

TITLE: FEEPS Reset Instructions, Version 2

CATEGORY: Operations

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REVIEW PERIOD: Annually

Purpose

The Front End Equipment Protection System (FEEPS) monitors the state of variables relevant to the protection of Front End equipment. When the FEEPS detects that a variable is not in the correct state, a fault occurs, and the Front End shutter permit is removed. The Front End Valve (FEV) and Beamline Isolation Valve (BIV) may also close, preventing any vacuum breach from propagating upstream.

Floor Coordinators and Operators are allowed to reset FEEPS faults under certain conditions:

The fault did not cause the loss of stored beam.

AND

The fault occurred due to a User vacuum fault

OR

The fault occurred due to a FE vacuum fault downstream of PS1

These instructions cover the resetting of FEEPS faults under these conditions. The course of action varies depending on whether the beamline has a commissioning/beryllium window or is windowless (i.e. has a differential pump). The variances are outlined below on pages 2-6.

Course of Action

1. Ask the user if he/she knows what caused the fault.
 - Often, the user mentions beamline vacuum work or suspected outgassing.
2. Ask the user to reset the Beamline EPS (BLEPS).
 - In many cases, the FEEPS cannot be reset if the BLEPS has not been reset.
 - Visiting users may need to call their beamline contact for assistance. Floor Coordinators and Operators are not authorized to reset the BLEPS.
3. Determine whether the beamline has a commissioning/beryllium window.
 - Following the path shown in Figure 1, access the Beamline-Specific FEEPS EPICS screen.
 - If the beamline has a commissioning window or beryllium window, it is shown in the beam path (circled in blue). Otherwise, the beamline is windowless.

