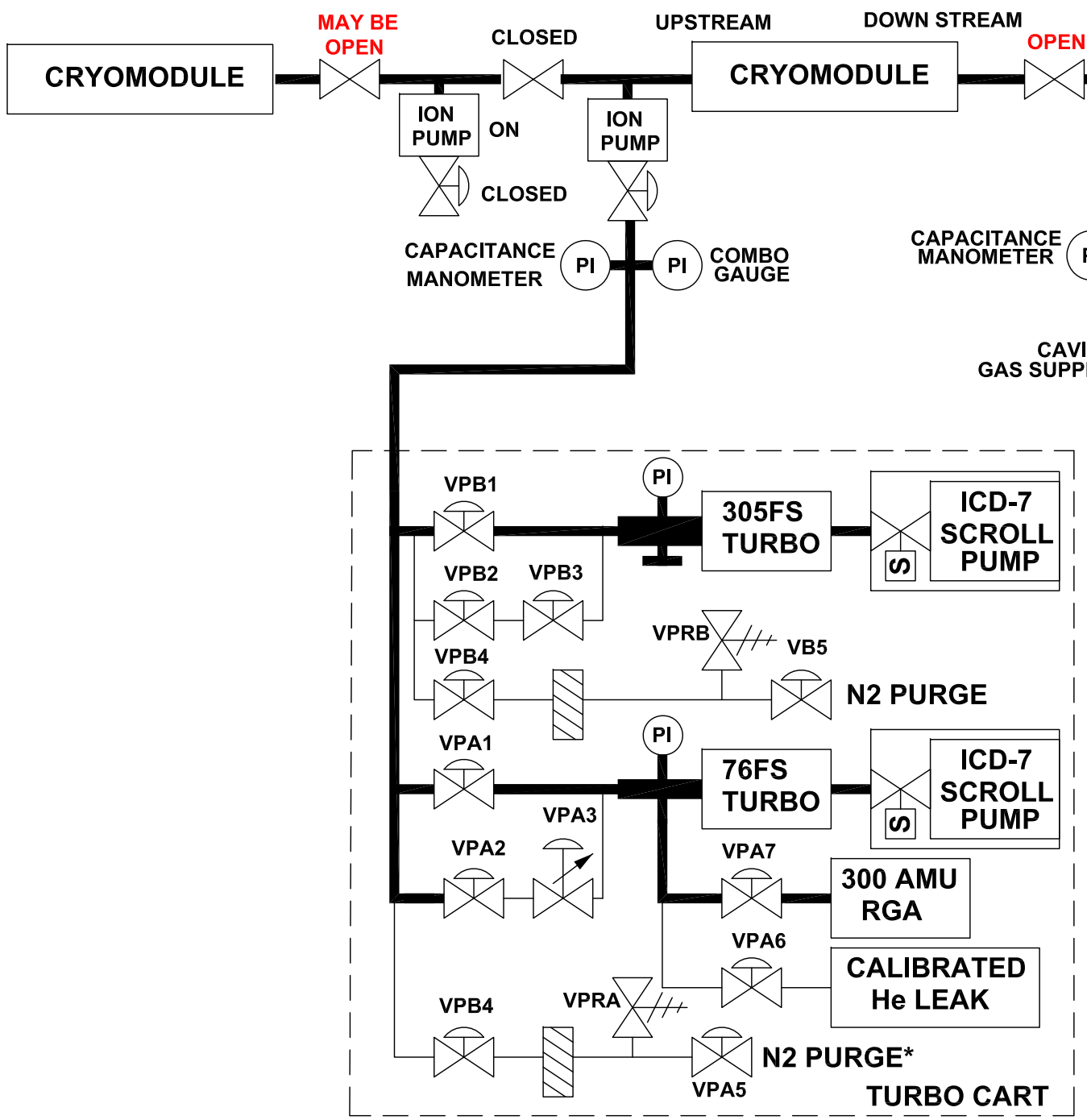
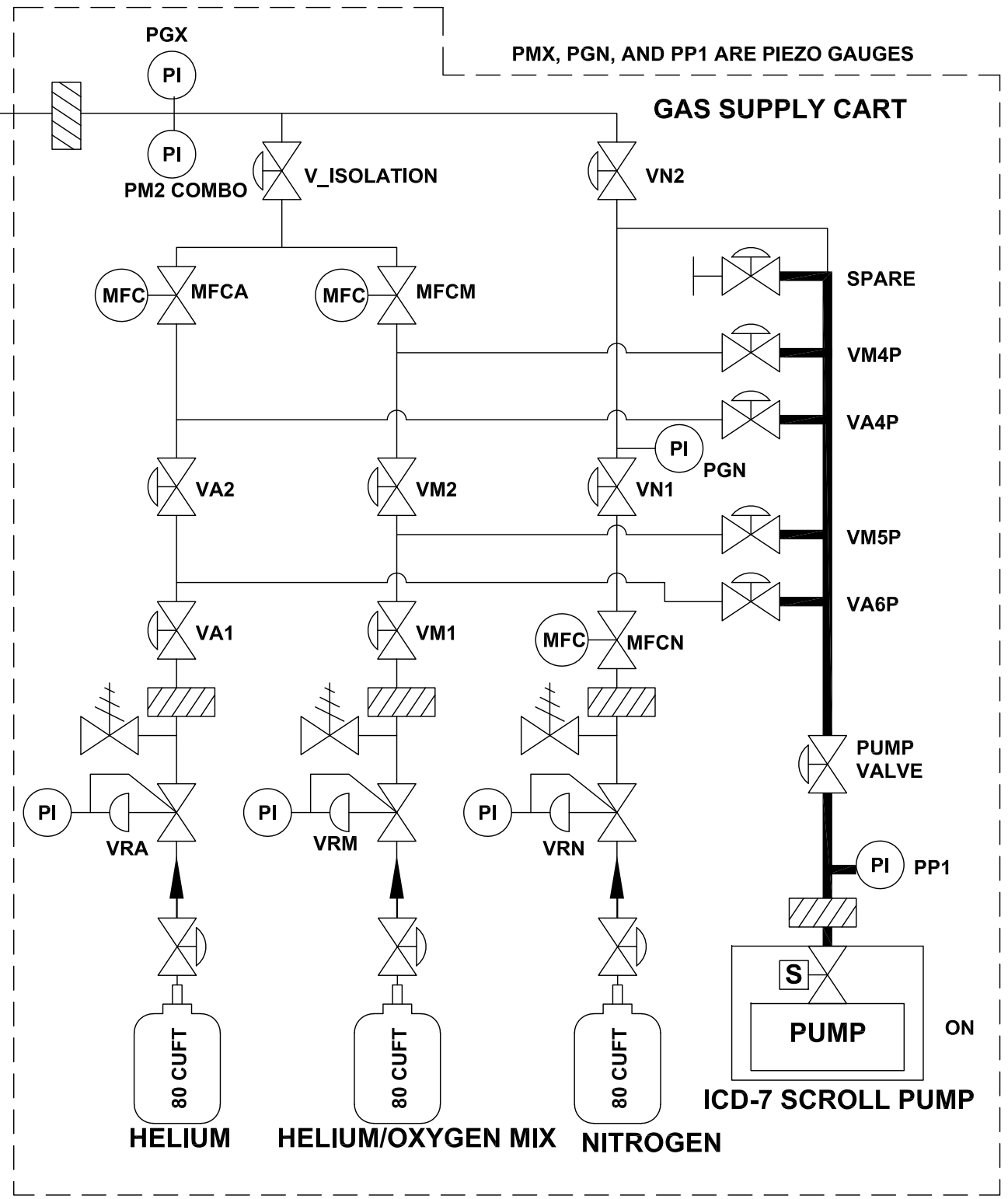




GAS SUPPLY AND PUMPING SYSTEM RESTORE CRYOMODULE CONFIGURATION

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

*NOTE SOME OF THE VACUUM CARTS ONLY HAVE ONE PURGE LINE.

