New Folder Name Comments Concerning R. Weiss Version of the Outgassing Test Procedures T950019

LIGO-T950019-00-B

COMMENTS COINCERNING RAI WEISS VERSION OF THE OUTGASSING TEST PROCEDURES

1. General Comment. I like the state vector numbers which Rai has used. I suggest that they be sequentially numbered from the start to the finish of the entire document.
2. Pump Down procedures 7 and 9. We do not want to turn off the bleed valves.
3. We have specified that the leak test will be done in accordance with HMST4QT. We will revise this leak detection document to include all seams which have not been tested.
4. *Pumpdown assay procedure #13. What is the point of doing this at this point in the pumpdown? The outgassing should be primarily from the tube. I would expect the pressure gages to go down by two orders of magnitude after V1 is closed.*
5. Pumpdown assay procedure #15 thru 17. Do this after section 4.0 in order to eliminate the time associated with filling and emptying of the trap. Also suggest that LNT1 is also cold for the same reason
6. Section 4.0 introduction. You have misread my procedure for the water outgassing tests. I used the gaging to determine the outgassing rate as you have previously suggested. The accumulation method was suggested only for water pumping speed determination.
7. Prebake water outgassing rate procedure #1. You state that you would use chi sq. fitting of the exponential with a constant to determine the nitrogen pump speed. The first question is how poorly will water reproduce a standard exponential after an accumulation? The second question is that I have always been taught that the pump speed can be calculated by the formula $S_p=\ln(P_1 / P)*V/T$. I assume that this equation will work if the pressure / time measurements are near the peak where outgasssing has little effect. *The third question or comment is that I think the chi sq. calculations for a nitrogen pump speed test are excessive.*
8. *Prebake water outgassing procedure 6 - 8. What is the requirement for measuring the pumping speed of the RGA pump system?*
9. Section 5.1 introduction. You are correct, the tube should be part of the expansion volume.
10. Section 6.0 introduction. I have failed to add the CO leak to my procedure, sorry. My procedure (with the addition of the CO) was as follows:
    a) Run an RGA spectrum (42 AMU values or full scan) of air at about 1E-5 torr using the variable leak valve.
    b) Run an RGA spectrum of CO at about 1E-5 torr using the variable leak valve.
    c) Use (a) and (b) to supply fractionation patterns for the air signature program.
    d) Run an RGA spectrum of the gas in the tube.
    e) Run the air signature progran to determine the percentage of the 28 peak in (d) that is attributable to nitrogen.
    f) Accumulate and use the RGA to measure the pressure spikes of the nitrogen calibrated leak and the tube to determine what is the calibration factor for the RGA.
    g) The air leak rate would then be the ion current reading of the RGA multiplied by the calculated correction factor to provide a total partial pressure of the 28 peak (torr liters / sec.). This value would then be multiplied by the percentage of the 28 peak attributable to nitrogen (torr liters / sec of nitrogen). This value would then be divided by 0.79 to determine the leak rate of air.

I think that this is preferrable to your procedure where you accumulate and try to catch the peak of the pressure spike while scanning 42 AMU values.

11. *Section 6.1 introduction. The use of the 42 AMU values in the air signature was developed, I believe in order to evaluate the hydrocarbon levels as well as the air signature. I believe that the analysis of the air signature by itself would use about 20 to 22 AMU values. I am concerned that the addition of the extra values may only confuse the air signature issue. If this turns out to be true, we want to be prepared to run the old version of Rai's air signature program and we will also expect to be compensated for the additional time spent in programming the RGA , running the additional outgassing tests and in data reduction time.*
12. *Section 6.1, air signature tests. The use of many different leak rates in the variable leak valve input of air for the air signature program is a refinement that may not be necessary and was not discussed at any time prior to this issue of the procedure. We do not believe this is in the scope of our contract.*
13. Section 7.0 introduction. We have not supplied heaters for the calibrated leaks. Heaters were not provided because the Nupro valves are not bakeable. We have also not heated, or insulated the upper half of the gages due to the cabling which is not able to withstand the heat. Heaters are provided for the inlet side of TMP1 and 3.
14. Section 9.0. Why do we have to keep LNT1 cold after the water partial pressure drops below that of H2 during the bake? It would be in our best interest that we warm up all traps for as long as possible through the bakeout, cooldown and post bake outgassing tests. I do not see a reason for any of the traps to be cooled, at least until after the water outgassing test number 1.
15. *Section 12.1. same comment as item 12*

Items 4, the last sentence of 7, 8,11, 12 and 15 are not in the scope of the contract and will result in additional costs. I would estimate that without 11 the additional costs will be on the order of 60 hours for preparation and measurement and an additional 40 hours in data manipulation and various report costs.

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COMMI

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