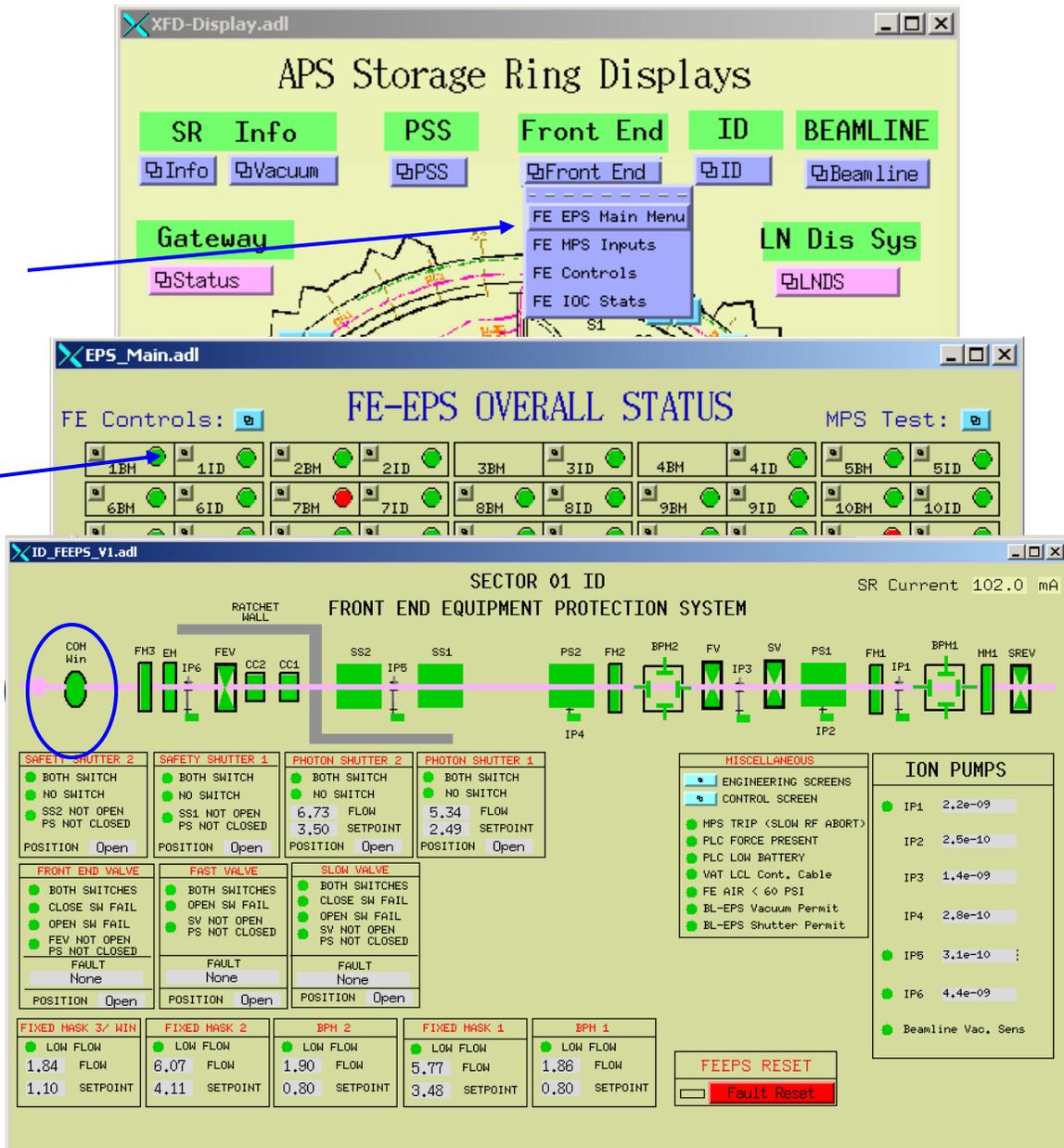


Figure 1: Path for accessing the Beamline-Specific FEEPS screen (EPICS). Note that 1-ID has a commissioning window, labeled “COM Win,” which is circled in blue. Some beamlines have a beryllium window, labeled “Be Win.”

For Beamlines with a Commissioning or Beryllium Window

4. The Floor Coordinator or Operator may attempt to reset the FEEPS. Following the path shown in Figure 2, access the Beamline-Specific EPS_Controls screen.
5. Upon accessing the EPS_Controls screen, click the “Reset” button (circled in red).
6. Once the fault has been reset, click the FEV and BIV “Open” buttons.

7. Details to note:

- The legend on the left side of the EPS_Controls screen shows that there is no FE permit and that PS1 and PS2 are closed, but the Beamline EPS (BLEPS) shutter permit is being given (circled in blue). As was noted in step 2, for most beamlines the BLEPS must be reset before the FEEPS can be reset.
- When there is a FEEPS fault, the FEEPS screen shows a red, blinking box next to the “Fault Reset” button. The EPS_Controls screen also shows a red blinking box above the “Reset” button (both are circled in red).
 - Occasionally, a user suspects that there has been a FEEPS fault, but only the BLEPS has faulted. In this case, refer to Item #3 in Appendix 1 (page 7).
- The EPS_Controls screen shows the open or closed status of PS1, Slow Valve, Fast Valve, FEV, and BIV (circled in yellow).