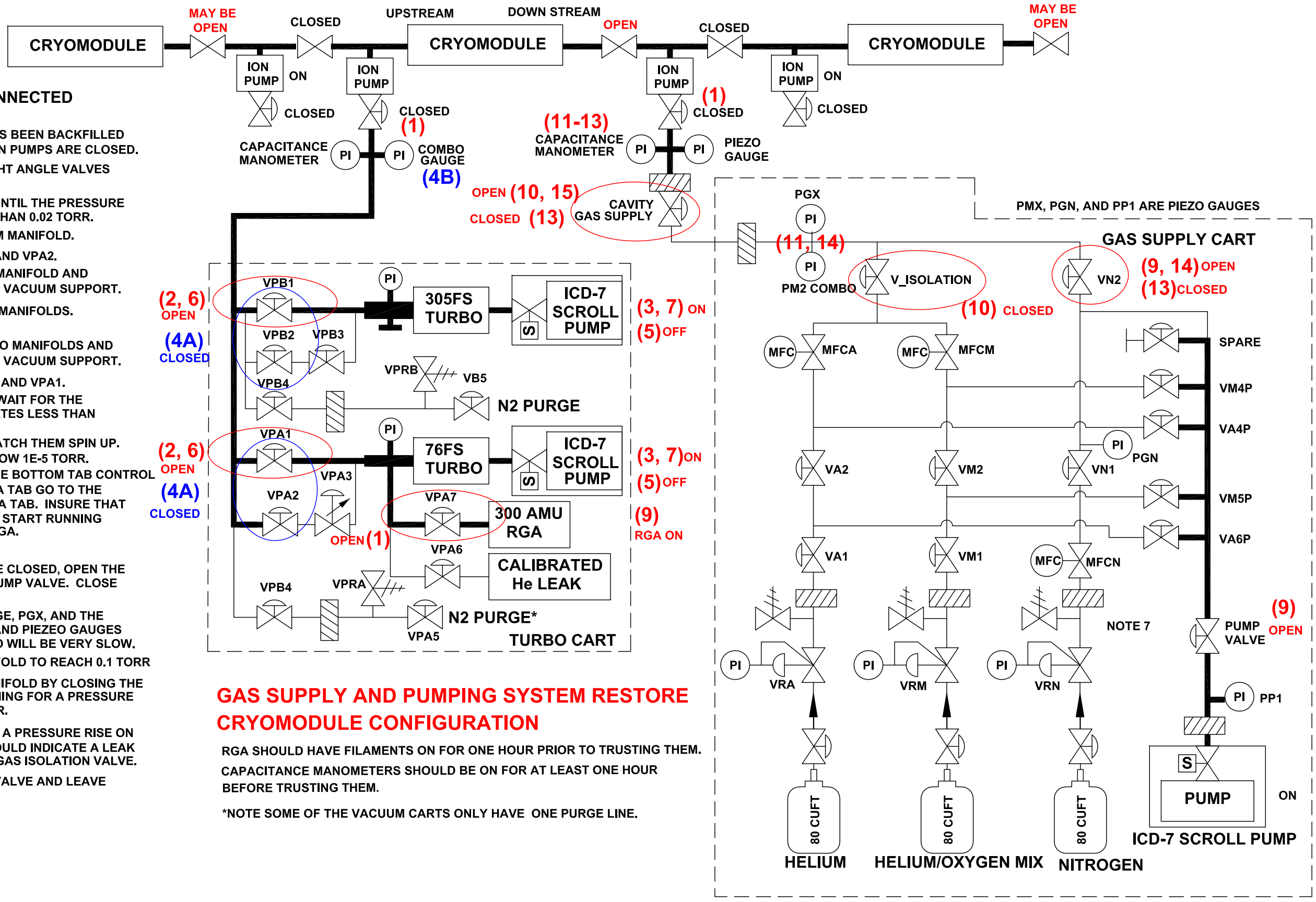
DAY 1
START UP AFTER MANIFOLDS CONNECTED

PUMP DOWN THE VACUUM MANIFOLD.

1. ASSUMPTION THAT THE VACUUM CART HAS BEEN BACKFILLED AND THE RIGHT ANGLE VALVES ON THE ION PUMPS ARE CLOSED.
2. ON THE TURBO CART OPEN THE 1-1/2" RIGHT ANGLE VALVES VPB1, VPA1 AND RGA VALVE VPA7.
3. TURN ON THE SCROLL PUMPS AND WAIT UNTIL THE PRESSURE ON EACH CONTROLLER INDICATES LESS THAN 0.02 TORR.
4. CHECK FOR GROSS LEAKS IN THE VACUUM MANIFOLD.
   A. CLOSE THE VALVES VPB1, VPB2, VPA1 AND VPA2.
   B. OBSERVE THE PRESSURE ON THE GAS MANIFOLD AND IF THE PRESSURE INCREASES CONTACT VACUUM SUPPORT.
5. CHECK FOR GROSS LEAKS IN THE TURBO MANIFOLDS.
   A. TURN OFF EACH SCROLL PUMP.
   B. OBSERVE THE PRESSURE ON THE TURBO MANIFOLDS AND IF THE PRESSURE INCREASES CONTACT VACUUM SUPPORT.
6. ASSUMING NO LEAKS OPEN VALVES VPB1 AND VPA1.
7. TURN THE SCROLL PUMPS BACK ON AND WAIT FOR THE PRESSURE ON EACH CONTROLLER INDICATES LESS THAN 0.02 TORR.
8. TURN ON THE TWO TURBO PUMPS AND WATCH THEM SPIN UP. THE PRESSURE SHOULD QUICKLY GO BELOW 1E-5 TORR.
9. STOP THE PLASMA MAIN PROGRAM. IN THE BOTTOM TAB CONTROL ISTRUMENT SETUP TAB CLICK ON THE RGA TAB GO TO THE TOP OF THE SCREEN AND SELECT THE RGA TAB. INSURE THAT THE CEM (ELECTRON MULTIPLIER) IS OFF. START RUNNING PLASMA MAIN PROGRAM TO START THE RGA.

