



## Environmental Health and Safety

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February 10, 2012

Document Control Desk  
Director, Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Attn: Christopher Ryder  
One White Flint North  
11555 Rockville Pike  
Rockville, Maryland 20852-2738

Re: Supplemental information for license amendment Submitted October 13, 2011  
License number SNM-95  
Docket # 70-113  
ML#11294A215

Dear Mr. Ryder,

As you requested in a phone communication on February 7, 2012, I am submitting additional information for a license amendment submitted by The Pennsylvania State University on October 13, 2011, NRC-ML# 11294A215. In that amendment Penn State University requested authorization to possess and use for research purposes about 46 micrograms of plutonium isotopes or about 73 microcuries.

As was discussed in the original amendment request, this material is part of old spent fuel samples that PSU plans to analyze. Along with the plutonium isotopes listed above, the samples will of course include multiple other isotopes produced by nuclear fission and nuclear decay. Each sample will have an activity of 0.1 - 10 uCi in about 20 grams of carrier. PSU expects to analyze less than 50 samples, but for license amendment purposes the activity estimates are based upon 60 samples of about 10 uCi total each. The total requested activity is therefore 600 uCi of all isotopes. As the samples arrive at PSU, the activity and isotopic content will be determined with much greater accuracy and carefully monitored. Penn State will only acquire the minimum number of samples and minimum activity necessary to perform the research.

The major constituents, the approximate calculated percentage of activity, the estimated activity, and calculated mass of radioactive elements are expected to be about:

NM5501

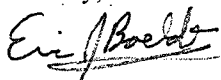
Isotope	Percent	Total uCi	specific activity uCi/gram	grams	
Cs-137	25%	150	8.80E+07	1.70E-06	
Ba-137m	25%	150	5.5 E+14	2.7E-13	
Sr-90	14%	84	1.50E+08	5.60E-07	
Y-90	14%	84	5.4E+11	1.56E-10	
U-all	<.01 %	0.01			
Am-241	4%	24	3429000	7.00E-06	
Cm-244	4%	24	8.20E+07	2.93E-07	
Pu-238	1.3%	8	1.70E+07	4.71E-07	
Pu-239	0.3%	2	6.00E+04	3.33E-05	
Pu-240	0.5%	3	2.30E+05	1.30E-05	
Pu-241	10%	60	1.10E+08	5.45E-07	
Pu - other	0.02%	0.1			
Eu-154	0.7%	4	1.50E+08	2.67E-08	
Cs-134	0.3%	2	1.30E+09	1.54E-09	
Pm-147	0.3%	2	9.40E+08	2.13E-09	
Np-239	0.03%	0.2	2.3E+11	8.70E-13	
Total	100%	597.31	uCi	5.7E-05	grams
				56.9797	micrograms

Since the radioactive constituents listed above are all intermixed, definite masses or activities cannot be given with more accuracy and may vary significantly between samples.

The original risk analysis performed prior to requesting this amendment included all the expected constituents listed above. Each nominal 1 uCi sample in 20 ml of solution would have about 0.12 ALI if completely ingested (600 mrem) or about 13 ALI (65 rem) if completely inhaled. The procedures and practices used to minimize such accidents are detailed in the application.

I hope this additional information is useful in your review of this application. Feel free to contact me if you need further clarifying information.

Sincerely,



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