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|  Traveler Title | Warm Girder Rework |
| Traveler Abstract | Outlines the removal, disassembly, and reinstallation of the warm girder |
| Traveler ID | WMGRDR-GRDR-RMV |
| Traveler Revision  | R1 |
| Traveler Author | Matthew Weaks |
| Traveler Date | 29-Jan-21 |
| NCR Informative Emails | Weaksmc |
| NCR Dispositioners | Drury,dipette,ari |
| D3 Emails | Drury,dipette,ari,weaksmc |
| Approval Names | Matthew Weaks | Anthony DiPette | Ari Palczewski | Mike Drury |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | Reviewer | Project Manager |

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| References | List and Hyperlink all documents related to this traveler. This includes, but is not limited to: safety (THAs, SOPs, etc), drawings, procedures, and facility related documents. |
| [22634-S-001](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-236328/22634-S-001%5B1%5D.pdf) – Helium Leak Test Procedure for Ultra High Vacuum Components |

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| [CP-L2PRD-CST-IONCLN](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-236349/CP-L2PRD-CST-IONCLN-R1.pdf) – Ionized Nitrogen Cleaning Procedure |

 | [CP-WMGRDR-CLNRM-GIRDER-ASSY-R1](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-235984/WMGRDR-CLNRM-GIRDER-ASSY-R1.docx), Girder Clean Assembly and Leak Check Procedure |  |  |
| [Girder Drawings Folder](https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-49642) | [Chemistry Cleaning Procedures](https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-2654?sort=Date) |  |  |  |

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| Revision Note |  |
| R1 | Initial release of this Traveler. |

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| Step No. | Instructions | Data Input |
| \*Note | 1. During the girder re-work process, there will be some items labeled as "Radioactive Material". **Radioactive Material (RAM)** is defined in the RadCon manual as any activated material, equipment or system component with radiation levels distinguishable from background. The following guidelines are to be adhered to when handling RAM in order to follow Radcon requirements:* There are no requirements for dosimetry for Radioactive Material Areas unless otherwise notified by a member of the RCD.
* Persons must be Radiation Worker I qualified to handle RAM.
* The RAM tag must accompany the item at all times with the following exceptions. Cleaning, heating or any process in which the tag will impede that process or the tag could be potentially damaged or destroyed.
* When performing processes listed above, the tag is to be removed by personnel performing the task and placed on the RAM tag board located in the area.
* Each component removed from the girder needs to be tagged with a Radcon coupon, recorded on the dedicated list.
* All hardware (bolts, nuts, gaskets…) needs to be gathered in a Rad waste bag.
* Once task is complete, the tag is to be placed back on the material/equipment.
* Eating, drinking or smoking is not permitted in Radioactive Material Areas.
* Remove all tags prior to installation of girder in the Accelerator

**Tasks associated with this traveler will be performed in the designated area of the clean room.****2 .The girder needs to be maintained upright in the same orientation it had on the beamline. Do not flip over, topple, …** |
| 1 | Serial Number of Girder | [[GRDRSN]] <<SN>> |
| All work to be done in a clean room or flow hood area.If particulate sampling is indicated, prepare all sample tubes inside clean room/flow hood area, and collect samples as directed by SRF Staff. | [[GirderStyle]]<<TEXT>>[[CleanConditions]]<<YESNO>>[[Sampling]]<<YESNO>>[[SRFtech1]]<<SRF>>[[InitialTimestamp]]<<TIMESTAMP>> |
| 2 | Close all valves associated with the girder vacuum space, and slowly bleed up the girder. Verify the girder is no longer under vacuum before proceeding.  | [[SlowBledUp]]<<YESNO>>[[BleedTime]]<<TIMESTAMP>> |
| 3 | After unbolting the bellows from the cryomodule isolation gate valve (Leaving the two on the sides of the flange tight), spray the bolt holes with ionized N2 from the N2 Gun over the particle counter nozzle until an indication of less that 2 counts (Or ALARA). Record the final counts. |  |
| 4 | Spray the gap area of the flange, again with Ionized N2 over the particle counter until an indication of of less than 2 counts (Or ALARA). Record the final counts. | [[FirstFlangeGapAreaCounts]]<<FLOAT>> |
| 5 | Remove the last two bolts of the flange while holding the flange in place to prevent movement. Slowly and carefully back the flange away from the valve.At this point, if sampling is indicated, take samples from the gate valve from within the clean room. Indicate the number of samples taken. | [[FirstFlangeSamplesTaken]]<<INTEGER>> |
| 6 | Cap the end of the beam pipe, and indicate type of blank/gasket/seal utilized.Depending on the work to be done, the appropriate 2.75” flange is to be installed. If the gate valve will be changed right away, the flange on the CM is blanked with a solid Goretex gasket and plastic gap. | [[FirstFlangeBlankCapStyle]] {{CF Blank, Plastic Cap, NA}} <<SELECT>>[[FirstFlangeGasketMaterial]] {{Cu Gasket,Goretex Blank, Goretex Gasket}} <<SELECT>>[[FirstFlangeBlankInstalled]] <<YESNO>> |

