

# Sequential Separation and Quantitative Analysis of TRU and Uranium in Urine

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November 14, 1994

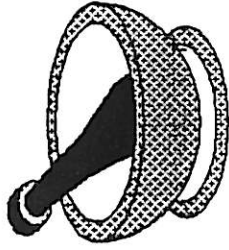
# ADVANTAGES

- **SAMPLE PREP:** One aliquot to prep
- **MOUNTING:** Two filters not four
- **COUNTING TIME:** 2000 min not 4000 min
- **HIGH TRACER YIELDS:** >90%
- **HIGH RESOLUTION:** <40 keV FWHM
- **QUANTIFY U**
- **QUANTIFY TRU:** At least partially
- **WASTE GENERATION:** No organics

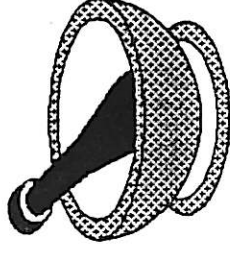
# DISADVANTAGES

- Am-241 Pu-238 Overlap
- If Resolution is Poor,  
Np-237 Th-230 overlap

# Sample Treatment for Urine



Add Tracer



Add Ca, Acidify with  $\text{HNO}_3$ , Digest for 3 Hours

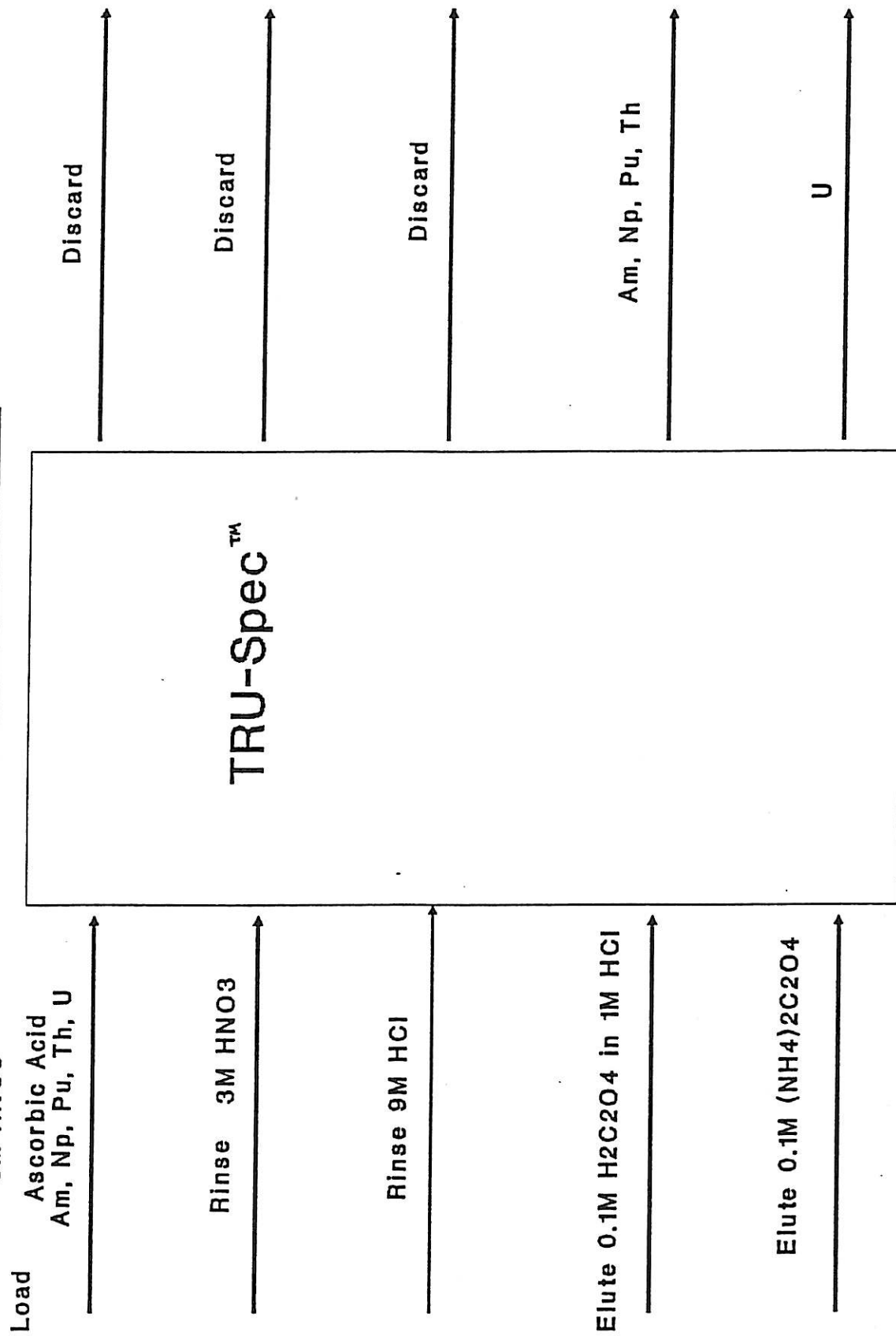
Precipitate as Phosphate

Dissolve Precipitate in  $\text{HNO}_3$

Wet Ash in  $\text{HNO}_3$

# Separation of TRU and Th from

## U on Tru-Spec Columns



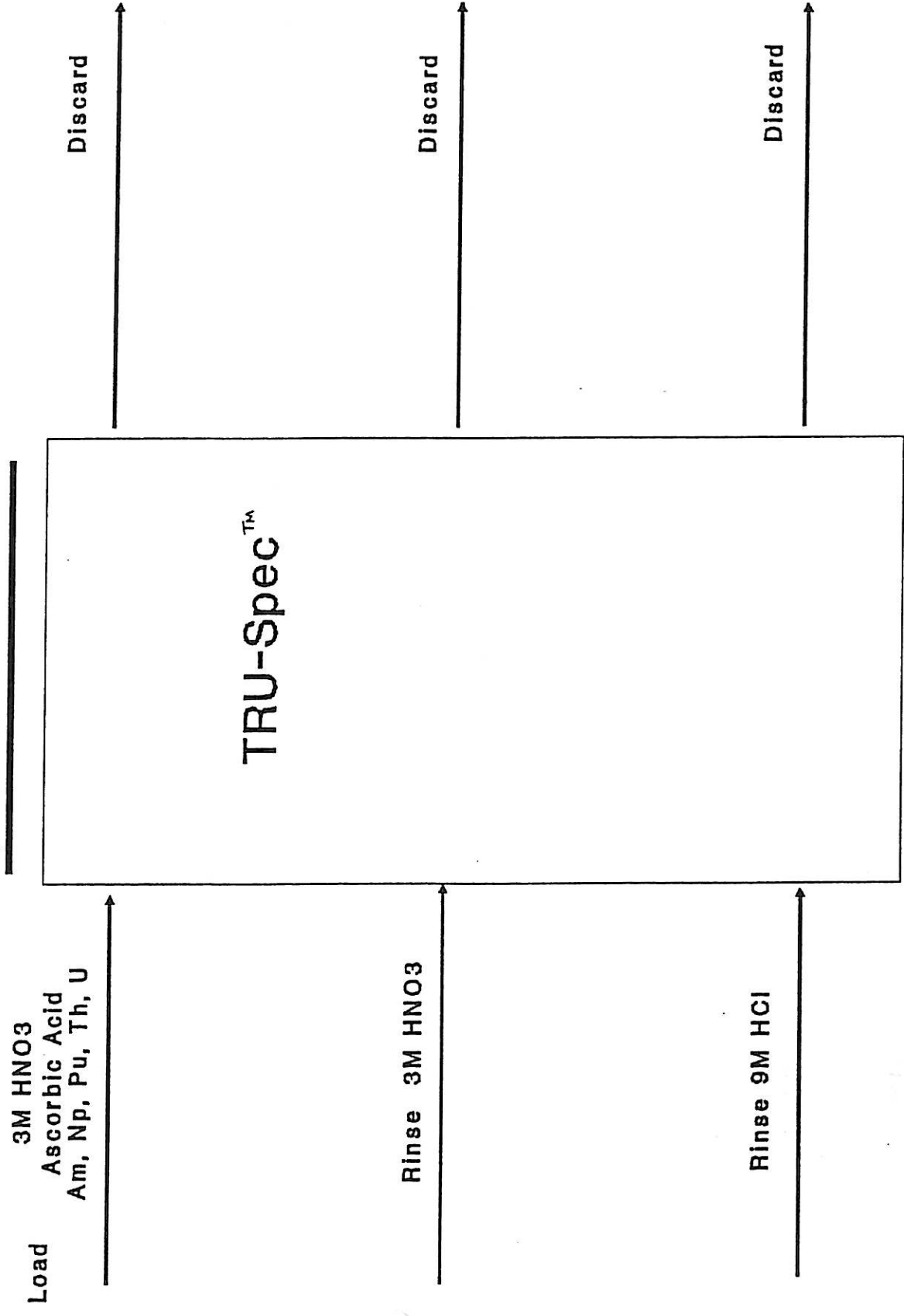
# Precipitation and Filtration For Alpha Spectroscopy