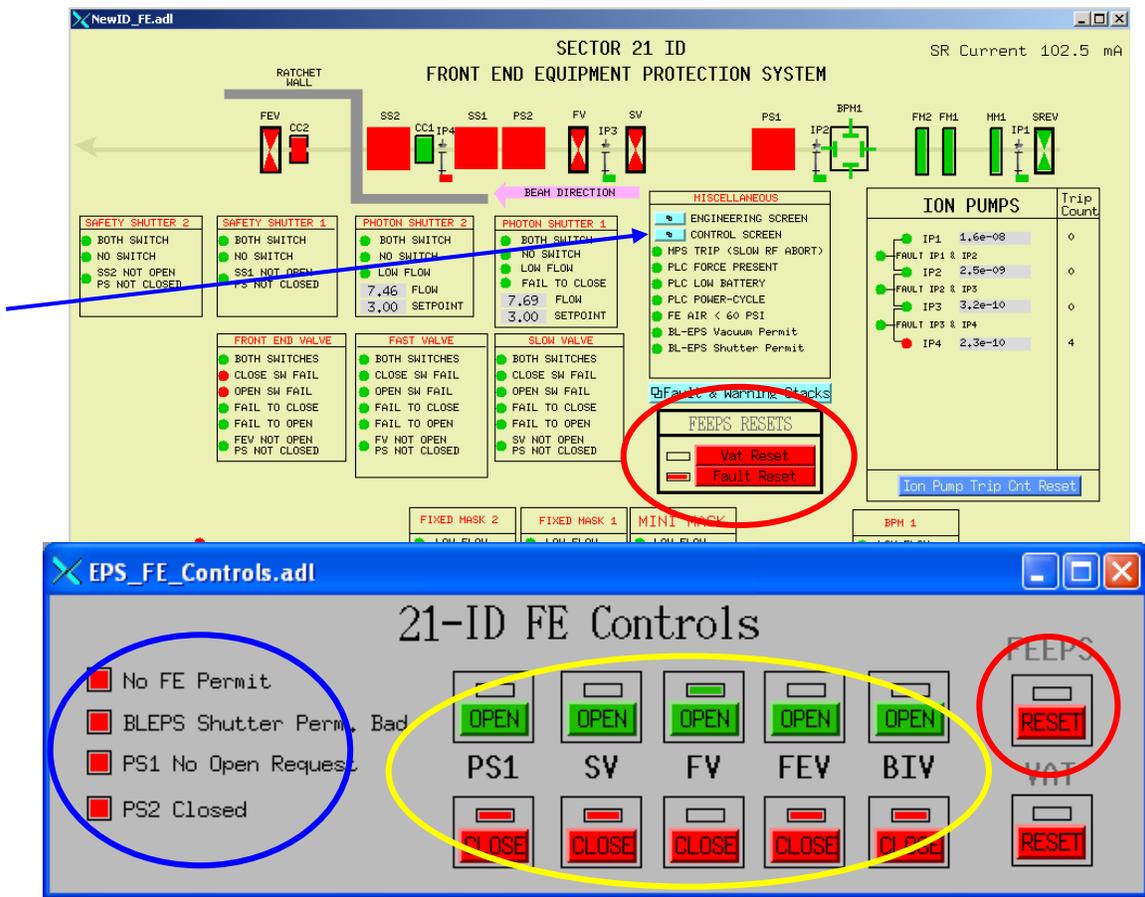
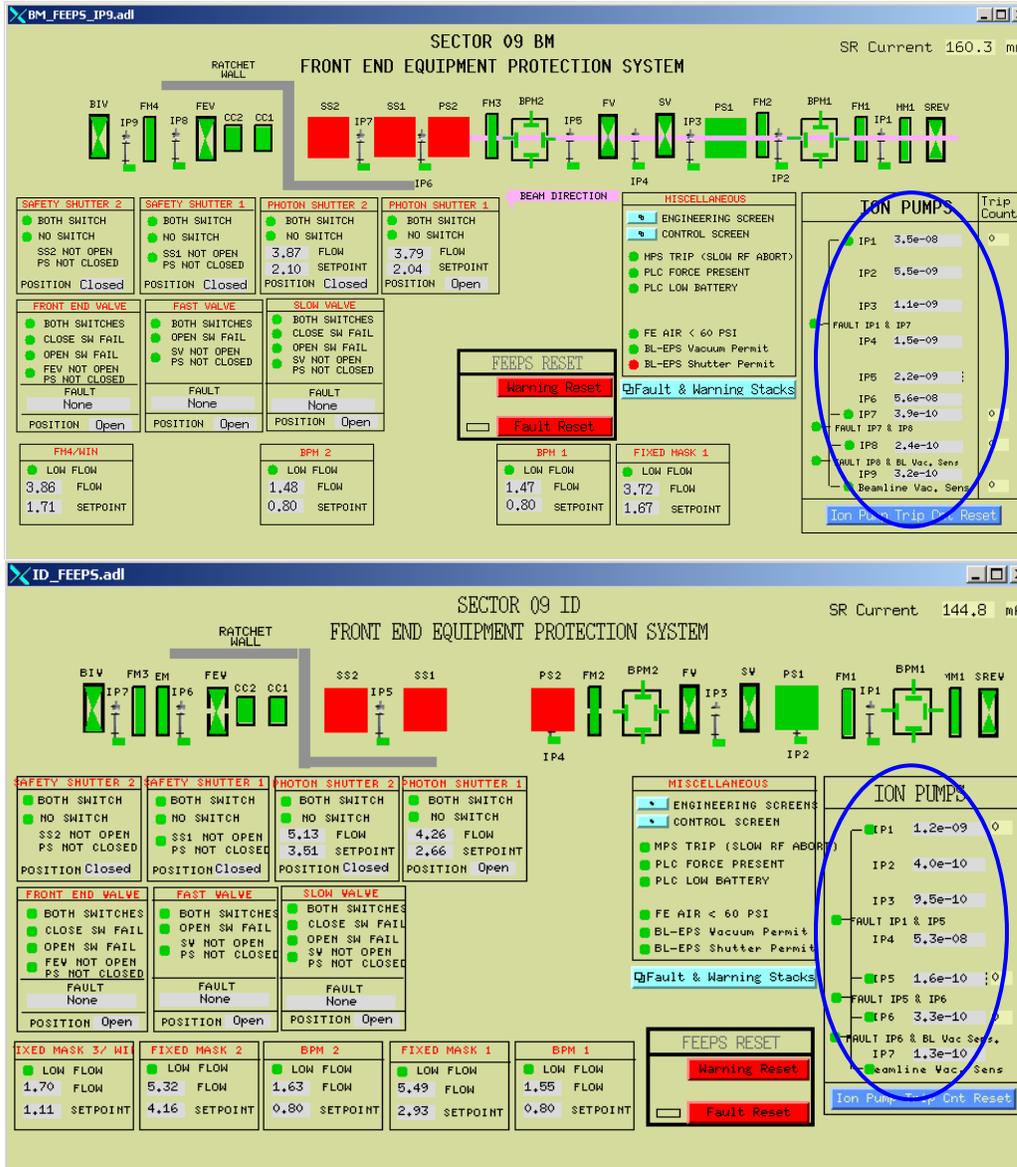


