



Measurements of Category I Special Nuclear Material at Nevada National Security Site

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Subcritical measurements at DAF

- LANL will support measurements of subcritical assemblies of SNM at the NNSS Device Assembly Facility (DAF)
- Both CVT and CNEC will be able to conduct 1 week each of measurements each year
- This year's schedule:
 - June 29 – July 2, 2015
 - July 6 – July 9, 2015
- We will have greater flexibility to select dates in 2016



Available materials

- The LANL inventory at DAF includes plutonium, uranium, and neptunium ranging from grams to tens of kilograms
- BeRP ball: 4.5 kg weapons-grade plutonium metal
- Rocky Flats shells:
 - 1/8 inch thick HEU metal hemishells
 - Can be assembled into spherical shells of various masses; 10-20 kg configurations are typical
- Fissionable material may be reflected by a variety of materials (polyethylene, tungsten, etc.)
- Many combinations are possible with the current LANL inventory



Courtesy J. Favorite and J. Hutchinson, LANL



Fissionable and Reflector Materials Allowed in Construction of Multiplying Assembly

Fissionable Material	Mass Limit
Pu in metal /compounds /dry residues	$\leq 3,000$ g
^{233}U in metal /compounds /dry residues	$\leq 3,000$ g
Pu in oxide	$\leq 4,400$ g
^{233}U in oxide	$\leq 4,400$ g
^{235}U in hydride	$\leq 3,000$ g
^{235}U in metal /compounds (excluding hydride) /dry residues	$\leq 10,000$ g
^{237}Np Sphere	~ 6 kg Np
BeRP Ball	~ 4.5 kg Pu
Rocky Flats Shells (1-24)	~ 13.7 kg HEU
One Thor Core Piece	$\sim 2-4$ kg Pu

Reflector Material	Type	Thickness Restriction
Copper	A	Total thickness of these reflectors shall not exceed 1 inch
Nickel		
Stainless Steel 304		
Tungsten		
Natural Uranium		
Depleted Uranium		
Cadmium		
Carbon Steel	B	The total combined thickness of Type A and B reflectors shall not exceed 1 inch if Type A reflectors are present. If no Type A reflectors are used, an unlimited thickness of Type B reflectors may be used.
Iron		
Lead		
Lucite		
Polyethylene		
Borated Polyethylene		
Manganese		
Boroflex	C	Unlimited thickness of these materials in any combination may be used.
Aluminum		
Thorium		
Mock HE1		
Mock HE2		
Mock HE3		



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Operational constraints

- DAF operates Monday – Thursday
- Escorting requirements will limit the number of visiting students/faculty to 9 people
- If any of the participants are foreign nationals, we need to provide LANL their names by January 1, 2015
- We have more time to select US citizen participants
- If we use pre-approved subcritical assemblies (there are a *lot* of them), we have until Spring to specify which assemblies we want
- We have to provide LANL with information describing all the instruments we plan to use and our experiment plans by January 1, 2015