PUMP DOWN THE GAS SUPPLY MAIFOLD

10. WITH THE ION PUMP RIGHT ANGLE VALVE CLOSED, OPEN THE CAVITY GAS SUPPLY VALVE, VN2, AND PUMP VALVE. CLOSE THE GAS SUPPLY V_ISOLATION VALVE.
11. MONITOR THE PRESSURES COMBO GAUGE, PGX, AND THE MANIFOLD CAPACITANCE MANOMETER AND PIEZEO GAUGES THE PUMP OUT SPEED ON THE MANIFOLD WILL BE VERY SLOW.
12. WAIT FOR THE PRESSURE ON THE MANIFOLD TO REACH 0.1 TORR
13. CHECK FOR A GROSS LEAK ON THE MANIFOLD BY CLOSING THE CAVITY GAS SUPPLY VALVE AND WATCHING FOR A PRESSURE RISE ON THE CAPACITANCE MANOMETER.
14. CLOSE THE VN2 VALVE AND CHECK FOR A PRESSURE RISE ON VPX AND THE COMBO GAUGE WHICH WOULD INDICATE A LEAK ON THE HOSE OR CONNECTION TO THE GAS ISOLATION VALVE.
15. OPEN VN2 AND THE CAVITY ISOLATION VALVE AND LEAVE THE SYSTEM PUMPING OVERNIGHT.



GAS SUPPLY AND PUMPING SYSTEM RESTORE CRYOMODULE CONFIGURATION

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

*NOTE SOME OF THE VACUUM CARTS ONLY HAVE ONE PURGE LINE.

DAY 2

START UP AFTER MANIFOLDS CONNECTED

VACUUM MANIFOLD LEAK CHECK

1. WITH THE ION PUMP GATE VALVE CLOSED CHECK THE PRESSURE ON THE VACUUM MANIFOLD COMBO GAUGE.IT SHOULD BE LESS THAN 1E-7 TORR.
2. CHECK THE PRESSURE ON THE TWO TURBO PUMP COMBO GAUGES THEY SHOULD BE IN THE LOW 1E-8 RANGE.
3. CHECK FOR A LEAK IN THE GAS MANIFOLD BY CLOSING VPB1, VPB2, VPA1 AND VPA2 AND MONITORING THE MANIFOLD COMBO GAUGE. IF THERE IS A LEAK SEAK VACUUM SUPPORT TO LEAK CHECK THE MANIFOLD AND HOSES.
4. OPEN VPB1, VPB2, VPA1 AND VPA2.

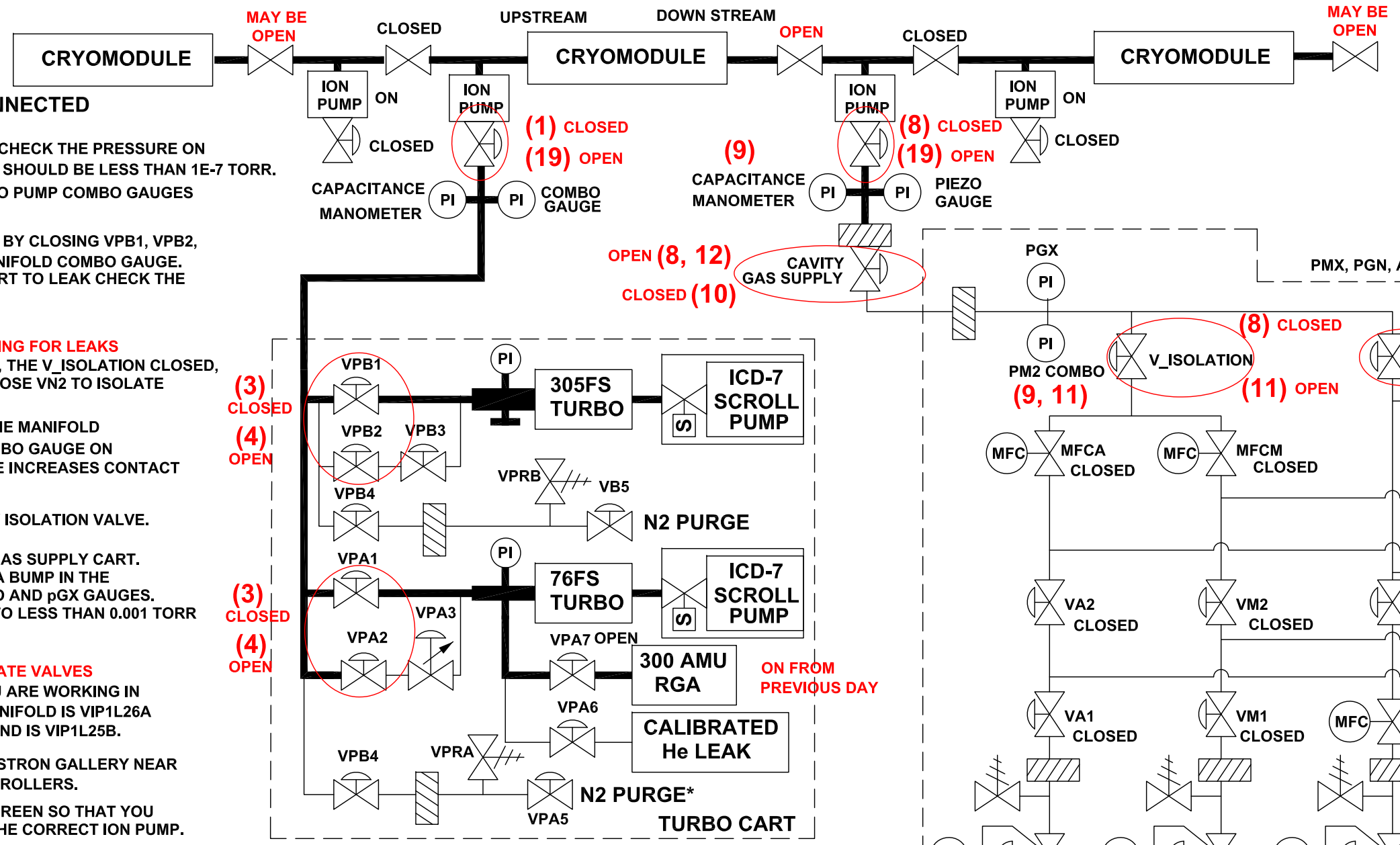
CHECK THE GAS SUPPLY MANIFOLD AND PIPING FOR LEAKS

8. WITH THE ION PUMP GATE VALVE CLOSED, THE V_ISOLATION CLOSED, THE CAVITY GAS SUPPLY VALVE OPEN, CLOSE VN2 TO ISOLATE THE SCROLL PUMP.
9. CHECK FOR A PRESSURE INCREASE ON THE MANIFOLD CAPACITANCE MANOMETER AND THE COMBO GAUGE ON THE GAS SUPPLY CART. IF THE PRESSURE INCREASES CONTACT VACUUM SUPPORT.
10. ASSUMING NO LEAKS CLOSE THE CAVITY ISOLATION VALVE. AND OPEN THE VN2 PUMPING VALVE.
11. OPEN THE V_ISOLATION VALVE ON THE GAS SUPPLY CART. IT WOULD NOT BE UNEXPECTED TO SEE A BUMP IN THE PRESSURE AS INDICATED ON THE COMBO AND pGX GAUGES. WAIT FOR THE PRESSURE TO RECOVER TO LESS THAN 0.001 TORR
12. OPEN THE CAVITY GAS SUPPLY VALVE.

