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|  Traveler Title | Warm Girder Rework |
| Traveler Abstract | Outlines the removal, disassembly, and reinstallation of the warm girder |
| Traveler ID | WMGRDR-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, WeaksMC, Ari |
| 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 | [[Girder Serial Number]] <<GIRDERSN>> |
| 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. | [[Note the style Girder being removed]]<<TEXT>>[[Work performed in clean conditions?]]<<YESNO>>[[Sampling Indicated?]]<<YESNO>>[[SRF Tech1]]<<SRF>>[[Initial Timestamp]]<<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.  | [[Girder slowly bled up?]]<<YESNO>>[[Bleed up Time]]<<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. | [[1st Flange Gap Area Counts]]<<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. | [[1st Flange Samples Taken]]<<INTEGER>> |
| 6 | Cap the end of the beam pipe, and indicate type of blank/gasket/seal utilized. | [[1st Flange Blank Cap Style]]{{CF Blank,Plastic Cap,N/A}}<<SELECT>>[[1st Flange Gasket Material]]{{Cu Gasket,Goretex Blank,Goretex Gasket}}<<SELECT>> |

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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. | [[2nd Flange Bolt Hole Counts]]<<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. | [[2nd Flange Gap AreaCounts]]<<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. | [[2nd Flange Samples Taken]]<<INTEGER>> |
| 11 | Cap the end of the beam pipe, and indicate type of blank/gasket/seal utilized. | [[2nd Flange Blank Cap Style]]{{CF Blank,Plastic Cap,N/A}}<<SELECT>>[[2nd Flange Gasket Material]]{{Cu Gasket,Goretex Blank,Goretex Gasket}}<<SELECT>> |

