



Norbert Holtkamp
Accelerator Systems Division
Division Director

PHONE: (865) 241-6945
FAX: (865) 241-6739
Cell Phone: (865) 919 1070
E-MAIL: holtkamp@sns.gov

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Over the course of the last week leaks were found in e-beam welds of 3 drift tubes of tank 4. Work was stopped immediately and a detailed investigation lead by LANL (J. Sims) is ongoing. A detailed description from Jim Sims is given in the next two paragraphs. Tank 3 and tank 1 continue to make good progress. As soon as the last parts from LANL (slug tuners and post couplers arrive, installation on tank 1 will continue and conditioning will begin. Preparations for the ARR and begin operation on July 7th are still on track.

Three of the 29 production DTL tank four drift tubes bodies welded at Hanford have developed water channel weld leaks. These leaks were located by routine pressurized helium leak checking tests done after diverter brazing which is the third major fabrication operation. Sections of the water channel weld, of the drift tube first detected to be leaking, have been made, polished and etched. The leak appears isolated to the electron beam weld "tail-out" section and seems caused by an irregular crack in the welded material. These sections are undergoing metallurgical and chemical evaluation by Los Alamos National Laboratory group MST-6. Two of the tank four "empty" (without magnets) drift tube bodies that passed post diverter brazing leak checking are being machined within .010" of final form. These will be pressure helium leak checked to detect any leaks or cracks that may have been uncovered by machining of the water channel welds. Only these two empty units are being machined; all other tank four drift tube body cavity and profile machining has been halted pending resolution of water channel weld leaks. Various repair and remediation plans are being prepared. Additional weld contamination prevention measures are being considered to further protect electron beam welds yet to be made. Parametric models of various possible weld repairs have been developed to allow the rapid production of weld repair drawings if they become required. Copper stock for possible weld repair parts (rings and/or plugs) has been located and secured. Currently it is believed all the leaks originate at the "tail-out" region of the final, deep electron beam weld. The leak zone shows cracking and there is also pin-hole piping porosity; these flaws may indicate a material impurity or weld contamination. This welding problem will likely impose a two week delay in the production schedule; efforts will be made to recover schedule as appropriate.

It is appearing more likely that the cause of the water channel weld leaks in the three tank 4 drift tubes is weld zone contamination. The current theory is there were copper oxides formed (due to contamination) and these were left at the last e-beam weld "tail-out". When the drift tube body was subjected to the hydrogen furnace brazing conditions these oxides were converted to copper and water and the water flashed to steam producing fractures which resulted in a leak at the tail-out zone. Hanford has taken numerous additional sections around the leaking weld and has not found any other evidence of additional cracking. If weld zone contamination is the cause of the leaks there is a possibility that we have found all the leaking units that were brazed (all of tank four DT's have been brazed). We are meeting tomorrow with Laboratory group MST-6 metallurgists and welding engineers who have experience with these types of problems in copper. In addition, we are proceeding with the machining of two non-leaking tank 4 empty drift tubes to near final profile to see if this operation will uncover leaks and or fractures.



Fig. 1: Tank 4 bolted together in RATS.

Vacuum leak testing of DTL-1 with DT's in place was completed today (6-3). All 59 top hats and DT's are leak tight. Final integrated leak testing will be done next week after the slug tuners and post couplers have been installed. The 48 hour conditioning of DTL-3 test was completed on Thursday (5-29). A power level of ~ 1.6 MW was put into the cavity at 30 Hz with a 1.1 ms pulse length. No additional high power conditioning tests are planned for this tank. The sections of DTL-4 have been bolted together and mounted on the support stand. Blanking off the ports in preparation for vacuum leak testing has begun (see attached picture).

Component	Engineer	Tank 4				Tank 5					
		Identifier	Quantity	Shipping Date	Delivered	Change from last week	Identifier	Quantity	Shipping Date	Delivered	Change from last week
Drift Tubes	Gentzlinger	4A	7	24-Jul-03	0		5E	8	22-Aug-03	0	
		4B	6	31-Jul-03	0		5F	7	28-Aug-03	0	
		4C	6	7-Aug-03	0		5G	8	4-Sep-03	0	
		4D	8	14-Aug-03	0						
Dummies	Gentzlinger			With DT Groups				With DT Groups			
EMDs	O'Hara		4	20-Oct-03	0		4	20-Oct-03	0		
BPMs	O'Hara		2	20-Oct-03	0		2	20-Oct-03	0		
Top hats	Rowton	1.25"	27	5-Aug-03	0	1.25"	23	5-Aug-03	0		
Shrouds	Rowton		27	5-Aug-03	0		23	5-Aug-03	0		
Endwalls	Turon		2	Complete	2		2	Complete	2		
Post Coupler Kits	Rowton		27	Bead Pull + 15	0		23	Bead Pull + 15	0		
Slug Tuners	Rowton		12	Bead Pull + 7	0		12	Bead Pull + 7	0		
Access Ports			2		0		2		0		
RF Grills			4		0		4		0		
Wave Guide-Iris	Valdiviez		1	30-Jul-03	0		1	7-Aug-03	0		
Window	Cummings		1	23-Jun-03	0		1	28-Aug-03	0		
Stands	Turon		1	Complete	1		1	Complete	1	0	

Tank 6					Tank 2				
Identifier	Quantity	Shipping Date	Delivered	Change from last week	Identifier	Quantity	Shipping Date	Delivered	Change from last week
6H	10	12-Sep-03	0		2J		16-Sep	0	
6I	11	22-Sep-03	0		2K		22-Sep	0	
					2L		26-Sep	0	
		With DT Groups			2M	41	2-Oct	0	
	4	1-Oct-03	0				None	0	
	2	1-Oct-03	0			4	1-Oct-03	0	
1.25"	21	5-Aug-03	0			2	1-Oct-03	0	
	21	5-Aug-03	0		.75"	41	17-Jun-03	0	
	2	Complete	2		1.00"	6	10-Jul-03	0	
	21	Bead Pull + 15	0			47	10-Jul-03	0	
	12	Bead Pull + 7	0			2	Complete	2	
	2		0			27	Bead Pull + 15	0	
	4		0			12	Bead Pull + 7	0	
	1	23-Aug-03	0			1		0	
	1	28-Aug-03	0			4		0	
	1	Complete	1	0		1	3-Sep-03	0	
						1	Complete	1	
						1	Complete		