

Replacement Fuel For The Vienna Austria TRIGA Research Reactor



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Domestic and Foreign Research Reactor Project / Idaho National Laboratory

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HOW DID WE GET HERE?

Returns Program

- Atoms for Peace Program
- INL/INTEC Designated as Receipt Site – TRIGA
- Thousands of FRR/DRR TRIGA Elements Received
- Many TRIGA Elements are Very Low Burnup



INTEC Facilities / INL



MAKING THE WORLD A SAFER PLACE



TU Wien Mark II TRIGA Research Reactor

- ◆ **GTRI (Global Threat Reduction Initiative)**
 - Eliminate Sources of Bomb Material from Research Reactors
 - March 2012 – Austria was Only Remaining Research Reactor World-wide with HEU TRIGA
 - International Agreements Committed to Remove HEU from Austria As Soon as Feasible

TU WIEN TRIGA MARK II RESEARCH REACTOR

- Critical Since March 7, 1962
- Only Operating Reactor in Austria
- Steady State Power of 250 kw
- Pulsing Capability up to 250 mw



IN WITH THE NEW(er); OUT WITH THE OLD THE IDEA

- Possible Unavailability of TRIGA Fuel
- Recent Univ. of Ariz. to Reed College Transfer of Fuel



Picture of a Standard "Streamlined" TRIGA Element

“IN WITH THE NEW(er); OUT WITH THE OLD” THE IDEA (cont.)



Storage Array at IFSF in Idaho

- TRTR Informal Discussions of INTEC Source for TRIGA
- “Idea” Picked up by DOE-NNSA & Proposed to Austria
- CWI Database Revealed ‘Prime’ TRIGA Elements Available

“THAR’S GOLD (FUEL) IN THEM THAR HILLS OF IDAHO”



- ◆ DOE / CWI / Austrian Ministry Met in Dec. 2011
- ◆ Proposal & Cost Estimate Developed with Seed Money

Austrian Delegation to Idaho

“GIT ‘ER DONE”

- ◆ DOE / Austrian Ministry / TU Wien Agreed to Make Exchange (Austria Paid)
- ◆ 77 ‘Prime’ Lightly Irradiated TRIGA Elements to Austria
- ◆ 91 ‘Well Used’ TRIGA Elements to Idaho
- ◆ Used the Same NAC-LWT Cask to Ship Elements - Both Directions



NAC-LWT Cask

“CHECK IT OUT!”



Fuel Examination Equipment

- ◆ Fuel Exams Performed in Austria & Idaho
- ◆ June Exam in Vienna, Austria
- ◆ September Exam in at INTEC

“WHAT YA GOT?”

- ◆ 91 Elements Examined
- ◆ 9 Elements had Breached Cladding
- ◆ 1 Element had No Cladding
- ◆ These Elements Were Canned