TURN OFF ION PUMPS AND OPEN ION PUMP GATE VALVES

NOTE ON VACUUM PUMP NUMBERING. IF YOU ARE WORKING IN ZONE 1L25 THE PUMP ON THE GAS SUPPY MANIFOLD IS VIP1L26A AND THE PUMP ON THE VACUUM MANIFOLD END IS VIP1L25B.

13. LOCATE AN EPICS COMPUTER IN THE KLYSTRON GALLERY NEAR THE RACK WITH THE VACUUM PUMP CONTROLLERS.
14. OPEN THE APPROPRIATE SRF VACUUM SCREEN SO THAT YOU VALIDATE THAT YOU ARE TURNING OFF THE CORRECT ION PUMP.
15. LOCATE THE ION PUMP POWER SUPPLY ON THE VACUUM MANIFOLD END (B PUMP). TURN OFF THE POWER SUPPLY AND GO THE THE BACKSIDE OF THE RACK AND UNPLUG THE RED HIGH VOLTAGE CABLE.
16. LOCATE THE ION PUMP POWER SUPPLY ON THE GAS MANIFOLD END. TURN IT OFF THE POWER SUPPLY GO TO THE BACKSIDE OF THE RACK AND UNPLUG THE RED HIGH VOLTAGE CABLE.
17. GO TO THE EPICS SCREEN AND CHECK TO MAKE SURE THAT YOU TURNED OFF THE CORRECT TWO PUMPS.
18. IN THE TUNNEL LOCATE THE JUNCTION BOXES FOR THE TWO PUMPS WHICH ARE ATTACHED TO THE CABLE TRAYS. UNPLUG THE CABLE GOING FROM THE JUNCTION BOX TO THE ION PUMP.
19. OPEN THE ION PUMP VALVES ON THE VACUUM MANIFOLD THEN THE ION PUMP VALVE ON THE GAS MANIFOLD.



GAS SUPPLY AND PUMPING SYSTEM RESTORE CRYOMODULE CONFIGURATION

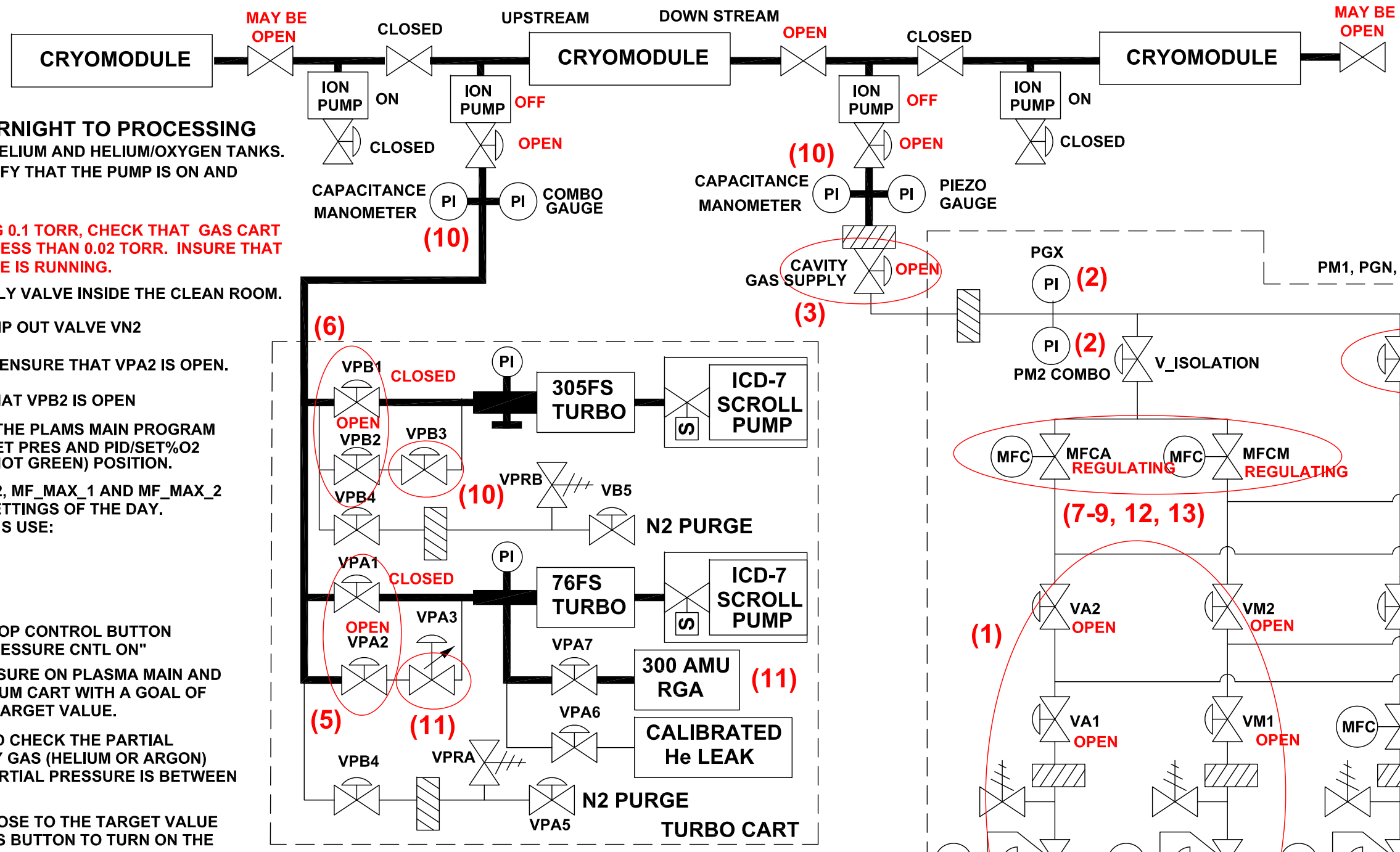
RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

*NOTE SOME OF THE VACUUM CARTS ONLY HAVE ONE PURGE LINE.

