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Ms. Farrah Gaskins, Health Physicist
Region I, USNRC
475 Allendale Road
King of Prussia, PA 19406

VIA FAX Mail Control # 144219

Dear Ms. Gaskins:

Please accept our below responses to your 12/14/2009 request via email, for additional information regarding our amendment for the NIAID Integrated Research Facility:

In your response to item 5 of our previous e-mail you stated that your IRF Analytical Lab will conduct its own independent analysis of USAG WWTP sludge and WWTP liquid for radioactive material content; that analysis will be done by liquid scintillation counting and high resolution quantitative gamma spectroscopy; that The USAG agreed to share sludge samples with the NIH for analysis; and that the primary method to ensure that NIAID-IRF wastewater does NOT contain radioactive materials exceeding 10CFR 20 Appendix B, Table 2 levels will be routine radioanalytical analyses of effluent prior to discharge from the NIAID-IRF blending tank. However, based on historical information from activities previously licensed at Fort Detrick, there have been detectable beta-emitters within Fort Detrick sewage sludge in concentrations exceeding the criteria for unrestricted release, although the releases to the site sewage were the limits for effluent water set forth in 10 CFR 20 Appendix B, Table 2.

Response: It's important the regulator understands that our plan to verify that radioactive effluents are not being discharged to the WWTP is based on substantially more than just sampling the blending tank. While the blending tank is a vital component of the overarching sampling protocol, routine analysis (depending on isotope usage) will be performed for each batch of sterilized effluent prior to transfer from the cook tanks to the blending tank. Additionally, sampling will be performed on each batch of digestate produced by the tissue digester to determine its suitability for direct transfer to the blending tank. The only potential that exists for the introduction of radioisotopes into the blending tank will be the inadvertent or unplanned use of sinks in non-BSL-4 areas, since these connect directly to the blending tank via the building sanitary drain lines.

The NIH Radiation Safety Program policy for non-BSL-4 radionuclide usage is that they are NEVER to be introduced into sink drains. This is the same policy employed and accepted by every other USAG tenant here at Ft. Detrick, who have had no mandatory sludge or effluent sampling/analysis for radioactive materials imposed upon them at any level, Garrison or otherwise. The main focus of our sampling efforts at the IRF is to ensure nothing gets out of our facility, not to utilize the WWTP as a collection point from

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which all IRF effluents can be routinely sampled later. The Garrison has indicated that they perform monthly influent and effluent sampling and they dry and process sludge on an annual basis in late spring or early summer. They have also stated their willingness, which they will be taken up on, to provide us with both liquid influent/effluent and dried sludge samples for our use during whichever type of sampling they're performing when it's being done.

a. Please explain why you would or would not sample sewage sludge and/ or other types of samples from the WWTP to establish a baseline of radioactive materials in the WWTP before your initial use of materials at the Fort Detrick facility.

We are familiar with the Garrison's history of detectable beta emitters at the WWTP, and we clearly state in the signed MOU that we reserve the right to obtain and analyze WWTP samples. Our intent is to exercise this right prior to our beginning research using radioisotopes, and this will obviously serve to provide us with comparative data that can be used in conjunction with other sampling data acquired over time to preclude the possibility of the IRF being identified as a contributor of radioactive material into WWTP sludge and effluents.

b. Although we agree that gamma spectroscopy is appropriate for analysis of gamma-emitters in sewage sludge samples, the use of liquid scintillation counting may not be sufficiently sensitive to detect beta-emitters in solid sludge samples. Please describe in more detail your methods for sampling and analysis of the sewage sludge and any other types of samples you may obtain from the sewage system. Your description should include the sample type(s), method(s) of sample collection, frequency of sampling, and any information regarding the operation of the WWTP that may affect the sampling you plan to perform. Also, if you expect to use Alpha-emitters at this location, describe the samples and analyses to be performed for alpha-emitters.

It is not our intent to analyze solid sludge via LSC, and the best methodology for effectively preparing Ft. Detrick sludge for LSC analysis is being researched. The simplest and most time effective method will be employed, and will be determined prior to the previously discussed baseline analysis being performed. As previously stated, a 1 liter sludge sample will be provided to the IRF by the Garrison. Approximately 1 gram of this sludge sample will be further processed either by dilution in distilled or purified water, or by more aggressive means such as TCLP extraction if necessary, to ensure radioactive components in the sludge are not hidden or masked by color, chemicals, or solids. Furthermore, the LSC equipment in use has the ability to correct for color and chemical quenching in addition to evaluating and correcting for chemiluminescence in the event the chemical agents used in processing contribute counts to that are not attributable to H-3. If this sample preparation approach presents any difficulty in the determination of the beta emitter content of the sludge, sludge samples will be sent to a commercial analytical laboratory for the quantitative analysis of the beta radioactivity.

There is no plan to use pure alpha emitters at the IRF. There will be limited use of commercially available uranyl acetate compounds to facilitate the use of electron microscopes. Residual uranyl acetate powder and solutions will be collected and handled as radioactive waste. In accordance with current NIH policy, the areas in which the uranyl acetate compounds are handled/used will be monitored for alpha activity on an annual basis by our compliance survey contractor.

c. Describe the analytical instrumentation to be used for analysis of sewage sludge and any other types of samples from the WWTP. Describe the sample geometry(ies) to be used in the analyses and verify that analytical instrumentation will be properly calibrated to perform the

analyses. In addition, provide the minimal detectable activity for the common radionuclides and sample types you expect to analyze.

Beta analysis is conducted on a Beckman LS6500. Gamma analysis is conducted on a Wallac Wizard 2480 gamma counter and an Ortec HPGe gamma spec system w/ GammaVision spectral analysis software. Samples will be counted in 20 ml glass and 1 liter Marinelli geometries. All instrumentation is calibrated at least annually under specific factory service support agreements, with QA and constancy checks performed each day prior to use. The current expectation is to utilize the following bench, imaging, and sealed source isotopes:

Isotope	Instrument	2 Min. MDA
H-3	LS6500	17 cpm/34 dpm
C-14	LS6500	10 cpm/13 dpm
F-18	Wizard 2480/HPGe	17 cpm/35 dpm
P-32	LS6500	22 cpm/22 dpm
Cr-51	Wizard 2480/HPGe	25 cpm/357 dpm
Co-57	Wizard 2480/HPGe	18 cpm/20 dpm
Ga-67	Wizard 2480/HPGe	35 cpm/50 dpm
Tc-99m	Wizard 2480/HPGe	23 cpm/26 dpm
I-125/I-129	Wizard 2480/HPGe	11 cpm/13 dpm
Cs-137	Wizard 2480/HPGe	23 cpm/144 dpm

Note: The MDA's provided above are for samples with 20 ml geometry, and where the detection mode is for gamma emitters, the MDA's listed are for the Wizard 2480 only. The LS6500 and the Wizard 2480 cannot be used to count 1 liter samples, and the HPGe MDA's are calculated during each analysis based on the current background conditions during the time the count is performed. For the HPGe, the GammaVision software will calculate MDA's based on the energy and efficiency calibration files selected, which are geometry specific, and then reports the MDA as the analysis result whenever the results are <MDA.

I hope that this information allows you to continue your review and approval of our amendment request.

Please contact me or Doug Carter if you need any additional information.

Robert A. Zoon, RSO, NIH
301-496-2254

cc: Doug Carter, HP, NIAID-IRF 301-631-7226