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Memorandum

To: File

From: John Effland and Denis Urbain

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Revisions: 2010-12-23 jee Initial
2010-12-27 jee Updated with today's results

Subject: Rate of Rise for FE SN 013

This document shows rate of rise results for FE SN 013 until essentially reaching warm-up. This is still considered a draft document and requires a conclusion and recommendation from the team prior to wider distribution.

A number of cryostats delivered to the NA FEIC show relatively high rates of pressure rise, as summarized in [Figure 1](#) and discussed in [JIRA](#). This might result in additional maintenance if the cryostats require more frequent pump-downs than the specified 1 year. If the leak rate is excessive and cryostat pressures exceed 30 mbar, vacuum pumping becomes complicated, which further complicates maintenance cycles.

The front end using cryostat SN 013 has nearly completed PAI testing, and to determine if out-gassing or actual leaking is causing excessive rates of rise during PAS, it is undergoing a temporary warm-up with no nitrogen injection during the holiday break. To show the rapidly changing temperature regime, the first 20 hours of temperature and pressure data are shown in [Figure 2](#). Initial pressure rise for the current warm-up ([Figure 3](#)) shows a lower rate of rise compared to warm-up pressures measured during PAS¹. The graphs from the PAS report were scaled and super-imposed on the current data because the original data is apparently stored on someone's desktop computer.

Most importantly, [Figure 4](#) shows pressure rise for the entire warm-up cycle, and the rapid pressure rise around midnight of Christmas Eve is likely due to sublimation of gases and water vapor leaking into the cryostat during the 4-month period that it was operated at cryogenic temperatures.

¹ "Cryostat SN-013 PAS Report - NA FEIC," [FEND-40.03.00.00-168-A-REP](#)

Figure 1: Measured Rate of Rise Summary for Cryostats delivered to the NA FEIC

	Rate of rise #1	Rate of rise #2	
Cryostat 5	4.1 E-4mbarl/s	n/a	
Cryostat 8	n/a	9.03E-4mbarl/s**	
Cryostat 13	7.4 E-4mbarl/s	1.1E-3mbarl/s *	
Cryostat 17	4.1E-4mbarl/s	7.1E-4mbarl/s	
Cryostat 20	5E-4mbarl/s	5E-4mbarl/s	
Cryostat 25	4.36E-4mbarl/s	5.58E-4mbarl/s	
Cryostat 29	9.1E-4mbarl/s	1.02E-3mabarl/s	

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Figure 2: FE SN 013 Rate of Rise, First 19 hours