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| Step No. | Instructions | Data Input |
| 7 | The above steps will be repeated for the opposite end of the girder |  |
| 8 | After unbolting the bellows from the cryomodule isolation gate valve (Leaving the two on the sides of the flange tight), spray the bolt holes with ionized N2 from the N2 Gun over the particle counter nozzle until an indication of less that 2 counts (Or ALARA). Record the final counts. | [[SecondFlangeBoltHoleCounts]] <<FLOAT>> |
| 9 | Spray the gap area of the flange, again with Ionized N2 over the particle counter until an indication of of less than 2 counts (Or ALARA). Record the final counts. | [[SecondFlangeGapAreaCounts]] <<FLOAT>> |
| 10 | Remove the last two bolts of the flange while holding the flange in place to prevent movement. Slowly and carefully back the flange away from the valve.At this point, if sampling is indicated, take samples from the gate valve from within the clean room. Indicate the number of samples taken. | [[SecondFlangeSamplesTaken]] <<INTEGER>> |
| 11 | Cap the end of the beam pipe, and indicate type of blank/gasket/seal utilized.Depending on the work to be done, the appropriate 2.75” flange is to be installed. If the gate valve will be changed right away, the flange on the CM is blanked with a solid Goretex gasket and plastic gap. | [[SecondFlangeBlankCapStyle]] {{CF Blank, Plastic Cap, NA}} <<SELECT>>[[SecondFlangeGasketMaterial]] {{Cu Gasket,Goretex Blank, Goretex Gasket}} <<SELECT>>[[SecondFlangeBlankInstalled]] <<YESNO>> |

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| Step No. | Instructions | Data Input |
| 12 | Move the girder to the holding area, and mark the girder with a RAM Tag. \*\*Coordinate with RadCon to have the girder surveyed, and prepared for transport.\*\* | [[RAMTagAttached]] <<CHECKBOX>>[[RadTech]] <<RAD>>[[RadComment]] <<COMMENT>>[[RadDate]] <<TIMESTAMP>>[[GirderRAMLevel1]] <<FLOAT>>[[GirderRemovalComments]]<<COMMENT>> |
| 13 | RAM Tag associated beamline, pumps, or other relevant components that will be removed with the girder, and arrange to have them surveyed.Record Serial Numbers where available, and record RAM levels of anything identified as RAM. | [[RAMtaggedItemsComments]]<<COMMENT>> |
| **Description** | **SN** | **RAM Level** |
| [[Item1Description]] <<TEXT>> | [[Item1SN]] <<SN>> | [[Item1RAMLevel]] <<FLOAT>> |
| [[Item2Description]] <<TEXT>> | [[Item2SN]] <<SN>> | [[Item2RAMLevel]] <<FLOAT>> |
| [[Item3Description]] <<TEXT>> | [[Item3SN]] <<SN>> | [[Item3RAMLevel]] <<FLOAT>> |
| [[Item4Description]] <<TEXT>> | [[Item4SN]] <<SN>> | [[Item4RAMLevel]] <<FLOAT>> |
| [[Item5Description]] <<TEXT>> | [[Item5SN]] <<SN>> | [[Item5RAMLevel]] <<FLOAT>> |
| [[Item6Description]] <<TEXT>> | [[Item6SN]] <<SN>> | [[Item6RAMLevel]] <<FLOAT>> |
| 14 | \*\*Contact RadCon and coordinate transport of the girder to the Test Lab, and have it placed in the RMA Storage\*\*RadCon will need to be contacted for movement from the RAM area to the Laydown area as well. | [[RadTransportTLTech]] <<RAD>>[[RadTransportTLComment]] <<COMMENT>>[[RadTransportTLDate]] <<TIMESTAMP>>[[DeliveryTLConfirmed]] <<CHECKBOX>>[[GRDRtempStorageTLapproved]] {{Hamlette}} <<HOLDPOINT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 15 | **\*\*\*Get authorization from RADCON to move girder from RMA storage area to the Production chem room\*\*\*** | [[RadMoveChemTech]] <<RAD>>[[RadMoveChemComment]] <<COMMENT>>[[RadMoveChemDate]] <<TIMESTAMP>> |
| 16 | The girder will be blown off prior entry in the Production chem room, wiped down with Isopropyl and blown off again prior entry in the cleanroom via the Production chem room path-thru | [[ChemTech]] <<SRFCVP>> |
| 17 | Set the girder in the cleanroom designated area.Ensure the area and girder are adequately clean.Prepare disassembly tooling, sampling tooling, supplies & samplesPrepare recording lists for particulate samples generated, girder components and Radcon couponsLet the cleanroom area recover | [[SRFSetupScientist]] <<SRF>>[[DisaSetupTech]] <<SRFCVP>> |
| 18 | Set an environmental witness sample prior starting disassembly and sampling tasks |  |
| 19 | Disassemble the girder using the dedicated disassembly tools following the order set by the sampling protocol WMGRDR-DISA-SAMPL-R1.docx**.** Use caution when removing and handling delicate items such as BPM chamber and beam viewers. Cover/protect all flanges immediately after disassembly. Store all fasteners for later use or disposal. If the fasteners are deemed as RAM, place in appropriate disposal container for Radcon.  | [[RadDisaTech]] <<RAD>>[[RadDisaComment]] <<COMMENT>>[[RadDisaDate]] <<TIMESTAMP>>[[SRFDisaScientist]] <<SRF>>[[DisaTech]] <<SRFCVP>>[[FastenersRAM]] <<YESNO>> |

