From: Dan Louie
To: Grant Minor;
cc: "Remy Dawson"; cessford@triumf.ca; "Maico Dalla Valle";
"Arthur Chun Ming Leung"; "Pierre Bricault"; "Lia Merminga"; "John Kaminski";
"Gordon Roy"; Yuri Bylinski;
Subject: Re: Lid-up complete - summary notes
Date: January 30, 2013 12:14:33 PM

Remy,

I've been involved with the last 7 lid up/down work.
My observation is that the last lift was atypical.

During a typical lift, the system will stop on the average 5 to 6 times.
Not all stops require an adjustment (reset) of the master synchro signal to restart.
After an master synchro adjustment, the lift can usually travel many inches before stopping.

In the past, I remember using local control to jogging a stubborn jack once.
After jogging, I recall the lift went fairly smoothly.

The jogging of jack 9 multiple times during a single lift is something I have never done before.

One more observation. We had to lower the lid twice. During both lowering, the system did not trip.

I agree with Grant to record the trips in the future.
They may give clues regarding the conditions of the jacks.

Cheers,
Dan

On 1/30/2013 11:23 AM, Grant Minor wrote:

> Remy,
>
> Before Dan Louie, Klaus was responsible for operating the elevation system controls.
>
> I believe I have only been present to observe 3 of the last 4 lid-up events.
>
> I recall that for at least one, if not two of these events, multiple trips

during the lift were common, and Klaus spent quite some time running back and forth between the pendant and the control racks resetting the system.

The Remote Handling records appear to be minimal and the exact number of trips on which station year-to-year do not appear to be recorded.

I think it would be wise for Dan and me to begin documenting the exact number of trips and the stations causing the trips for each lid-up. I tried my best this year to capture the sequence but next year I will be sure to work with Dan to document all of the trips, resets, and jogs.

Cheers,

Grant

From: Remy Dawson [mailto:rdawson@triumf.ca]
Sent: January 30, 2013 10:06 AM
To: 'Grant Minor'; cessford@triumf.ca; 'Dan Louie'; 'Maico Dalla Valle'; 'Arthur Chun Ming Leung'
Cc: 'Pierre Bricault'; 'Lia Merminga'; 'John Kaminski'; 'Gordon Roy'
Subject: RE: Lid-up complete - summary notes

Grant,

Thanks for the detailed notes.
In a historical context, was this lid up typical or was it atypical?

Remy

From: Grant Minor [mailto:gminor@triumf.ca]
Sent: January-29-13 18:56
To: cessford@triumf.ca; 'Dan Louie'; Maico Dalla Valle; Arthur Chun Ming Leung
Cc: Pierre Bricault; 'Lia Merminga'; remy.dawson@triumf.ca; John Kaminski; Gordon Roy
Subject: Lid-up complete - summary notes

Hi all,

Please find attached my e-log notes on the lid-up work today.

Thanks and best regards,

Grant

From: gminor@triumf.ca [mailto:gminor@triumf.ca]
Sent: January 29, 2013 6:49 PM
To: John Wong; Bevan Moss; Grant Minor
Subject: Lid-up complete - summary notes

A new ELOG entry has been submitted:
Logbook: **RH-Cyclotron** Message ID: 7 Entry time: **Tuesday, January 29, 2013, 18:49**
Author: Grant Minor
Category: Elevation Jack
Type: Standard Operation
Subject: Lid-up complete - summary notes
Lid-up was first attempted yesterday (Jan 28th) by Dan Louie, Arthur Cheung, and Maico Dalla Valle. They experienced problems with Station 9 continually tripping the system and were not successful.

This morning again there were problems raising the lid above ~1 inch due to tripping at station 9. It was observed that the mechanical counter at Station 9 was increasing about 5 to 6 times faster than the counters at the other stations. There may be a mechanical problem with the gear reduction for this counter. However, the mechanical counter is just a readout and does not control any aspect of the lid up. Comparisons between stations 9 and 10 at the 1 inch trip point are shown below. Station 10 is representative of the other stations within about 100 counts.

~ 1-inch trip	Station 9 counter	Station 10 counter
Attempt 1 from fully lowered	6976	1814
Attempt 2 from fully lowered	5899	1397

The lid was lowered fully and the gap between the yoke and the

upper structure primary beams was measured by Maico at one spot per station with 1/4" stock and feeler gauges (see attached reference photo from 2012).

Station	Gap (inch)
1	.265
2	.295
3	.378
4	.270
5	.390
6	.290
7	.274
8	.345
9	.373
10	.393
11	.445
12	.356

Not much could be concluded from the measurements. The control system is supposed to keep the jacks parallel within about 50 thou, however Stations 1 and 11 appeared to be out by 180 thou. It is difficult to say without further study weather this larger discrepancy is due to overshoot at each station after the lower limit switches are reached.

Grant Minor, Dan, Maico, and Arthur met in the Main Control Room at around 1:30pm to assess. Dan commented that Station 9 was continually lagging in the system and causing the ~1 inch trip. The decision was made to drive the whole system to the ~1inch trip point and then jog Station 9 manually to bring it back into the "go" band of tolerance, and continue on this way until the "sticky" portion of travel was overcome. In Grant's opinion, the transmission system at each station (motor, reducers, jacks, and upper bearing) sits dormant in one position for a full year each year and settles in a single position. Some asymmetry in the static and dynamic friction from station to station is expected after such a long idle period. Additionally, the lubrication at station 9 has not been serviced since

1996 (18 years). Grant also felt that jogging the system in small increments to bring it back into the tolerance band should not damage the jacks, motors, or reducers provided they were carefully monitored for abnormal noises or overheating.

The sequence of events following the 1:30pm meeting is outlined below:

- The system tripped as expected around 1 inch.

- Station 9 was jogged upwards 20 thou, measured with the dial indicator. Station 9 counter increased from 9255 to 9429.

- The entire system was run upwards by about another inch with several more trips, some from Station 9 and some from other stations. Dan reset the system after each trip.

- At around 2 inches, Station 9 was jogged again. Maico reset the dial indicator and attempted to jog manually but the dial did not move. This might have been due to the lag at Station 9 creating some amount of backlash before the load was taken again. He reset the dial again and this time measured a jog of 25 thou. Dan asked us to back off by 20 thou, then he reset the system and we continued to raise.

- The system was raised to about 3" in small increments with several more trips, each time reset by Dan. Station 9 was jogged 3 more times during this period by 10 thou each time, at approx. counter readings 16 362, 16 802, and 17 134.

- The system then ran properly for quite some time and tripped at around 6 inches. We stopped to inspect the tank seal, which was OK.

- The system was reset by Dan and run again to about 10 inches, at which point station 1 tripped. Station 9 counter read 60 775, Station 11 counter read 10 829 (again a factor of 6 discrepancy).

- Dan requested a jog of 10 thou at Station 1, and then we continued to run. The system ran with only a couple of trips up to about 1 foot

from the upper limit.

- At around 1 foot from the upper limit, Station 7 started to cause tripping. It was jogged 10 thou and we continued all the way to the upper limit.

(Total travel is approximately 48 inches or 4 feet).

During the course of the work, it was observed that the motor at station 9 was getting hot early (around 2 to 3 inches of travel), but the motors at other stations (e.g. Station 11, Station 1) reached about the same temperature to touch after the system was running properly.

Report by Grant Minor, P.Eng.

Attachment 1: Jacks_Station_6_and_4_Procedure_Jan_12_2012_122.jpg 738 kB

ELOG V2.7.5-2130