

# LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

Prepared by: Allen Sibley	Document Type LIGO-M990175 -A-M 03/01/99	Approved:
Approved:	<h2 style="margin: 0;">Isolatable Volume Pump Down Procedure</h2>	Approved:
Site Operations Manager, Livingston Site		Approved:

Date: \_\_\_\_\_ Lead Operator: \_\_\_\_\_  
 Pump Down Location: \_\_\_\_\_ Aided by: \_\_\_\_\_  
 Start Time: \_\_\_\_\_

This procedure specifies actions to be taken to safely pump down an isolatable volume. Pump cart connections (see procedure LIGO-M990170-00-M) shall be completed before start of this procedure. If pumps are connected to a new AC hookup, check rotation. Note that indicator lights *may not* be lit if there are bad connections or failed filaments. Use vacuum gauge indications to confirm status of valves and make note of any failed indicator lights in this procedure.

**Equipment Required:**

- |                       |                         |
|-----------------------|-------------------------|
| 1. EH 2600 Roots-Pump | 3. STPH2000C Turbo Pump |
| 2. EDP 200 Pump       | 4. QDP80 Pump           |

Completed  
 (check)

**Procedure:**

**A. Preliminary Checks**

- |   |       |
|---|-------|
| 1) Verify that pump cart maintenance is current and that fluids are at their proper levels, etc.  | _____ |
| 2) Ensure that all 44" and 48" gate valves associated with the isolatable volume are locked and in the "Closed" position (see Lockout/Tag Out procedure LIGO-M9990190-00-M).  | _____ |
| 3) The gate annulus space must now be pumped down and the ion pump started.   | _____ |
| 4) Ensure that the 6" gate valve is in the "Closed" position, this valve is located on the roughing port where the pump cart is connected.  | _____ |
| 5) <b>NOTE: THE PRESSURE DIFFERENCE ACROSS A 6" GATE VALVE MUST BE LESS THAN 10 TORR BEFORE IT CAN BE OPENED.</b> Check status of each of the remaining pump ports on the isolatable volume. Also check status of back to air valves and annulus system valves. | _____ |

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Completed  
(check)

## B. Start Roughing Pump Down

Use EH2600 roots pump backed by EDP200

- 1) Ensure that the cooling water and pneumatic/purge seal air supplies for both of the pumps are connected and operating. \_\_\_\_\_
- 2) Ensure that the "Remote/Local" switch on the EDP200 control panel is set for "Remote" control. \_\_\_\_\_
- 3) Ensure that the "Booster/Inlet Valve" switch on the EH2600 control panel is in the "Hand" position. \_\_\_\_\_
- 5) Ensure that the red On/Off rotatable switch on the EH2600 control panel is in the "On" position. \_\_\_\_\_
- 6) Ensure that the "Control Voltage" switch on the EH2600 control panel is "On." \_\_\_\_\_
- 7) Verify that the "Power On" and "Inlet Gate Valve Closed" lamps are lit. \_\_\_\_\_
- 8) Verify the previous ten steps with a second check mark. \_\_\_\_\_
- 9) Open the 6" gate valve. \_\_\_\_\_
- 10) On the EH2600 control panel, start the EDP200 pump by pressing the "EDP200 Pump Remote" "Start" button. *Allow the EDP200 to run for 30 minutes before proceeding to the next step.* \_\_\_\_\_
- 11) Verify that the "System Primed" lamp is lit at control panel EH2600. \_\_\_\_\_
- 12) Verify the previous two steps. \_\_\_\_\_
- 13) Start the EH2600 by pressing the "EH2600 Booster/Inlet Valve Start/ Open" button. \_\_\_\_\_

## C. Stop Roughing

*In an emergency stop pumping by pushing the "Emergency Stop" button on either the EDP200 or the EH2600 control panels.*

- 1) To stop pumping, push the "EDP200 Pump Remote" "Stop" button on control panel EH2600. The pumps will continue to run for the duration set by TDR-2 (30 seconds to 15 minutes is typical). Allow the pumps to shut \_\_\_\_\_

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down before proceeding to the next step.

- |   | <u>Completed</u><br><u>(check)</u> |
|---|------------------------------------|
| 2) Verify that the "Inlet Gate Valve Closed" lamp is lit on control panel EH2600.   | _____                              |
| 3) Turn the red rotatable "On/Off" switch on the EH2600 control panel to "Off."   | _____                              |
| D. Start Final Pump Down (or restart Turbo pumping)   | _____                              |
| Use STPH2000C turbo pump backed by QDP80.   |                                    |
| 1) Verify that the 10" gate valve is closed on the port where the pump cart is connected. If this is a restart, close this valve.                                       | _____                              |
| 2) Ensure that the cooling water (check booster pump) and pneumatic/purge seal air supplies for both of the pumps are connected and operating. Check QDP80 fluid level. | _____                              |
| 3) Ensure that the "Remote/Local" switch on the QDP80 control panel is in "Remote" position.  | _____                              |
| 4) Ensure that the "Safety Valve" switch is "Closed."   | _____                              |
| 5) Ensure that the red rotatable "On/Off" switch is "On."   | _____                              |
| 6) Verify that "Control Voltage" is on.   | _____                              |
| 7) Verify the previous six steps with a second check mark.  | _____                              |
| 8) Press the "QDP80 Drypump" "Start" button on the STPH2000C control panel. Verify that the "QDP80 Pump On" lamp is lit on control panel STPH2000C.                     | _____                              |
| 9) Shift the "Safety Valve" switch on the STPH2000C control panel from "Closed" to "Rough."   | _____                              |
| 10) Verify that the Safety Valve is open.   | _____                              |
| 11) Verify the previous four steps with a second check mark.  | _____                              |
| 12) Press the "STPH2000C Turbo Pump" "Start" button.  | _____                              |

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- 13) Once the turbo reaches operating speed and the "Normal" indication is lit (~5 minutes), set the safety valve to "Turbo" position.

Completed  
(check)

14) Confirm that the isolatable volume pressure is less than  $1 \times 10^{-1}$  torr. \_\_\_\_\_

15) Open the 10" valve slowly while monitoring the turbo status. Continue to monitor until pressures stabilize or begin to trend downward.

## E. Stop Final Pump Down

In an emergency *stop pumping* by pushing the "Emergency Stop" button on either the QDP80 or the STPH2000C control panels. \_\_\_\_\_

1) Close the 10" gate valve. \_\_\_\_\_

2) Shift the "Safety Valve" switch from "Open" to "Closed" on control panel STPH2000C. \_\_\_\_\_

3) Verify that the "Safety Valve Open" lamp is off on control panel STPH2000C. \_\_\_\_\_

4) Press "QDP80 Drypump" "Stop" and, if necessary, the "STPH2000C Turbo Pump" "Stop" buttons. \_\_\_\_\_

5) Verify that the "Brake" light (red LED) is off at the STPH2000C controller before proceeding (braking takes about 12 minutes after Stop is initiated). \_\_\_\_\_

6) Verify the previous five steps with a second check mark. \_\_\_\_\_

7) Rotate the red "On/Off" switch to the "Off" position.

Acknowledge Task

Completion by \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

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## Procedure for Isolatable Volume Pump Down

Date: \_\_\_\_\_ Lead Operator: \_\_\_\_\_

Pump Down Location: \_\_\_\_\_ Aided by: \_\_\_\_\_

Start Time: \_\_\_\_\_

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\_\_\_\_\_

### Comments/Information

Note any unusual conditions and inform appropriate personnel.

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