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| 20 | Record the existing serial numbers of each component, and choose the new serial number from the drop-down list if indicated. If the old and new serial numbers are different, engrave the part with the new number that was chosen in the drop-down list. Print and record all existing component data on the [Girder assembly drawing](http://jlabdoc.jlab.org/docushare/dsweb/Get/File-9530/5cell_pair_with_text.jpg). Any component that has been tagged as RAM shall be noted in the last column. |
| **Part** | **Original Serial No** | **Standardized Serial No** | **Part RAM?** | **Part Present** |
| Pump drop |  | [[PMPDRPSN]] <<PMPDRPSN>> | [[PMPDRPSN\_RAM]] <<YESNO>> |  |
| BPM chamber |  | [[BPMSN]] <<BPMSN>> | [[BPMSN\_RAM]] <<YESNO>> |  |
| Ion Pump | [[BLIPSN\_Orig]] <<SN>> | [[BLIPSN]] <<BLIPSN>> | [[BLIPSN\_RAM]] <<YESNO>> |  |
| Gate valve | [[BLGVSN\_Orig]] <<SN>> | [[BLGVSN]] <<BLGVSN>> | [[BLGVSN\_RAM]] <<YESNO>> | [[BLGVSN\_Present]] <<YESNO>> |
| Gauge on 2.75" CF | [[GCF275SN\_Orig]] <<SN>> | [[GCF275SN]] <<GCF275SN>> | [[GCF275SN\_RAM]] <<YESNO>> | [[GCF275SN\_Present]] <<YESNO>> |
| 90 angle all-metal valve (AMUV) | [[AMGVSN\_Orig]] <<SN>> | [[AMGVSN]] <<AMGVLSN>> | [[AMGVSN\_RAM]] <<YESNO>> |  |
| Beamviewer assembly  | [[BVWRSN\_Orig]] <<SN>> | [[BVWRSN]] <<BMVWRSN>> | [[BVWRSN\_RAM]] <<YESNO>> | [[BVWRSN\_Present]] <<YESNO>> |
| QD beamtube assembly A | [[QDBTSNA\_Orig]] <<SN>> | [[QDBTSNA]] <<QDBTSN>> | [[QDBTSNA\_RAM]] <<YESNO>> | [QDBTSNA\_Present]] <<YESNO>> |
| QD beamtube assembly B | [[QDBTSNB\_Orig]] <<SN>> | [[QDBTSNB]] <<QBDTSN>> | [[QDBTSNB\_RAM]] <<YESNO>> | [[QDBTSNB\_Present]] <<YESNO>> |
| 2.75" CF A |  |  | [[CFBLK275\_A\_RAM]] <<YESNO>> |  |
| 2.75" CF B |  |  | [[CFBLK275\_\_B\_RAM]] <<YESNO>> |  |
| Viewport /2.75" CF C |  |  | [[CFBLK275\_C\_RAM]] <<YESNO>> | [[CFBLK275\_C\_Present]] <<YESNO>> |
| Bellow A | [[BLBPSNA\_Orig]] <<SN>> | [[BLBPSNA]] <<BLBPSN>> | [[BLBPSNA\_RAM]] <<YESNO>> | [[BLBPSNA\_Present]] <<YESNO>> |
| Bellow B | [[BLBPSNB\_Orig]] <<SN>> | [[BLBPSNB]] <<BLBPSN>> | [[BLBPSNB\_RAM]] <<YESNO>> | [[BLBPSNB\_Present]] <<YESNO>> |