Figure 2: Path for Resetting FEEPS.

For Windowless Beamlines

8. If the beamline is windowless, more checks are needed to ensure that any beamline vacuum problems are not propagated upstream. Using the Beamline-Specific FEEPS screen (Figure 3), check to see that the pressure on all but one of the ion pumps is in the 10^{-9} range or less (circled in blue).

- For most beamlines, one ion pump reads in the 10^{-7} range due to outgassing if the shutter has been closed for several minutes. A yellow dot indicates that the pressure is in this range. The actual ion pump varies depending on the exact front end configuration. As long as only one ion pump is reading between the 10^{-7} and the 10^{-9} ranges, the FE vacuum is considered to be acceptable for the purposes of this procedure.



IP1: _____
 IP2: _____
 IP3: _____
 IP4: _____
 IP5: _____
 IP6: _____
 IP7: _____
 IP8: _____
 IP9: _____

Figure 3: FEEPS screens for 9-BM and 9-ID, showing ion pumps to be checked. Note that when resetting the FEEPS for 9-BM, it would be necessary to check nine ion pumps, as opposed to 9-ID, which only has seven ion pumps to be checked. Blanks have been provided where the ion pump values can be entered prior to resetting the FEEPS.

9. Check the Beamline RGA (Figure 4). The pressure should be in the range of 10^{-9} or less (circled in blue).

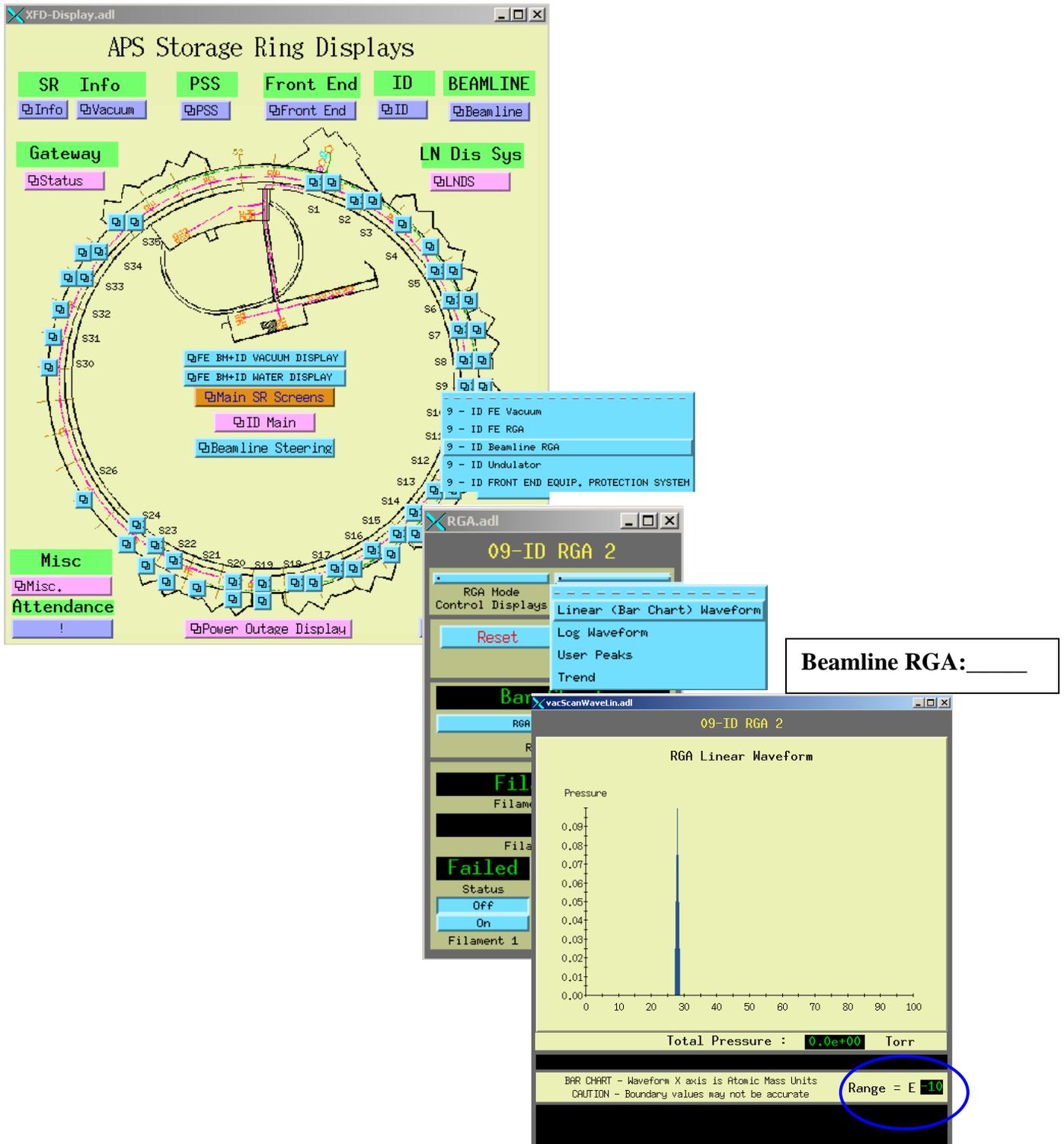


Figure 4: Path for checking the Beamline RGA before resetting the FEEPS for a windowless beamline. A blank has been provided where the Beamline RGA value can be entered prior to resetting the FEEPS.

10. If pressure conditions in steps 8 and 9 are satisfied, follow steps 4 through 7 to reset the fault and open the FEV and BIV.

- If any of the pressure readings in steps 8 and 9 are not within the prescribed range, do not attempt to reset the FEEPS or open any valves. Contact the Vacuum Group on-call engineer.

For All Beamlines

11. If the fault does not reset or occurs more than 3 times per shift, contact the Vacuum Group on-call engineer. He/She can provide advice as to whether the fault can continue to be reset or whether call-ins are necessary.

- File an RMD report even if you continue to reset the fault; follow-up by AES Division personnel during business hours may be required.
- If call-ins are necessary, notify the on-call Floor Coordinator. A CCWP may be required, depending on the equipment involved.

