

2017 Jul 10 T2 Solenoid Valve Replacement

Monday, July 10, 2017
11:07 AM

Original submitted E-Fault by ops regarding failed valve:

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Grant
-----Original Message-----
From: cyc_efault@triumf.ca [mailto:cyc_efault@triumf.ca]
Sent: Sunday, July 9, 2017 9:47 PM
To: bricault@triumf.ca; iearle@triumf.ca; joseph@triumf.ca; maxim@triumf.ca;
gminor@triumf.ca; angela@triumf.ca; dnagra@triumf.ca; echapman@triumf.ca;
elena@triumf.ca; fhosta@triumf.ca; gordroy@triumf.ca; polarbob@triumf.ca;
cycinfo@triumf.ca; juppall@triumf.ca; pjy@triumf.ca; rswanson@triumf.ca;
genge@triumf.ca; rlovlidge@triumf.ca; violeta@triumf.ca; kevinmcl@triumf.ca;
kmollard@triumf.ca; rschick-martin@triumf.ca; dbandiera@triumf.ca
Subject: CYCLOTRON Fault 10119 (new fault) T2 target cooling system flow
lost

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*** USE THE URL BELOW TO LOG INTO THE FAULT REPORT SYSTEM ***

CYCLOTRON Fault 10119
Summary: T2 target cooling system flow lost To Group: Targets Issued by:
Robin Swanson
Priority: immediate response
Preventive Request: 0
Details:
At 19:17 T2 target cooling system flow on the Cu-ALCW side of the heat
exchanger went to zero. Confirmed that target system had in fact lost flow
to heat exchanger when water package temps began to rise.

Cooling package responds to commands via EPICS, and valve B1A:T2CS:SVSEC
shows as actuating when water package is toggled On/Off. Flow
B1A:T2CS:FGSEC:RDFLOW remains at zero throughout testing.

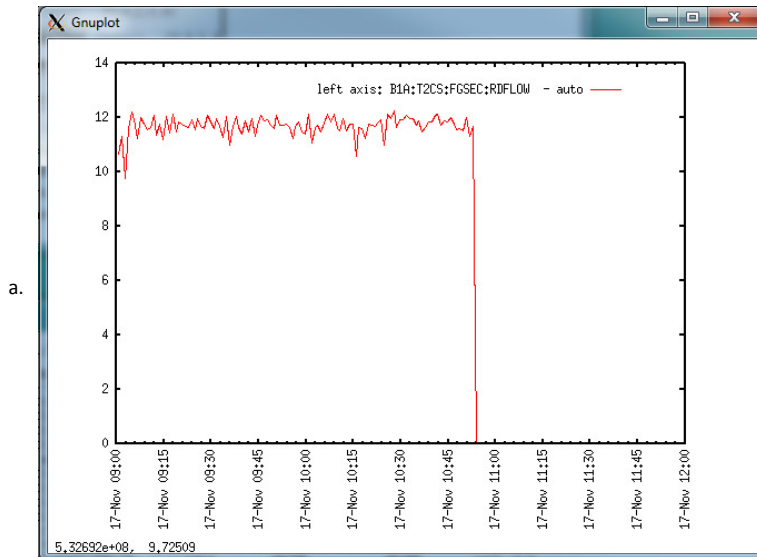
T1 target cooling system shows nominal flow to heat exchanger.
Initial Action Taken:
Checked if T1 target cooling system had similar symptoms. Confirmed Cu-ALCW
was at operating pressure and that no new leaks started since T2 lost flow.

https://web.accel.triumf.ca/ncr/dbfault.pl?faultgroup=CYCLOTRON&faultno=10119&btn\_submit=Getfault

