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| Traveler Title | Return U-tube Modification to add Flow Meters |
| Traveler Abstract | This Traveler outlines the steps necessary to modify the Return Linac u-tubes to add flow meter assemblies. Work within this Traveler is to be performed by trained and authorized Assembly Technicians. All materials shall be kept inside the established RADCON barrier until they have been surveyed and released. **\*\* Radiation surveys shall be performed and information recorded at traveler hold points.\*\******\*\* Radiological controls are a critical component of the cryomodule rework disassembly and assembly process. Dose rate, as well as contamination surveys (where indium gaskets or seals are present) shall be performed and analyzed, with information communicated to all involved personnel. Results will be recorded at traveler hold points. RW-II training will be required where contamination is identified\*\**** |
| Traveler ID | SRFOPS-CMA-UTUBE-RWRK |
| Traveler Revision  | R1 |
| Traveler Author | Aaron Auston |
| Traveler Date | 12-Jun-24 |
| NCR Informative Emails | drury |
| NCR Dispositioners | drury,fischer,weaksmc |
| D3 Emails | drury,fischer |
| Approval Names | Aaron Auston | Matt Morgan | John Fischer | Mike Drury |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | CMA Group Lead | Project Representative |

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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.**All materials linked below and throughout this traveler are for reference only and should be verified for latest version at time of use.** |
| [73400-1006](https://misportal.jlab.org/jlabDocs/items/193459)-2K RETURN U-TUBE FLOW METER INSERT ASSEMBLY | [73400-1005](https://misportal.jlab.org/jlabDocs/items/191040)-TUBE, 4 OD COPED | [73400-1004](https://misportal.jlab.org/jlabDocs/items/191039)-HALF NIPPLE ASSEMBLY | [73400-1003](https://misportal.jlab.org/jlabDocs/items/191036)-2K RETURN U-TUBE FLOW METER WIRING DIAGRAM | [73400-1002](https://misportal.jlab.org/jlabDocs/items/193458)-C100 2K RETURN U-TUBE FLOW METER MODIFICATION |
| [73400-1001](https://misportal.jlab.org/jlabDocs/items/193457)-ALTERNATE FLOW METER MODIFICATION | [73400-1000](https://misportal.jlab.org/jlabDocs/items/193456)-FLOW METER MODIFICATION |  |  |  |

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

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| **Part Description** | **Serial No.** |
| Return u-tube from the linac that needs to be modified to add flow meters to accommodate testing. | [[UTUBESN]] <<SN>>[[RAMTAGPIC]] <<FILEUPLOAD>>[[COMMENT0]] <<COMMENT>> |
| **Step No** | **Instructions** | **Data Input** |
| 1 | U tube has been delivered with orientation for modification identified and RADCON has been informed. | [[RECVDATE]] <<TIMESTAMP>>[[RECVTECH]] <<SRFCMP>>[[RECVCOMMENT]] <<COMMENT>> |
| 2 | Prepare cryogenic feedthrus | [[CRYOPREPDATE]] <<TIMESTAMP>>[[CRYOPREPCOMMENTS]] <<COMMENT>> |
| Record FT serial number | [[FTSN]] <<SN>> |
| Cold Shock 3x’s | [[CSHKDONE]] <<CHECKBOX>>[[CSHKTECH]] <<SRFCMP>> |
| Leak Check | [[LEAKTECH]] <<SRFCMP>>[[LEAKFILE]] <<FILEUPLOAD>> |
| Electrical check | [[ELECTECH]] <<SRFST>> |
| 3 | Understand RADCON requirements for metal fabrication work, ie. herculite, and HEPA vacuum. | [[RADDATE]] <<TIMESTAMP>>[[RADTECH]] <<SRFCMP>>[[RADCOMMENT]] <<COMMENT>> |
| 4 | Add holes to outer and inner u-tube piping* Using grinder add 4” hole to the out u tube jacket
* Open MLI
* Locate and add ¾” hole to inner pipe
* Weld ¾” weld nipple to inner pipe
* Perform weld inspection
 | [[WELDDATE]] <<TIMESTAMP>>[[WELDTECH]] <<SRFCMP>>[[WELDFILE]] <<FILEUPLOAD>>[[WELDINSPECTOR]] <<SRFCMP>>[[WELDCOMMENTS]] <<COMMENT>> |
| 5 | Cold shock 3x’s and Leak check the weld nipple addition. | [[CSHKDATE]] <<TIMESTAMP>>[[CSHKTECH2]] <<SRFCMP>>[[CSHKCOMMENT]] <<COMMENT>>[[CSHKDONE2]] <<CHECKBOX>>[[INLKCHKDONE]] <<CHECKBOX>> |
| 6 | Close up Mylar and install the flow meter assembly with electrical checkout. | [[ELECDATE]] <<TIMESTAMP>>[[MYLARTECH]] <<SRFCMP>>[[ELECTECH2]] <<SRFST>>[[ELECCOMMENTS]] <<COMMENT>> |
| 7 | Fabrication of outer jacket. | [[FABOJSTARTDATE]] <<TIMESTAMP>> |
| Purge outer jacket. | [[FABOJTECH]] <<SRFCMP>> |
| Weld on flange neck. | [[FABOJWELDER]] <<SRFCMP>> |
| Final electrical connection. | [[FABOJELECTECH]] <<SRFST>> |
| Leak Check  | [[FABOJLEAKFILE]] <<FILEUPLOAD>> |
| Fabrication completed. | [[FABOJENDDATE]] <<TIMESTAMP>>[[FABOJCOMMENTS]] <<COMMENT>> |
| 8 | Pressure test U-Tube using PS7 form | [[PTDATE]] <<TIMESTAMP>>[[PTTECH]] <<SRFCMP>>[[PTFILE]] <<FILEUPLOAD>>[[PTCOMMENTS]] <<COMMENT>> |
| 9 | Notify RADCON then deliver to accelerator vault. | [[NOTIFYTECH]] <<SRFCMP>>[[NOTIFYDATE]] <<TIMESTAMP>>[[NOTIFYCOMMENT]] <<COMMENT>> |