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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.\*\* | [[RAM Tag attached?]]<<CHECK>>[[Rad Tech]]<<RAD>>[[Rad Comment]]<<COMMENT>>[[Rad Date]]<<TIMESTAMP>>[[Girder RAM Level1]]<<FLOAT>>[[Girder Removal Comments]]<<COMMENT>> |
| 13 | RAM Tag associated 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 idendified as RAM. | [[Items tagged/RAM Levels/Comments]]<<COMMENT>> |
| **Description** | **SN** | **RAM Level** |
| [[Item 1 Description]]<<TEXT>> | [[Item 1 SN]]<<SN>> | [[Item 1 RAM Level]]<<FLOAT>> |
| [[Item 2 Description]]<<TEXT>> | [[Item 2 SN]]<<SN>> | [[Item 2 RAM Level]]<<FLOAT>> |
| [[Item 3 Description]]<<TEXT>> | [[Item 3 SN]]<<SN>> | [[Item 3 RAM Level]]<<FLOAT>> |
| [[Item 4 Description]]<<TEXT>> | [[Item 4 SN]]<<SN>> | [[Item 4 RAM Level]]<<FLOAT>> |
| [[Item 5 Description]]<<TEXT>> | [[Item 5 SN]]<<SN>> | [[Item 5 RAM Level]]<<FLOAT>> |
| [[Item 6 Description]]<<TEXT>> | [[Item 6 SN]]<<SN>> | [[Item 6 RAM Level]]<<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. | [[Rad Tech 1]]<<RAD>>[[Rad Comment1]]<<COMMENT>>[[Rad Date1]]<<TIMESTAMP>>[[Confirm delivery of the Girder to the Test Lab]]<<CHECK>>[[David Hamlette approve temporary storage of Girder in the Test Lab]]{{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 chemroom\*\*\*** | [[RadTech2]] <<RAD>>[[RadComment2]] <<COMMENT>>[[RadDate2]] <<TIMESTAMP>> |
| 16 | The girder will be blown off prior entry in the Production chemroom, wiped down with Isopropyl and blown off again prior entry in the cleanroom via the Production chemroom path-thru | [[ChemistryTechnician]] <<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, girdercomponents and Radcon couponsLet the cleanroom area recover | [[SRFScientist1]] <<SRF>>[[DisaTech1]] <<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.  | [[RadTech2]] <<RAD>>[[RadComment2]] <<COMMENT>>[[RadDate2]] <<TIMESTAMP>>[[SRFScientist2]] <<SRF>>[[DisaTech2]] <<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>> | [[PMPDRP\_RAM]] <<YESNO>> |  |
| BPM chamber |  | [[BPMSN]] <<BPMSN>> | [[BPM\_RAM]] <<YESNO>> |  |
| Ion Pump | [[Ion\_Pump]] <<SN>> | [[IONPMPSN]] <<IONPMPSN>> | [[IONPMP\_RAM]] <<YESNO>> |  |
| Gate valve | [[GV\_Orig]] <<SN>> | [[GVGSN]] <<GVGSN>> | [[GVG\_RAM]] <<YESNO>> | [[GVG\_Present]] <<YESNO>> |
| Gauge on 2.75" CF | [[Gauge\_Orig]] <<SN>> | [[GAUGESN]] <<GAUGESN>> | [[GAUGE\_RAM]] <<YESNO>> | [[GAUGE\_Present]] <<YESNO>> |
| 90 angle all-metal valve (AMUV) | [[AMUV\_Orig]] <<SN>> | [[AMUVSN]] <<AMUVLSN>> | [[AMUV\_RAM]] <<YESNO>> |  |
| Beamviewer assembly  | [[BMVWR\_Orig]] <<SN>> | [[BMVWR]] <<BMVWRSN>> | [[BMVWR\_RAM]] <<YESNO>> | [[BMVWR\_Present]] <<YESNO>> |
| QD beamtube assembly A | [[QDQBT\_A\_Orig]] <<SN>> | [[QDQBT\_A]] <<QDBTSN>> | [[QDQBT\_A\_RAM]] <<YESNO>> | [QDQBT\_A\_Present]] <<YESNO>> |
| QD beamtube assembly B | [[QDQBT\_B\_Orig]] <<SN>> | [[QDQBT\_B]] <<HOMESN>> | [[QDQBT\_B\_RAM]] <<YESNO>> | [[QDQBT\_B\_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 | [[Bellow\_A\_Orig]] <<SN>> | [[Bellow\_A]] <<ENDDSN>> | [[Bellow\_A\_RAM]] <<YESNO>> | [[Bellow\_A\_Present]] <<YESNO>> |
| Bellow B | [[Bellow\_B\_Orig]] <<SN>> | [[Bellow\_B]] <<ENDDSN>> | [[Bellow\_B\_RAM]] <<YESNO>> | [[Bellow\_B\_Present]] <<YESNO>> |
| Step No. | Instructions | Data Input |
| 21 | Retrieve and store environmental witness sample placed prior starting disassembly and sampling tasks | [[Girder Samples Taken]]<<INTEGER>> |
| 22 | \*\*\*Coordinate with RADCON for surveying and moving parts from Cleanroom to RMA area or to accomplish the next task\*\*\* | [[RadTech3]] <<RAD>>[[RadComment3]] <<COMMENT>>[[RadDate3]] <<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.\*\* | [[Ion Pump SN]]<<IONPMPSN>>[[Ion Pump New or Reuse]]{{New, Reuse Old}}<<SELECT>>[[Right Angle Valve SN]]<<AMUVLSN>>[[Right Angle Valve New or Reuse]]{{New, Reuse Old}}<<SELECT>>[[Spool SN]]<<SN>>[[Spool New or Reuse]]{{New, Reuse Old}}<<SELECT>>[[Bellows A SN]]<<ENDDSN>>[[Bellows A New or Reuse]]{{New, Reuse Old}}<<SELECT>>[[Bellows B SN]]<<ENDDSN>>[[Bellows B New or Reuse]]{{New, Reuse Old}}<<SELECT>>[[Comments on new girder parts]]<<COMMENT>> |
| 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.\*\* | [[Ion Pump Refurb, Storage, or Disposal]]{{Refurb,Storage,Disposal}}<<SELECT>>[[Right Angle Valve Refurb, Storage, or Disposal]]{{Refurb,Storage,Disposal}}<<SELECT>>[[Comments on parts for refurb or storage]]<<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.\*\* | [[SS Parts Storage or Disposal]]{{Storage,Disposal}}<<SELECT>>[[Comments on damaged and SS Parts]]<<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 | [[Describe the cleaning procedures used for old parts before re-use]]<<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. | [[Pete contacted?]]<<YESNO>>[[X+ Measurement]]<<Float>>[[X- Measurement]]<<Float>>[[Y+ Measurement]]<<Float>>[[Y- Measurement]]<<Float>>[[Check if any measurements exceed 0.25dB]]<<CHECK>>[[Notes and Comments on RF measurements]]<<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 | [[Does this girder have a Beam Viewer?]]<<YESNO>>[[Listed persons contacted?]]<<YESNO>>[[Beam Viewer Assembly completed]]<<TIMESTAMP>>[[Notes and Comments on Beam Viewer Assembly]]<<COMMENT>> |