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| Step No. | Instructions | Data Input |
| 21 | Retrieve and store environmental witness sample placed prior starting disassembly and sampling tasks | [[NumGirderSamplesTaken]] <<INTEGER>> |
| 22 | \*\*\*Coordinate with RADCON for surveying and moving parts from Cleanroom to RMA area or to accomplish the next task\*\*\* | [[RadMoveRMATech]] <<RAD>>[[RadMoveRMAComment]] <<COMMENT>>[[RadMoveRMADate]] <<TIMESTAMP>> |
| 23 | Collect required new parts (Ion Pump, Right Angle Valve, SS Part Spools, Bellows) from stock, and place all new components in assembly bins.Record the Serial Numbers for all new partsSerialize any old parts that do not yet have a SN.Note which components are being reused, and which are being swapped for new.\*\*Notify RadCon about all part movement for survey and tracking.\*\* | [[BLIPSNnew]] <<BLIPSN>>[[BLIPSNnewCondition]] {{New, Reuse Old}} <<SELECT>>[[BLGVSNnew]] <<BLAVSN>>[[BLAVSNnewCondition]] {{New, Reuse Old}} <<SELECT>>[[SPOOLSNSN]]<<SN>>[[SPOOLCondition]] {{New, Reuse Old}} <<SELECT>>[[BLBSN1]] <<SN>>[[BLBSN1Condition]] {{New, Reuse Old}} <<SELECT>>[[BLBSN2]] <<SN>>[[BLBSN2Condition]] {{New, Reuse Old}} <<SELECT>>[[GirderPartsComments]] <<COMMENT>>[[GirderPartsDisposition]] {{Refurbish, Storage, Disposal}} <<SELECT>> |
| 24 | Route parts (Ion Pump & Right Angle Valve) for storage of refurb.Note which items are being sent for storage, refurb, or use as-is.\*\*Contact RadCon to coordinate movement and storage of RAM.\*\* | [[BLIPSNDisposition]] {{Refurbish, Storage, Disposal}} <<SELECT>>[[BLGVSNDisposition]] {{Refurbish, Storage, Disposal}} <<SELECT>>[[GirderPartsDispositionComments]] <<COMMENT>> |
| 25 | Route unused (SS Parts & Damaged Parts) parts to storage or trash.Note which items are being send for storage, or disposal.\*\*Contact RadCon to coordinate movement, storage and disposal of RAM.\*\* | [[SSPartsDisposition]] {{Storage, Disposal}} <<SELECT>>[[SSPartsComments]]<<COMMENT>> |

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| Step No. | Instructions | Data Input |
| 26 | \*\*Coordinate with RadCon to have parts moved to chemistry and cleanroom\*\* | [[RadTech4]] <<RAD>>[[RadComment4]] <<COMMENT>>[[RadDate4]] <<TIMESTAMP>> |
| 27 | Clean Girder Parts following Procedure WMGRDR-CHEM-COMP-DEGR-R1.docx | [[OldPartsCleaningComments]] <<COMMENT>> |
| 28 | Contact Pete Francis (x7528) for RF measurement of BPM before entry to cleanroom.If any of the RF Measurements exceed 0.25dB, note them in the comments. | [[ContactedRFMeasTech]] <<YESNO>>[[XplusMeasurement]]<<Float>>[[XnegMeasurement]]<<Float>>[[YplusMeasurement]]<<Float>>[[YnegMeasurement]]<<Float>>[[MeasurementsExceedLimit]] <<CHECK>>[[RFmeasurementsComments]] <<COMMENT>> |
| 29 | Contact Anthony Delacruz (x7029/ delacruz@jlab.org) , Christopher Norris (x6513/ norris@jlab.org) and Keith Cole (x5920/ colek@jlab.org) - EESICS. for beam viewer assembly | [[BeamViewerPresent]] <<YESNO>>[[BeamViewTechContacted]] <<YESNO>>[[BVWRCompletedDate]] <<TIMESTAMP>>[[BVWRComments]] <<COMMENT>> |

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| Step No. | Instructions | Data Input |
| 30 | Clean and Degrease Girder Assembly cart. | [[GRDRAssyCartCleaningComments]] <<COMMENT>> |
| 31 | Assemble Girder on cart in cleanroom – CP-WMGRDR-CLNRM-GIRDER-ASSYUpload relevant phots and files for the girder assembly. | [[GRDRAssyCompleted]] <<YESNO>>[[GRDRAssyComments]] <<COMMENT>>[[GRDRAssyDocuments]]<<FILEUPLOAD>> |