TRANSITION FROM OVERNIGHT TO PROCESSING

1. OPEN THE VALVES ON THE HELIUM AND HELIUM/OXYGEN TANKS. VA1, VA2, VM1 AND VM2 VERIFY THAT THE PUMP IS ON AND THE PUMP VALVE IS OPEN.
2. CHECK THAT PGX IS READING 0.1 TORR, CHECK THAT GAS CART COMBO GAUGEIS READING LESS THAN 0.02 TORR. INSURE THAT THE PLASMA MAIN SOFTWARE IS RUNNING.
3. OPEN THE CAVITY GAS SUPPLY VALVE INSIDE THE CLEAN ROOM.
4. CLOSE THE GAS SUPPLY PUMP OUT VALVE VN2
5. CLOSE THE VALVE VPA1 AND ENSURE THAT VPA2 IS OPEN.
6. CLOSE VPB1 AND ENSURE THAT VPB2 IS OPEN
7. OPEN THE VAC CNTL TAB IN THE PLAMS MAIN PROGRAM AND INSURE THAT THE PID/SET PRES AND PID/SET%O2 SWITCHES ARE IN THE OFF (NOT GREEN) POSITION.
8. SET THE MF_SET_1 MF_SET_2, MF_MAX_1 AND MF_MAX_2 ARE SET TO THE NOMINAL SETTINGS OF THE DAY. WITHOUT OTHER ISTRUCTIONS USE:
   - MF_SET_1 = 9.6
   - MF_SET_2 = 4.5
   - MF_MAX_1 = 20
   - MF_MAC_2 = 10
9. CLICK ON THE PRESSURE LOOP CONTROL BUTTON SUCH THAT IT INDICATES "PRESSURE CNTL ON"
10. MONITOR THE CAVITY PRESSURE ON PLASMA MAIN AND ADJUST VPB3 ON THE VACUUM CART WITH A GOAL OF GETTING IT CLOSE TO THE TARGET VALUE.
11. OPEN THE RGA SCREEN AND CHECK THE PARTIAL PRESSURE OF THE PRIMARY GAS (HELIUM OR ARGON) ADJUST VPA3 UNTIL THE PARTIAL PRESSURE IS BETWEEN 1E-5 AND 5E-5 TORR.
12. WHEN THE PRESSURE IS CLOSE TO THE TARGET VALUE CLICK ON THE PID/SET_PRES BUTTON TO TURN ON THE PRESSURE CONTROL LOOP.
13. ADJUST MF_SET_2 UNTIL THE OXYGEN PERCENTAGE IS ABOUT 6%. WHEN IT IS CLICK ON THE PID/SET%O2 BUTTON IN ORDER TO REGULATE THE PERCENTAGE OXYGEN.
14. WAIT AT LEAST 10 MINUTES TO MAKE SURE THAT THINGS ARE STABLE BEFORE TURNING ON THE PLASMA.



GAS SUPPLY AND PUMPING SYSTEM SET UP FOR PROCESSING

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

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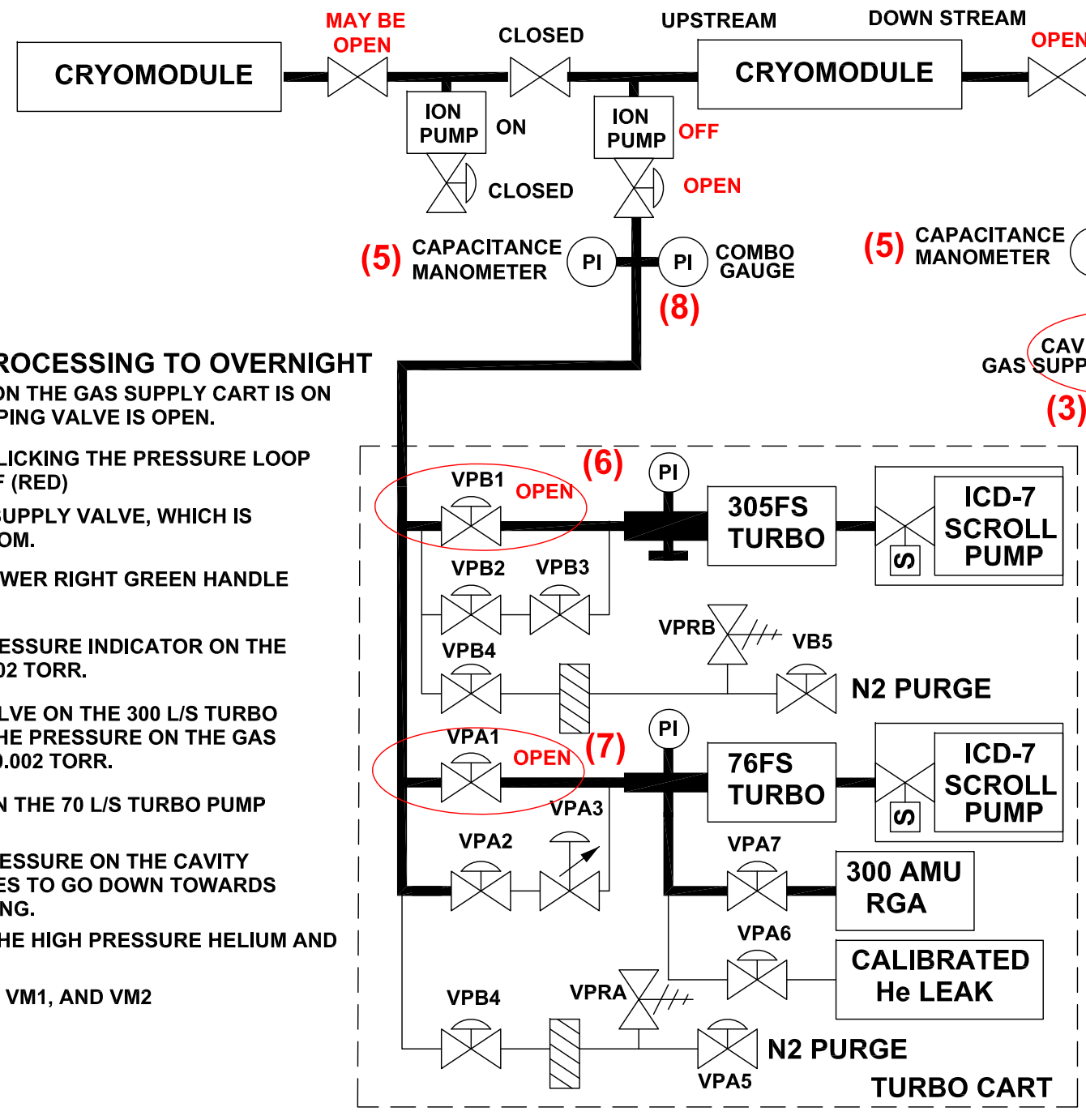
TRANSITION FROM PROCESSING TO OVERNIGHT

1. INSURE THAT THE PUMP ON THE GAS SUPPLY CART IS ON AND THAT THE MAIN PUMPING VALVE IS OPEN.
2. CLOSE MFC VALVES BY CLICKING THE PRESSURE LOOP CONTROL BUTTON TO OFF (RED)
3. CLOSE THE CAVITY GAS SUPPLY VALVE, WHICH IS INSIDE OF THE CLEAN ROOM.
4. OPEN THE VN2 VALVE (LOWER RIGHT GREEN HANDLE VALVE.
5. WAIT FOR THE CAVITY PRESSURE INDICATOR ON THE GAS SUPPLY CART IS < 0.02 TORR.
6. OPEN THE MAIN PUMP VALVE ON THE 300 L/S TURBO (VPB1) AND WAIT UNTIL THE PRESSURE ON THE GAS SUPPLY CART IS BELOW 0.002 TORR.
7. OPEN THE MAIN VALVE ON THE 70 L/S TURBO PUMP (VBA1)
8. MAKE SURE THAT THE PRESSURE ON THE CAVITY COMBO GAUGE CONTINUES TO GO DOWN TOWARDS 1E-4 TORR BEFORE LEAVING.
9. CLOSE THE VALVES ON THE HIGH PRESSURE HELIUM AND HELIUM/OXYGEN TANKS.
10. CLOSE VALVES VA1, VA2, VM1, AND VM2