Add Nd Carrier,  $TiCl_3$  for Uranium, and HF  
Filter Sample on a 0.1 Micron Gelman Filter

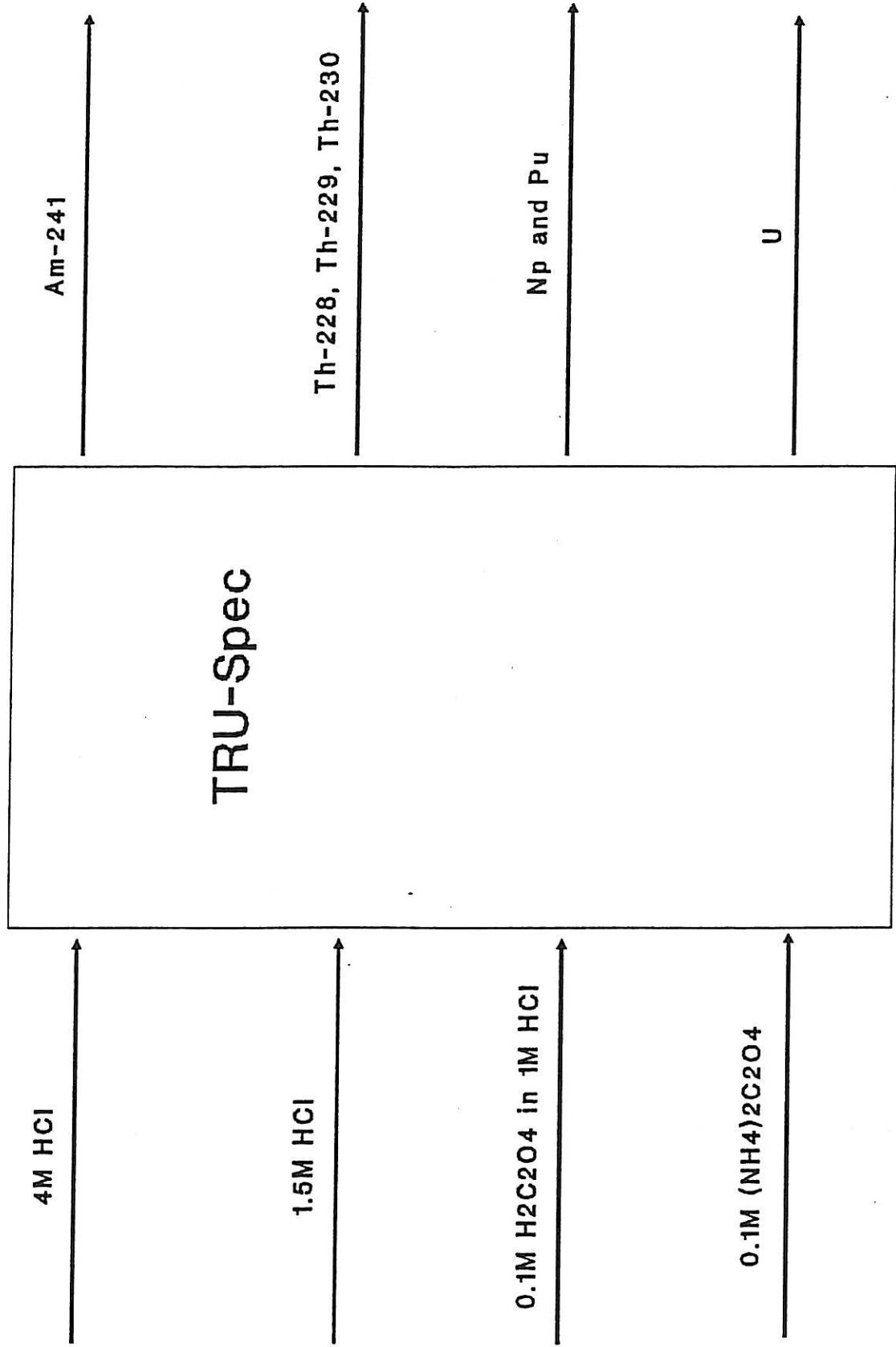
Wash with H<sub>2</sub>O and Ethanol

Mount on Planchet