12. Occasionally, it will not be possible to reset the FEEPS via EPICS due to computer communication problems. It is recommended trying to use another EPICS gateway if this happens. For instance, if the hydra gateway is being used to view EPICS displays, try to use the rhea gateway. This may make it possible to reset the FEEPS and/or open valves. However, if there are still communications problems using EPICS, a Controls Engineer will have to be called to clear the problem, as the FEEPS hard controls that used to be located in a chassis on the storage ring mezzanine, are no longer existent.

13. Document the occurrence in the appropriate shift log. Include the time, beamline, vacuum readings that were checked for windowless beamlines (ion pumps, RGA), and whether the fault reset without difficulty or required further action.

Appendix 1: Other Information

1. When in doubt, the Operator is always welcome to call the on-call Floor Coordinator for assistance in troubleshooting.

2. Occasionally, a user will request:

- That the FEV or BIV be closed in preparation for beamline vacuum work.
- That the FEV or BIV be opened after vacuum work, when there is no FEEPS trip. Floor Coordinators and Operators are permitted to grant such requests. Most beamlines do not have control of these valves.

3. Occasionally, a user suspects that there has been a FEEPS fault, but only the BLEPS has faulted. The Beamline Status screen (Figure 5, next page) can be helpful in troubleshooting.

- The screen shows:
 - Front End Status including EPS, MPS, DIW, and VAC (headings in blue)
 - Positions of the SV, FEV, BIV, and PS1 (headings in purple)
 - Beamline Vacuum and BLEPS Permit (headings in green)
- 12-BM and 17-BM show a pattern typical of a FEEPS trip in which the Front End EPS and VAC columns are red, and the FEV and BIV (if present) are closed.
 - 12-BM also has a Beamline VAC fault, and the BLEPS Permit has been removed.
 - 17-BM has no Beamline VAC fault, but the BLEPS Permit has been removed. Note that 17-BM does not have a BIV.
- 8-BM, 9-BM, and several other beamlines show a pattern typical of a BLEPS trip.
 - Only the BLEPS Permit has been removed. The FEV and BIV are open.
 - The Front End EPS column is red because the BLEPS must be reset before the FEEPS will give shutter permit.
 - In this case, the user should be informed that there has been no FEEPS vacuum trip and that the Beamline EPS needs to be reset.