GAS SUPPLY AND PUMPING SYSTEM SET UP FOR OVERNIGHT/WEEKENDS

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

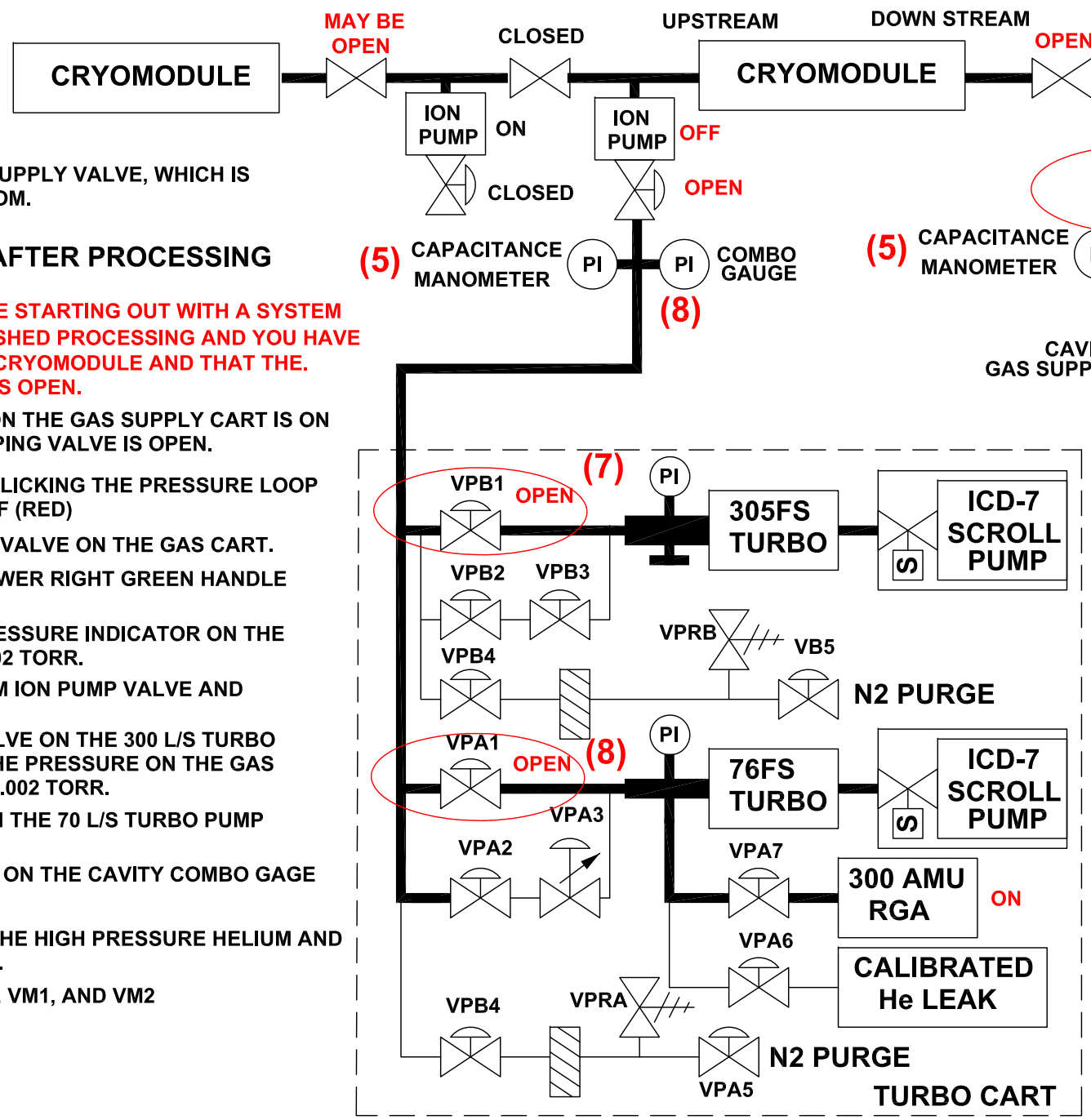
CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

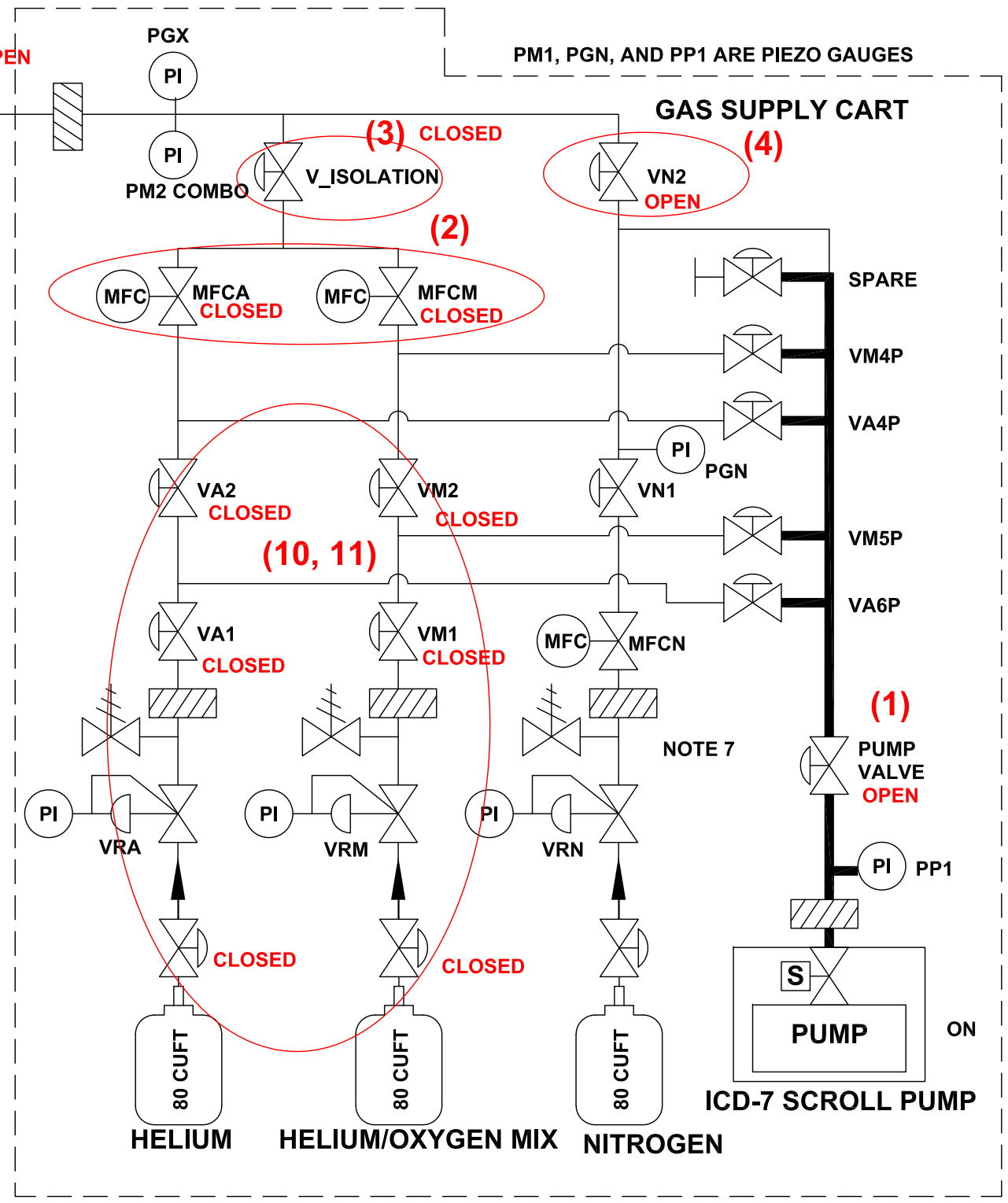
3. CLOSE THE CAVITY GAS SUPPLY VALVE, WHICH IS INSIDE OF THE CLEAN ROOM.