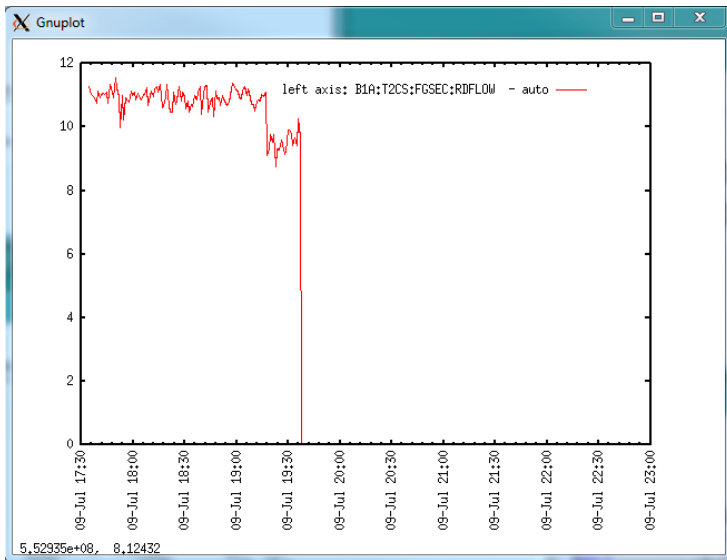
What to do with an e-fault:
https://web.accel.triumf.ca:443/ncr/html/help.html#what to do
```

Screen clipping taken: 2017-07-10 11:07 AM

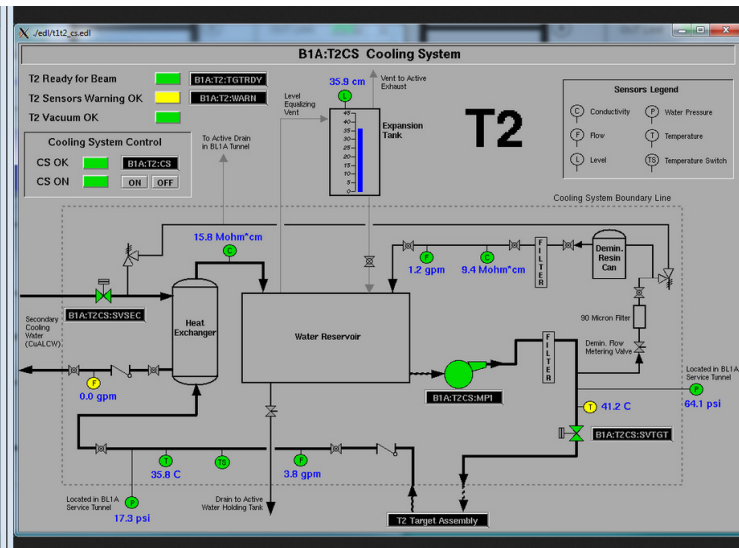
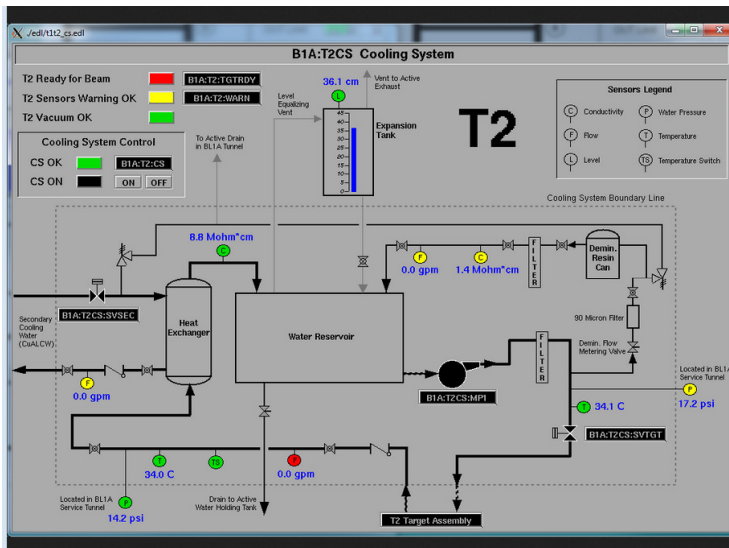
1. Plot of previous known failure of suspected valve, plot of B1A:T2CS:FGSEC:RDFLOW, flow meter downstream of heat exchanger secondary side.



2. Plot of 2017 Jul 10 valve failure, plot is of flow to B1A:T2CS:FGSEC:RDFLOW

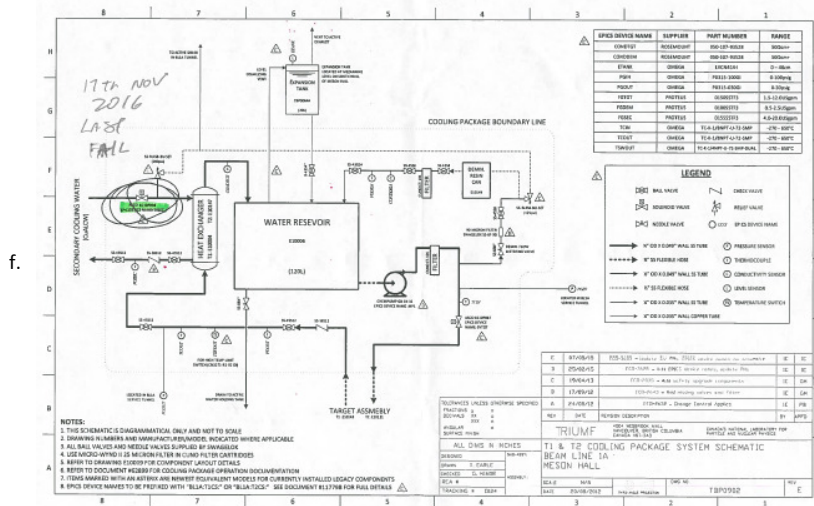


3. Ops elog dated 2017-07-09 21:55:45 showing restart of water package, turned off vs turned on.



4. Restarting T2 water package:

- a. Valve shows green in epics
- b. No flow in down stream flow meter
 - i. Could possibly be bad flow meter or bad valve, but more likely the latter (proven not the case, see below)
- c. Indirect evidence it was a valve failure and not a flow sensor failure from ops was when the package was restarted the target water temperature was still climbing.
- d. Same kind of valve as failure as one in 2016 Nov 16 to 17 (confirmed after blocks removed).
- e. Drawing of water schematic, failed valve highlighted:



5. After uncover, did same rudimentary check as with last failure in 2016 november with Controls (Tony) to see if valve was still functional.
 - a. Had Pierre listen for the solenoid fire, Tony actuated remotely twice, no sound, could not hear from mezzanine.
6. 2 work permits taken out, one to access tunnel, one to do repair.
 - a. [C2017-07-10-6](#) for swapping solenoid valve
 - b. [C2017-07-10-5](#) to access the shutoff and drain valves in the tunnel
 - c. (tunnel work permit was taken preemptively incase valves needed to be accessed, this was the case as there was no shutoff on the water package proper)
 - d. Third permit taken by Doug to uncover the blocks above the water pack.
