during transport due to the physical properties of the sample, from equipment limitations, and from the measurement instrumentation used. The uncertainty reported by the SRS in their Site Environmental Report currently considers the counting uncertainty in the instrument, which is the standard reporting protocol for radioanalytical chemistry results. The main focus of this paper is to give an overview of all uncertainty components in the tritium measurements, to estimate the total uncertainty according to ISO 17025, and to propose experiments to verify some of the estimated uncertainties. The main uncertainty components discovered and investigated in this paper are tritium absorption or desorption in the sample container, fractionation during distillation, pipette volume, and tritium standard uncertainty. The goal is to quantify these uncertainties and to establish a combined uncertainty in order to increase the scientific depth of the SRS Site Environmental Report.

MEDICAL SECTION SPECIAL SESSION: PATIENT RELEASE
Tuesday, 24 July 2012
Room 313
8:15 am – Noon

TAM-F.1

RADIONUCLIDE THERAPY PATIENT RELEASE: AN OVERVIEW. J. Siegel (Nuclear Physics Enterprises, Marlton, NJ 08053)

Overly restrictive release criteria for radionuclide therapy patients, including the more-than-60-y-old "30-mCi rule," are still being used to this day. It was not until 1987 that the 30-mCi rule was codified and a dose-rate alternative (<50 mSv h^{-1} at 1 m) was also provided. In another revision of 10 CFR 35.75 in 1997, the NRC adopted a risk-informed, performance-based approach to more objectively base patient release on a purely dose-based criterion and to adequately address the various therapeutic radiopharmaceuticals in use. Licensees are able to release patients regardless of how much administered activity they receive, as long as the TEDE to any other individual from exposure to the released patient is not likely to exceed 5 mSv. Licensing guidance for compliance with this revised regulation has been provided by the NRC in NUREG-1556, Vol. 9. According to the NUREG, compliance with the NRC regulatory dose limit requirement can be demonstrated by licensees by either: (1) using provided default tables for administered activity or measured dose rate at 1 m for a variety of radionuclides; or (2) performing a patient-specific dose calculation. The "default table" limits were set assuming that the patient is an unattenuated point source and that the activity remains in the body until it is fully decayed. As these assumptions are clearly incorrect, or at best overly conservative in most cases, licensees should choose to perform more appropriate patient-specific dose calculations. A number of published studies have indicated that even the patient-specific dose-based method is unnecessarily conservative. However, most licensees simply adopt the methods promoted in NRC guidance. This overview will critically evaluate the various patient release methods and present objective analyses to provide recommendations for improvements to existing NRC guidance in order to establish more realistic calculational algorithms for patient release, to be used by licensees to demonstrate compliance with 10 CFR 35.75. It is hoped that based on these recommendations, along with assistance from the radiation protection community, licensees will be encouraged to critically re-evaluate and then update their patient release policies and procedures.

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