RESTORE SYSTEM AFTER PROCESSING DAY 1

THIS ASSUMES THAT YOU ARE STARTING OUT WITH A SYSTEM RIGHT AFTER YOU HAVE FINISHED PROCESSING AND YOU HAVE LOW PRESSURE GAS IN THE CRYOMODULE AND THAT THE. CAVITY GAS SUPPLY VALVE IS OPEN.

1. INSURE THAT THE PUMP ON THE GAS SUPPLY CART IS ON AND THAT THE MAIN PUMPING VALVE IS OPEN.
2. CLOSE MFC VALVES BY CLICKING THE PRESSURE LOOP CONTROL BUTTON TO OFF (RED)
3. CLOSE THE V_ISOLATION VALVE ON THE GAS CART.
4. OPEN THE VN2 VALVE (LOWER RIGHT GREEN HANDLE VALVE.
5. WAIT FOR THE CAVITY PRESSURE INDICATOR ON THE GAS SUPPLY CART IS < 0.02 TORR.
6. CLOSE THE DOWN STREAM ION PUMP VALVE AND TORQUE IT TO 15 FT-LBS.
7. OPEN THE MAIN PUMP VALVE ON THE 300 L/S TURBO (VPB1) AND WAIT UNTIL THE PRESSURE ON THE GAS SUPPLY CART IS BELOW 0.002 TORR.
8. OPEN THE MAIN VALVE ON THE 70 L/S TURBO PUMP (VBA1)
9. WAIT FOR THE PRESSURE ON THE CAVITY COMBO GAGE IS BELOW 1E-4 TORR.
10. CLOSE THE VALVES ON THE HIGH PRESSURE HELIUM AND HELIUM/OXYGEN TANKS.
11. CLOSE VALVES VA1, VA2, VM1, AND VM2
12. WAIT OVERNIGHT





GAS SUPPLY AND PUMPING SYSTEM SET UP OVERNIGHT PUMPING AFTER PROCESSING

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

CAPACITANCE MANOMETERS SHOULD BE ON FOR AT LEAST ONE HOUR BEFORE TRUSTING THEM.

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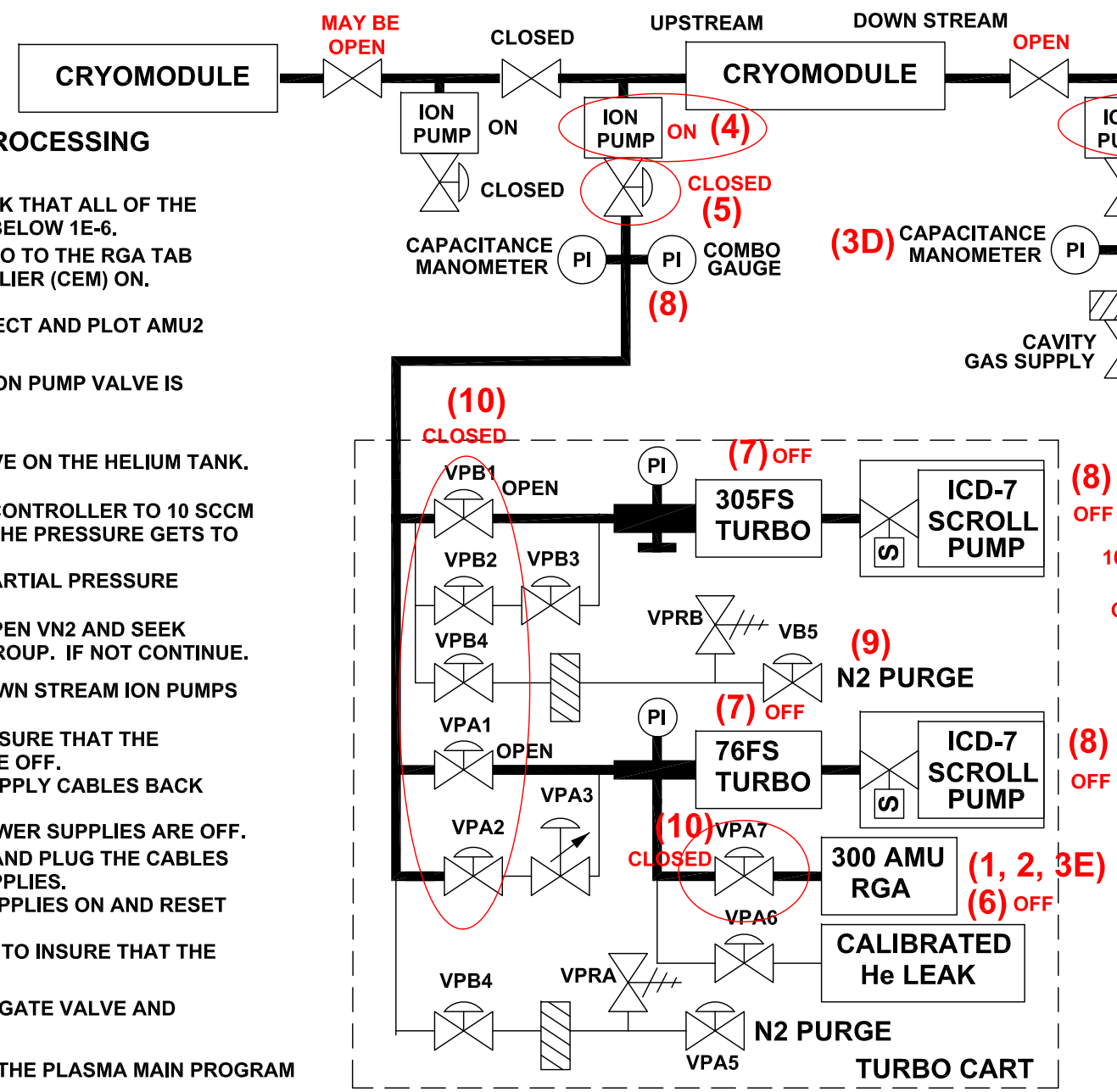
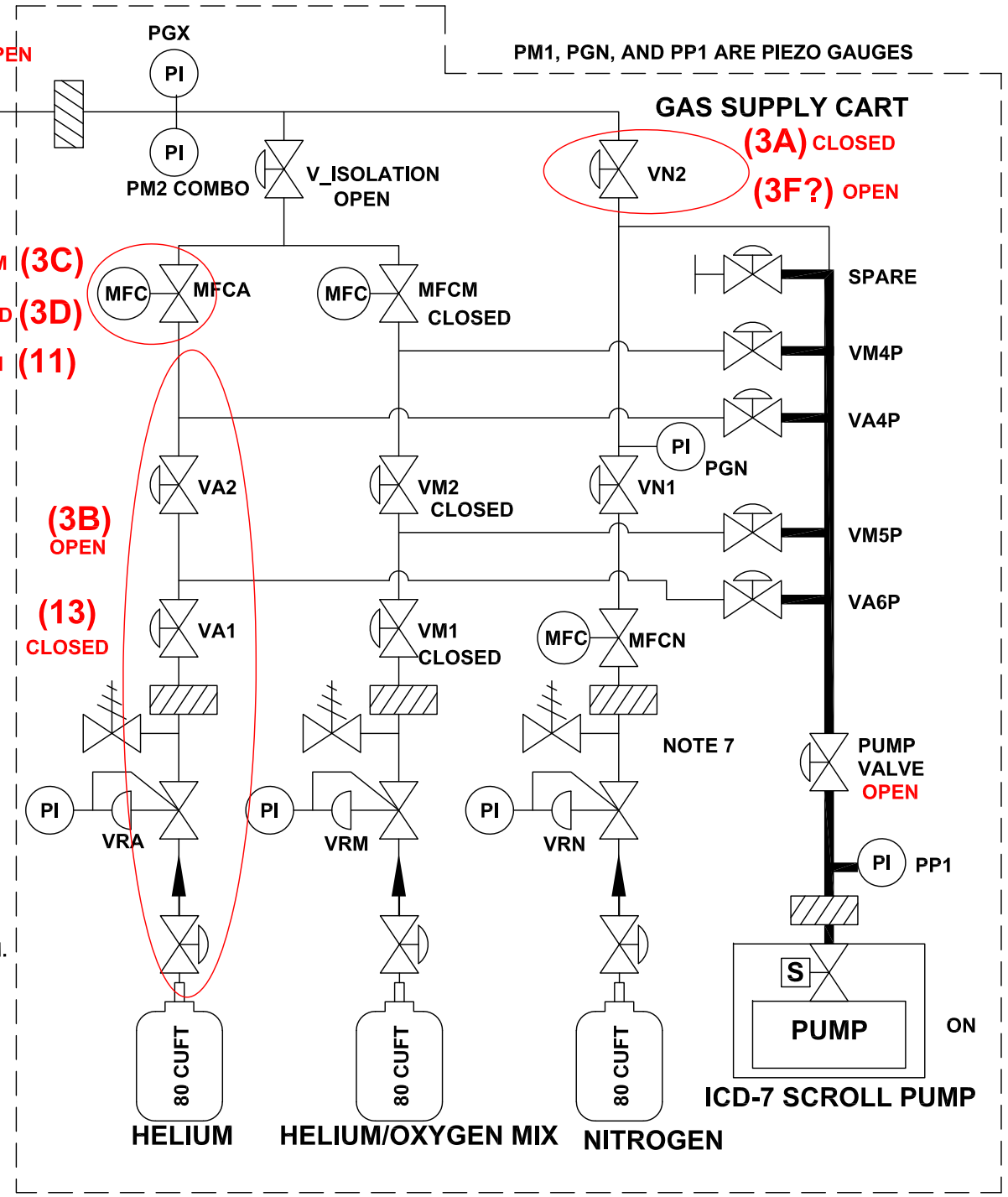
RESTORE SYSTEM AFTER PROCESSING
DAY 2