7. Accessed tunnel with Doug, shut off the supply and returns, drained the return line as best as possible at tunnel location:
 - a. Had to assess if water package proper had shut off valves for the heat exchanger which it did not. It has shutoffs at the return side only (probably to facilitate removing the flow meter).
 - b. Should add a tap line to the return line drain to make drainage easier, this is an ongoing issue. Other wise water sprays (uncontrolled release) everywhere when the ball valve is opened.
8. Did actual repair with MDV:
 - a. Disconnected old valve via the swagelock fittings, lower fitting seems galled or something. Use the "drip pan" to hold the water that came out of the heat exchanger. Pan with water was left behind and covered after job.
 - b. Box of the new valve:



- a. Disconnecting old valve some black debris fell into drain pan, unsure if debris was already there or not.
- b. Connected new valve to multipin, had Controls (Tony) remote fire it, works, confirmed by Doug.
- c. MDV removed fittings from failed valve, taped pipe joints, reattached swagelok couplings to valve.

- d. Valve replaced on to water package.
 - e. Total job time replacing valve proper, est 30 mins.
9. Once valve connected, had ops restart water system.
- a. Heard solenoid fire, ops reported low flow but then back to normal after 5-10 minutes, likely from the heat exchanger being drained from removing the valve. MDV heard cavitation, but went away. Visually checked for leaks at the joints, none were seen. Pressure may not have been high enough to spot slow leaks at the joints however.
 - b. Flow meter was showing normal flow, Doug and Ops ok to re cover blocks
 - c. Doses: MDV .04 mSv, Doug P. .007mSv , KCN .019 mSv; 0.066 mSv Total, does not include plant group uncovering blocks.
10. Work done by 15:15.
11. Post mortem:
- a. Valve has failed about two times in the same way in the last year.