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| Step No. | Instructions | Data Input |
| 32 | Leak check fully assembled girder Procedure Incl with AssemblyUpload Leak Check Chart, relevant photos/pictures, and Data Files | [[GRDRLeakTight]] <<YESNO>>[[GRDRLeakRateStepSize1]] <<FLOAT>>[[CalibratedLeakRateNumber1]] <<FLOAT>>[[GRDRLeakTestDocuments]] <<FILEUPLOAD>> |
| 33 | Slow turn-on the Ion Pump. Using the Reduced particle generation Ion pump turn-on procedure . Note the current and voltage of the Ion Pump | [[FirstSlowTurnOnCurrent]] <<FLOAT>>[[FirstSlowTurnOnVoltage]] <<FLOAT>>[[IPSlowTurnOnComments]] <<COMMENT>> |
| 34 | Backfill cart with Nitrogen | [[CartBackfillNitrogen]] <<CHECK>> |
| 35 | Remove the end blanks and replace with soft seals.Bag the assembly in the Cleanroom | [[BlanksReplaced]] <<CHECK>> |
| 36 | If necessary, contact RadCon to remove the girder from the cleanroom to the staging area. | [[RadConContacted]] <<YESNO>>[[RADRemvCLNRMTech]] <<RAD>>[[RADRemvCLNRMComments]] <<COMMENT>>[[RADRemvCLNRMDate]] <<TIMESTAMP>> |
| 37 | Collect final assembly bellows and spoolsNote the Serial Numbers of the bellows and spools. | [[ComponentsCollected]] <<YESNO>>[[BLBPSNAnew]] <<BLBPSN>>[[BLBPSNBnew]] <<BLBPSN>>[[SPOOLSNAnew]] <<SN>>[[SPOOLSNBnew]] <<SN>> |
| 38 | Clean final assembly bellows and spools - Procedure | [[BPBLandSPPOOLcomments]]<<COMMENT>> |

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| Step No. | Instructions | Data Input |
| 39 | Contact vacuum group to confirm parts and girder ready for install. | [[VacuumGroupContacted]] <<YESNO>> |
| 40 | If necessary, contact RadCon to have the girder moved to the tunnel, otherwise transport the girder normally to the tunnel. | [[RadConRequired]] <<CHECK>>[[GRDRRAMLevel2]] <<FLOAT>>[[GRDRtransportedToTunnel]] <<YESNO>>[[Notes and Comments on girder transport]]<<COMMENT>> |
| 41 | Prepare the installation area before bringing the girder in. | [[InstallationAreaPrepared]] <<YESNO>> |
| 42 | Assemble all components marked as “Present” in step 3 for the girder assembly in accordance with the procedure CEBAF-CLNRM-GIRDER-ASSY, Girder Clean Assembly and Leak Check Procedure. Use caution when handling delicate items such as the BPM chamber and beam viewer. Store all fasteners for later use or disposal.  | [[GRDRAssyProcedureCompleted]] <<CHECK>>[[AssyTech]] <<SRFCVP>> [[AssyDate]] <<TIMESTAMP>> [[AssyComment]] <<COMMENT>> [[AssyDocumentation]] <<FILEUPLOAD>> |

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| Step No. | Instructions | Data Input |
| 43 | Slow pump new girder, upload data files. | [[SlowPumpDataFiles]] <<FILEUPLOAD>>[[SlowPempComments]] <<COMMENT>> |
| 44 | Leak check the girder from 0-100. Upload the Leak Check Chart, relevant data files, and photos. | [[GRDRLeakCheckPassed]] <<YESNO>>[[GRDRLeakRateStepSize2]] <<FLOAT>>[[GRDRCalibratedLeakRateNumber2]] <<FLOAT>>[[LeakCheck2DataFiles]] <<FILEUPLOAD>>[[LeakCheck2Comments]] <<COMMENT>> |
| 45 | Slow turn-on the Ion Pump. Using the Reduced particle generation Ion pump turn-on procedure . Note the current and voltage of the Ion Pump | [[SecondSlowTurnOnCurrent]] <<FLOAT>>[[SecondSlowTurnOnVoltage]] <<FLOAT>>[[SecondSlowTuneOnComments]] <<COMMENT>> |
| 46 | Slowly backfill the cart to verify the angle valve does not leak | [[AngleValveLeak]] <<YESNO>> |