1. OPEN THE RGA SCREEN AND CHECK THAT ALL OF THE PARTIAL PRESSURE VALUES ARE BELOW 1E-6.
2. ON THE PLASMA MAIN PROGRAM GO TO THE RGA TAB
   (A) TURN THE ELECTRON MULTIPLIER (CEM) ON.
   (B) SET FINAL MASS TO 6.
   (C) ON A PLOTTING SCREEN SELECT AND PLOT AMU2 AND AMU4.
3. CHECK THAT THE DOWN STREAM ION PUMP VALVE IS LEAK TIGHT.
   (A) CLOSE VALVE VN2
   (B) OPEN THE HIGH PRESSURE VALVE ON THE HELIUM TANK. VA1 AND VA2.
   (C) OPEN THE HELIUM MASS FLOW CONTROLLER TO 10 SCCM
   (D) CLOSE THE HELIUM MFC WHEN THE PRESSURE GETS TO 0.3 TORR.
   (E) CHECK TO SEE IF THE HELIUM PARTIAL PRESSURE INCREASES IN THE RGA.
   (F) IF THE PRESSURE INCREASES OPEN VN2 AND SEEK SUPPORT FROM THE VACUUM GROUP. IF NOT CONTINUE.
4. RESTORE THE UPSTREAM AND DOWN STREAM ION PUMPS TO OPERATION.
   (A) OPEN AN EPICS SCREEN AND INSURE THAT THE ION PUMP POWER SUPPLIES ARE OFF.
   (B) PLUG THE ION PUMP POWER SUPPLY CABLES BACK INTO THE JUNCTION BOXES.
   (C) VERIFY THAT THE ION PUMP POWER SUPPLIES ARE OFF.
   (D) GO TO THE SERVICE BUILDING AND PLUG THE CABLES INTO THE ION PUMP POWER SUPPLIES.
   (E) TURN THE ION PUMP POWER SUPPLIES ON AND RESET THEM IN EPICS.
   (E) WATCH THE ION PUMP SIGNALS TO INSURE THAT THE PRESSURE IS GOING DOWN.
5. CLOSE THE UP STREAM ION PUMP GATE VALVE AND TORQUE IT TO 15 FT-LBS.
6. TURN OFF THE RGA BY STOPPING THE PLASMA MAIN PROGRAM
7. TURN OFF THE TURBO PUMPS AND LET THEM SPIN DOWN FOR 20 MINUTES.
8. TURN OFF THE SCROLL PUMPS.
9. CONNECT A NITROGEN LINE TO THE PURGE PORT AND BACKFILL THE SYSTEM WITH NITROGEN UNTIL THE PRESSURE REACHES 760 TORR.
10. VPB1, VPB2M VPB4, VPA1, VPA2 AND VPA7
11. CLOSE VN2 AND STOP PUMPING ON THE GAS SUPPLY CART.
12. BACKFILL THE GAS SUPPLY CART AND MANIFOLD WITH HELIUM USING THE MFC MFCA
13. CLOSE THE HELIUM TANK, VA1, VA2 AND MFCA





GAS SUPPLY AND PUMPING SYSTEM RESTORE TO ION PUMP OPERATION.

RGA SHOULD HAVE FILAMENTS ON FOR ONE HOUR PRIOR TO TRUSTING THEM.

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