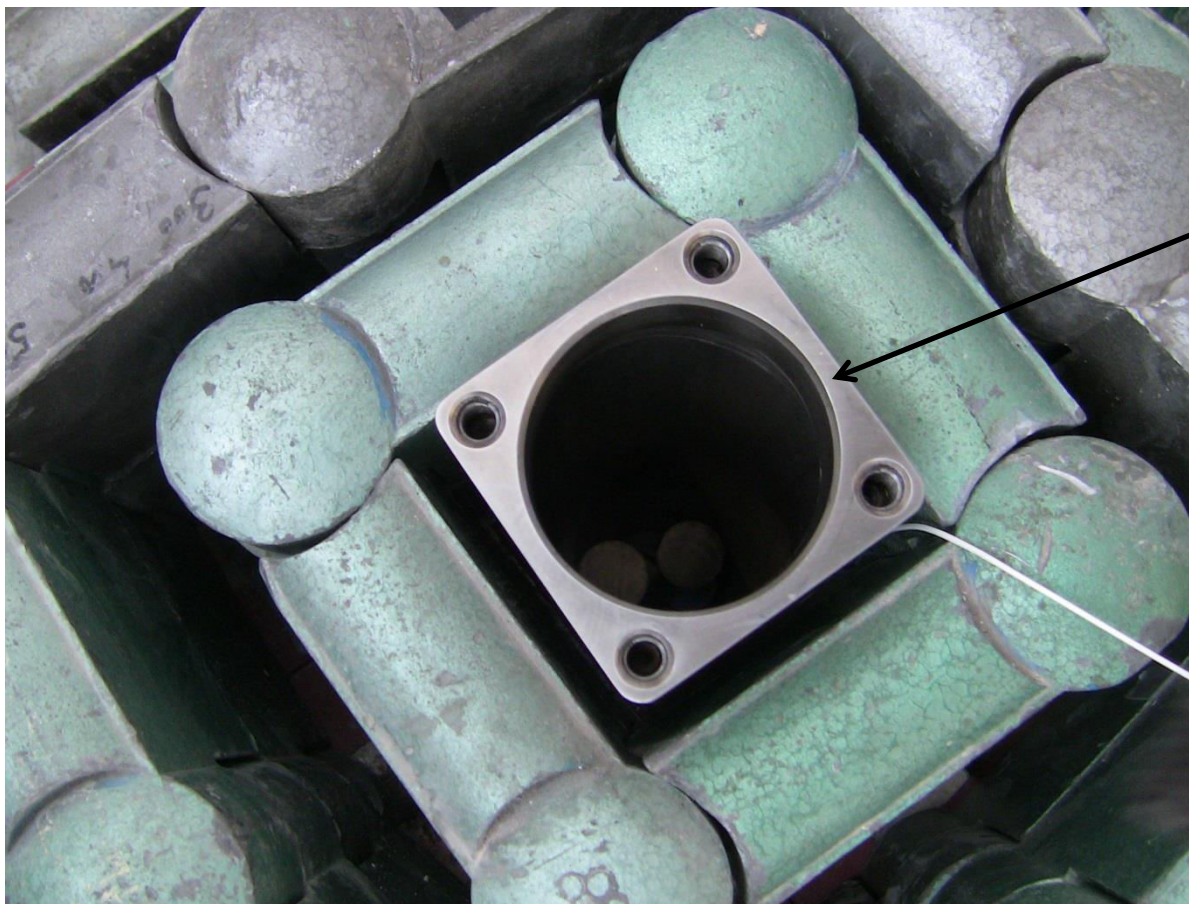


Element w/ No Cladding



Al-Clad TRIGA Element w/ Breached Cladding

“IT’S DARK IN HERE!”



SFFC

NAC Sealed Failed Fuel Can (SFFC) with Fuel Pieces

“WAY TO GO, IDAHO!”

- ◆ 79 Elements Examined
- ◆ 2 Elements Rejected for Anomalies
- ◆ Sent: 75 Elements From Musashi, Japan;
- ◆ 2 Elements From Cornell Univ.



Examination Stand



Austrians Examining Elements

“WHERE’S THE MEAT?”

INTACT SS TRIGA ELEMENTS AVAILABLE FOR HARVEST FROM IFSF AT INTEC

Intact SS TRIGA Elements	Burnup (%)										
	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	> 50
SS - Std (8.5/20)	42	112	194	67	73	52	96	9	3	0	8
Cum	42	154	348	415	488	540	636	645	648	648	656
SS - Streamlined (8.5/20)	28	17	8	2	0	0	0	0	0	0	0
Cum	28	45	53	55	55	55	55	55	55	55	55
SS - Total (8.5/20)	70	129	202	69	73	52	96	9	3	0	8
Cum	70	199	401	470	543	595	691	700	703	703	711

SS - Conversion (8.5/20)	29	112	37	29	0	0	2	0	0	0	0
Cum	29	141	178	207	207	207	209	209	209	209	209

“FOR WHAT IT’S WORTH”

- ◆ Your Input is Needed on Acceptable Burnup
- ◆ Also, Is Time Out of Reactor Important?