# Loading of Actinides



# Elution of Actinides

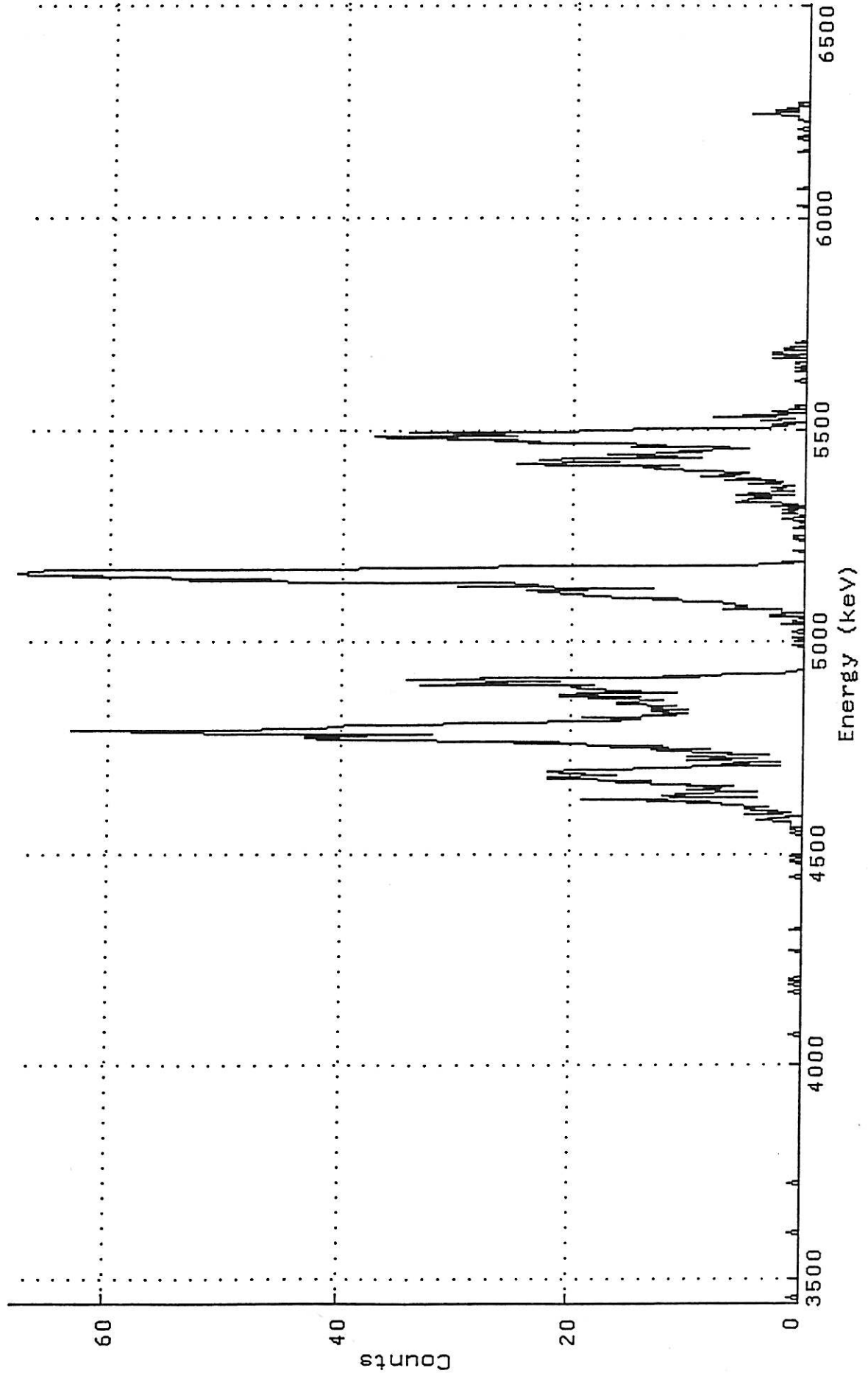




Spectrum : DKA200: [ALPHA.ALUSR.ARCHIVE.S]S\_TRU\$SAMPLE7\_BJ.CNF; 4  
Title : 019

Sample Title:

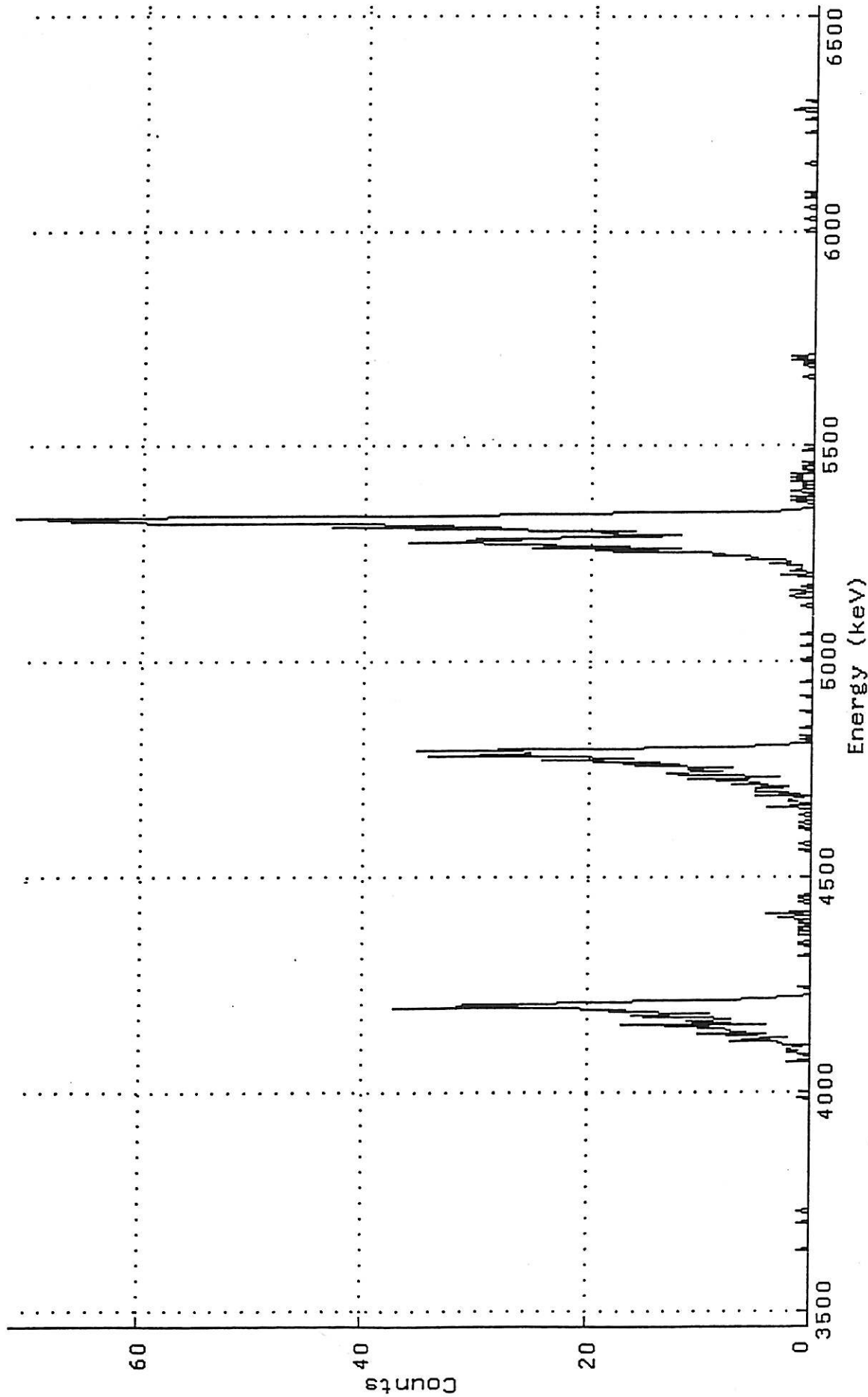
Start Time: 19-OCT-1994 15:21 Sample Time: 19-OCT-1994 00:00 Energy Offset: 3.43411E+03  
Real Time : 0 16:38:49.00 Sample ID : SAMPLE7 Energy Slope : 3.17432E+00  
Live Time : 0 16:38:47.99 Sample Type: BJ Energy Quad : -1.75222E-04



Spectrum : DKA200:[ALPHA.ALUSR.ARCHIVE.S]S\_TRU\$SAMPLE7\_UU.CNF;3  
Title : 007

Sample Title:

Start Time: 19-OCT-1994 15:14 Sample Time: 19-OCT-1994 00:00 Energy Offset: 3.45647E+03  
Real Time : 0 16:38:51.99 Sample ID : SAMPLE7 Energy Slope : 3.11606E+00  
Live Time : 0 16:38:51.99 Sample Type: UU Energy Quad : -1.24227E-04



# LOW ACTIVITY FILTERS

ACTIVITY	ug Nd	FWHM	FWHM	FWHM	YIELD	SPIKE
DPM		U-232	U-234	U-238	U-232	RECOVERY
12.3	25	24.1	22.6	25.1	75.1	100.7
12.3	50	29.5	35.6	28.6	101.1	94.7
12.3	100	37.2	40.3	34.0	100.9	96.9
12.3	200	79.4	85.5	83.8	99.6	87.1

# References

- E. P. Horwitz, M. L. Dietz, D. M. Nelson, J. J. LaRosa,  
and W. D. Fairman, *Analytica Chimica Acta*, 238(1990) 263-  
271.
- C. W. Sill, R. L. Williams, *Anal. Chem.*, 53(1981) 412-415.