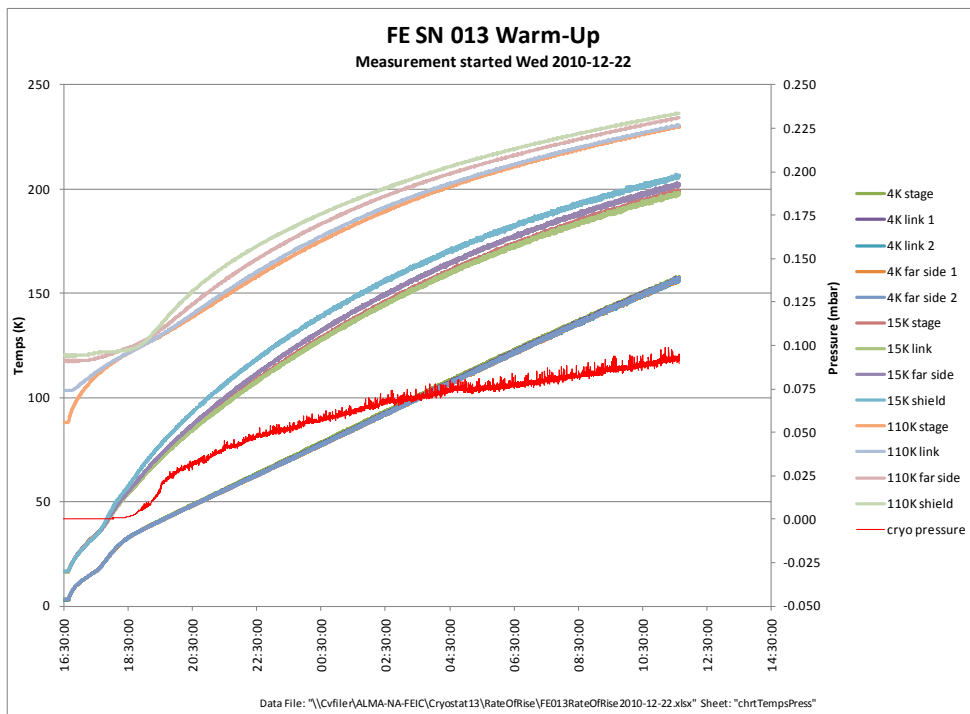




Figure 3: Pressure Rise for FE SN 013 after installation of vacuum equipment (blue curve) and first 19 hours with fully-equipped front end (red curve)

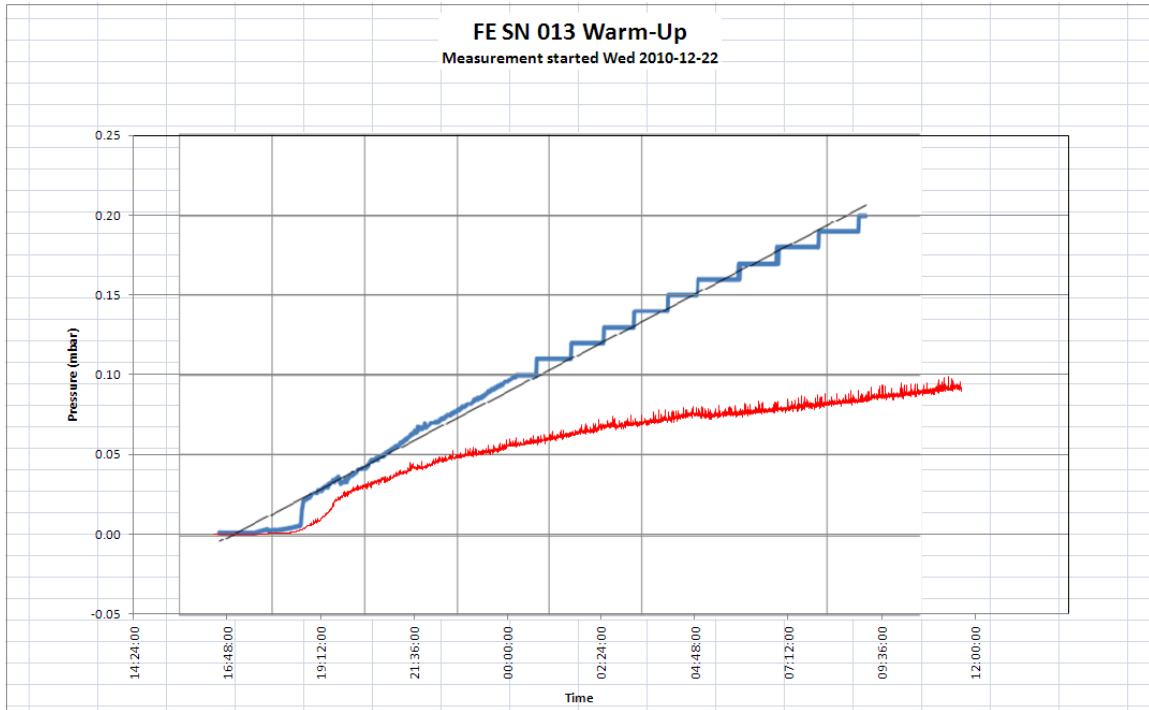


Figure 4: FE SN 013 Rate of Rise to Warm Up

