From: James Ferguson
Sent: Tuesday, June 23, 2009 5:54 PM
To: Amy Webster; Evan Vokes; Tom Slimmon; Kevin Widenmaier; Niteesha Edwards; John Riley; Christian Cyrenne; Trent Bertholet
Subject: DL Flange Meeting Agenda

Ahead of the meeting tomorrow, which some of you are not able to attend I wanted to update everyone as to where we are with these flanges. This will also serve as an Agenda for the meeting. Please review and feel free to discuss at the meeting.

1. DEFECTS IN FLANGE

There has been some discussion over the cracks in the flange that we repaired. There has been some discussion that they are forging defects and some discussion that they are related to heat treating/material issues. While we may not determine the actual root cause (because we were not able to send the flange for destructive testing) this point is mostly moot. Whether this was caused during forging, or whether it was caused by a material or heat treating issue, we have to seriously question the base materials and forgings that DL is using to manufacture their flanges. This applies to every DL Flange, even those that are final machined in Houston as per the Technical Agreement with TransCanada. For DL, all of their forgings come from the plant in Romania so we have to question all of the flanges supplied by DL.

To date we have suspended any future orders with DL Flange until we are confident that the issues have been resolved and we will not see these defects again. This is easier said than done, but restoring confidence in DL as a minimum will require:

i. A Report from DL as to the Root Cause of This Issue
ii. An Acceptable Plan to go forward (by DL) to ensure that these to not happen in the future
iii. Analysis from Final Investigation from Meikle River, Woodenhouse, and Keystone Flanges (See Agenda Item 5)

2. CODE COMPLIANCE FOR FLANGES / HISTORY

An analysis has been done as to the Code Compliance/Drawings of these flanges. It was actually much more complicated than it should have been. I will go into more detail in the meeting, but the history in short is:

i. These Flanges were Ordered to Our Specification (TES-FLGE-LD Rev. 3) which is based on CSA Z245.12-05;
ii. Drawings for the Flanges Were Questioned and it was Determined that the Flanges Were Manufactured, Machined, and Certified in Romania which is not as per the Technical Agreement under which DL is approved to supply Flanges to TransCanada;
iii. The Flanges Arrived On Site;
iv. The Flanges (from Drawings and Markings) Were to B16.47 Series A, and not to CSA Z245.12-05;
v. The Flanges Were Accepted on a Project Specific Basis;

Here is where the Code Compliance comes into play which will provide some good lessons learned for future projects:

i. CSA Z662 allows flanges to be B16.47 Series A, but they are limited to A350 LF2 (Class 1 or 2) or A105 material
ii. Under CSA Z662 you have to base the flange design on the minimum yield strength for these material standards, **which prevents us from taking advantage of higher grade (i.e. Q+T) material!**
iii. The Drawings and MTR's show the material to be CSA Z245.12 Grade 483. **For this to be allowed the flange must be in total accordance with CSA Z245.12!**

iv. The dimensions of the flanges (from the drawings) meet both CSA Z245.12 and B16.47 Series A **with the exception of the hub angle which does NOT meet CSA!**
v. Under CSA Z245.12 you can use non-standard dimensions for flanges **if the flanges meet the requirements of ASME Section VIII Div I Appendix 2 with CSA's acceptance limits**
vi. The flanges meet ASME Section VIII Division I Appendix 2 for Operating Conditions under MAOP
vii. **The Flanges do NOT meet ASME Section VIII Division I Appendix 2 for Gasket Seating (Bolt Up) Conditions**

This would then appear that the flanges meet B16.47-Series A and not CSA Z245.12. Unfortunately we cannot use B16.47 Series A with the higher strength and the flanges would not be acceptable under CSA Z662. However, ASME Section VIII Div I has a Non Mandatory Appendix that says for large diameter flanges under high pressure that the bolt up conditions may not be met under Appendix 2 because the bolting stress calculation under these conditions is not necessarily accurate of the actual bolting stresses. Engineering Analysis shows that under Appendix 2 we could meet bolt up conditions if we moved to lower strength bolts or used smaller bolts, both of which contravene common sense. However, under Z662 we can use operating experience and engineering assessment to accept a non-standard material if it will meet or exceed the material requirements specified in Z662. We know from operating experience that the flanges are not being yielded or seeing excessive bolt up force, and we have a procedure to minimize the stresses during gasket seating (i.e. bolting up opposite sides). **Therefore we can accept this flange under Z662, but I am not sure if it is because we can say it meets CSA Z245.12-05 or because it meets B16.47-Series A and we can accept the non-standard material replacement under Z662 based on operating experience.**

I realize this point could be confusing, and hopefully Tom can correct my mistakes.

3. FOLLOW UP WITH DL FLANGE

Besides the points mentioned in (1) above, which DL has not yet responded too we have several other things we need to follow up on:

i. What do they suggest for inspection (I believe they have responded to this question)?
ii. Do we need DL/Can DL certify the flange to CSA Z245.12-05? If so, do we need to stamp/mark these flanges appropriately
iii. We need to issue NCR's to DL
iv. Clearly these flanges do not meet our specification – another NCR
v. We need to clarify the hub angle dimension requirements for CSA flanges to DL.
vi. More to come…

4. INSPECTION PLAN FOR REMAINING FLANGES

This becomes our next challenge. I have spoken with some of our integrity and crack assessment experts, and I have invited our NDE expert (Evan Vokes) to this meeting. We have also contacted some contacts at RTD to get their thoughts. Our current plan is that we would recommend inspection of 100% of all the above ground flanges, which would mean 100% of all the flanges because I believe they are all above ground. The inspection would be done with UT and visually. We would then take a percentage of the flanges, remove the coating, and perform MPI to confirm. However, this could change depending upon our discussion. We are mainly choosing UT because we are hoping we do not have to remove the coating. However, if we do we will have to reconsider our inspection. Because this is either a base material problem we have nothing to go on to say the other flanges cannot be affected, and we cannot pick which ones are more likely to have issues than others.

We need to firm up our decision on this ASAP.

5. KEYSTONE FLANGES

On an interesting note, Keystone has ordered a lot of flanges from DL, which were supplied out of Romania. Many of these are lower grade, but I am working with them so that we can coordinate our findings and inspections.

6. LESSONS LEARNED

i. We should NOT be accepting flanges outside of CSA Z245.12 where the design is for high grade, and especially large diameter, flanges;
ii. We need to clarify the hub angle dimensions to each manufacturer
iii. More to come…

I'm sure we will go into more detail on some issues, but the main one to nail down is NUMBER 4!

Thanks,

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