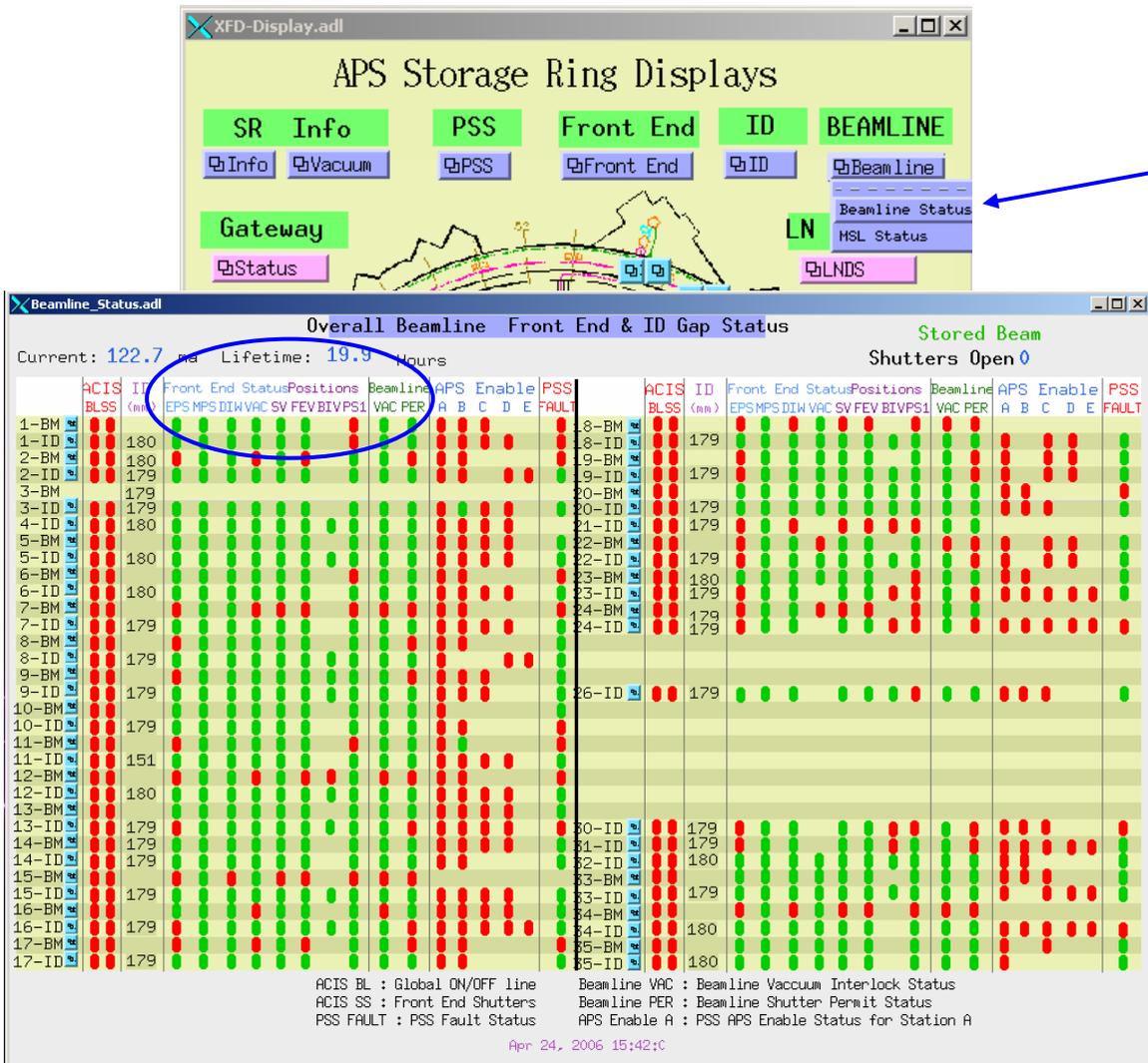


Figure 5: Path to Beamline Status screen.