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| Step No. | Instructions | Data Input |
| 30 | Clean and Degrease Girder Assembly cart. | [[Describe the cleaning procedure used for the Girder Assembly Cart]]<<COMMENT>> |
| 31 | Assemble Girder on cart in cleanroom – CP-WMGRDR-CLNRM-GIRDER-ASSY | [[Girder Assembly completed?]]<<YESNO>>[[Notes and Comments on girder assembly.]]<<COMMENT>>[[Upload relevant photos and documentation of the assembled girder.]]<<FILEUPLOAD>> |

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| Step No. | Instructions | Data Input |
| 32 | Leak check fully assembled girder Procedure Incl with Assembly | [[Does the girder pass leak check?]]<<YESNO>>[[Leak Rate Step Size1]]<<FLOAT>>[[Calibrated Leak Rate Number1]]<<FLOAT>>[[Upload Leak Check Chart, relevant photos/pictures, and Data Files]]<<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 | [[1st Slow Turn-On Current]]<<FLOAT>>[[1st Slow Turn-On Voltage]]<<FLOAT>>[[Notes and Comments on Ion Pump slow turn on]]<<COMMENT>> |
| 34 | Backfill cart with Nitrogen | [[Confirm cart backfilled with nitrogen]]<<CHECK>> |
| 35 | Remove the end blanks and replace with soft seals.Bag the assembly in the Cleanroom | [[Confirm replacement of end blanks with soft seals]]<<CHECK>> |
| 36 | If necessary, contact RadCon to remove the girder from the cleanroom to the staging area. | [[Was RadCon contacted?]]<<YESNO>>[[RAD Tech4]]<<RAD>>[[Rad Comments4]]<<COMMENT>>[[Rad Date4]]<<TIMESTAMP>> |
| 37 | Collect final assembly bellows and spoolsNote the Serial Numbers of the bellows and spools. | [[Have the components been collected?]]<<YESNO>>[[Bellows A SN]]<<ENDDSN>>[[Bellows B SN]]<<ENDDSN>>[[Spool A SN]]<<SN>>[[Spool B SN]]<<SN>> |
| 38 | Clean final assembly bellows and spools - Procedure | [[Describe the cleaning process used for the bellows and spool]]<<COMMENT>> |
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| Step No. | Instructions | Data Input |
| 39 | Contact vacuum group to confirm parts and girder ready for install. | [[Vacuum group contacted?]]<<YESNO>> |
| 40 | If necessary, contact RadCon to have the girder moved to the tunnel, otherwise transport the girder normally to the tunnel. | [[Check if RadCon was required]]<<CHECK>>[[Girder RAM Level2]]<<FLOAT>>[[Was the girder transported to the tunnel?]]<<YESNO>>[[Notes and Comments on girder transport]]<<COMMENT>> |
| 41 | Prepare the installation area before bringing the girder in. | [[Was the installation area properly prepared prior to installation?]]<<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.  | [[All components for this girder have been assembled in accordance with the assembly procedure.]]<<CHECK>>[[AssyTechSRFCVP]] <<SRFCVP>> [[AssyDate]] <<TIMESTAMP>> [[AssyComment]] <<COMMENT>> [[Upload any relevant photos and/or documentation]]<<FILEUPLOAD>>  |

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| Step No. | Instructions | Data Input |
| 43 | Slow pump new girder, upload data files. | [[Slow Pump data files]]<<FILEUPLOAD>>[[Notes and comments on slow pump of the girder]]<<COMMENT>> |
| 44 | Leak check the girder from 0-100. Upload the Leak Check Chart, relevant data files, and photos. | [[Did the girder pass leak check?]]<<YESNO>>[[Leak Rate Step Size2]]<<FLOAT>>[[Calibrated Leak Rate Number2]]<<FLOAT>>[[Leak Check2 Data Files]]<<FILEUPLOAD>>[[Notes and comments on leak check]]<<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 | [[2nd Slow Turn-On Current]]<<FLOAT>>[[2nd Slow Turn-On Voltage]]<<FLOAT>>[[Notes and Comments on Ion Pump slow turn on]]<<COMMENT>> |
| 46 | Slowly backfill the cart to verify the angle valve does not leak | [[Does the angle valve leak?]]<<YESNO>> |