



# Operating Procedure (PS01)

Title: Mainline Unit Operation - Abnormal Conditions at PS01  
Number: 4.1.11-01  
Revision: 3  
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Effective Date: 12/02/09

Approved by: <b>PS01 O&amp;M Supervisor</b>
Applicable to: Pump Station 1

### Purpose

This procedure outlines the steps taken by pump station personnel in the event of the following abnormal operating conditions:

- Vibration alarms or vibration shutdowns occur on a Mainline Unit Gas Generator (GG), Reaction Turbine (RT) or Mainline Pump (MLP).
- The GG is operating with a high (alarm) Exhaust Gas Temperature (EGT) spread.
- The GG speed (N1) is continually below 6900 rpm.

### Responsible and Accountable Resources

- PS01 O&M Supervisor
- PS01 Control Room Operator (CRO)

**SPECIAL INSTRUCTIONS**

*This procedure does not have to be physically present at the work site, initialed, or signed.*

- All steps in this procedure shall be completed in sequence unless specifically noted. The CRO will complete the steps and direct the actions performed for this procedure.
- An alarm is normally a safe but abnormal condition and should be acted upon. The degree of haste used in carrying out the actions can vary with circumstances. Common sense should be applied. A shutdown condition is normally caused by unsafe conditions, or a condition wherein the integrity of the equipment is threatened. Operation of equipment under a shutdown condition is not normally allowed.

### Procedure

#### RT or Mainline Pump High Vibration

If vibration levels are in an alarm condition, take the following action:

1. Record the following parameters and provide the information to Maintenance Engineering:
  - Pump drive end vertical vibration: \_\_\_\_\_
  - Pump drive end horizontal vibration: \_\_\_\_\_
  - Pump free end vertical vibration: \_\_\_\_\_
  - Pump free end horizontal vibration: \_\_\_\_\_
  - RT vertical vibration: \_\_\_\_\_

**FEDERAL ENERGY REGULATORY COMMISSION**

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- RT horizontal vibration: \_\_\_\_\_
- RT speed: \_\_\_\_\_
- GG speed: \_\_\_\_\_
- Suction/Discharge Leading Edge Flow Meter (LEFM): \_\_\_\_\_
- Unit Flow Rates (elbow tap):
  - Unit 1: \_\_\_\_\_
  - Unit 2: \_\_\_\_\_
  - Unit 3: \_\_\_\_\_
- Station Suction Pressure: \_\_\_\_\_
- Station Discharge Pressure: \_\_\_\_\_
- Physical assessment of equipment condition. How does it feel and sound?:  
\_\_\_\_\_  
\_\_\_\_\_

**Gas Generator High Vibration**

If vibration levels are in an alarm condition, take the following action:

\_\_\_ 1. Record the following information and provide it to Maintenance Engineering for evaluation:

- Vibration level - Inlet: \_\_\_\_\_
- Vibration level - Exhaust: \_\_\_\_\_
- GG Speed: \_\_\_\_\_
- RT Speed: \_\_\_\_\_
- EGT: \_\_\_\_\_
- EGT Spread:
  - Highest (+) thermocouple No. \_\_\_\_\_ Spread (+) \_\_\_\_\_
  - Lowest (-) thermocouple No. \_\_\_\_\_ Spread (-) \_\_\_\_\_
- Bleed valve status: OPEN / CLOSED
- Ambient Temperature: \_\_\_\_\_
- Anti-ice system status: ON / OFF
- Physical assessment of equipment condition. How does it feel and sound?:  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_ 2. If icing conditions exist or are suspected or the problem is not obvious, shut down the unit and perform the following checks:

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- Inspect plenum, bellmouth, and Inlet Guide Vanes (IGV) for ice accumulation.
- Check anti-icing equipment for proper operation.
- Check IGV freedom of movement.
- Inspect compressor for foreign object damage.
- Check freedom of rotor.
- Check magnetic chip detectors.

### High Vibration Shutdown on Gas Generator, RT, or Main Line Pump

If none of the checks outlined in "Gas Generator High Vibration" have been performed, due to an unanticipated shutdown:

1. Make a physical assessment of the machine condition.
  - Inspect plenum, bellmouth, and Inlet Guide Vanes (IGV) for ice accumulation.
  - Check anti-icing equipment for proper operation.
  - Check IGV freedom of movement.
  - Inspect compressor for foreign object damage.
  - Check freedom of rotor.
  - Check magnetic chip detectors.
  - Pull the transition piece and inspect the turbine section on the GG.
2. If an obvious problem is found, report the condition to Maintenance Engineering before continuing with this procedure.
3. If the problem is not obvious, a restart may be attempted.
  - If the restart is successful and everything appears normal, continue operating the unit per normal procedures.
  - If the restart is successful but a vibration alarm is showing, complete the checks outlined in "Gas Generator High Vibration" and report the results to Maintenance Engineering.
  - If a vibration shutdown occurs on the restart, contact Maintenance Engineering and do not attempt a second restart.

### EGT Spread Alarm or Shutdown Condition

#### NOTE

The EGT spread alarm is  $\geq 75^{\circ}\pm$

If an EGT spread alarm is encountered:

1. Read and record the temperatures from each thermocouple.

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### NOTE

Do not assume that the thermocouple is open, as it may be the case that a can has flamed out. If a can has actually flamed out, the average EGT readings displayed by the FT-100 and the strip chart recorder should be similar.

- \_\_\_ 2. If a can is cold, immediately stop the engine and troubleshoot.

### NOTE

Low or high is a relative term, but implies that the can is alive but burning at a high or low temperature relative to the other cans.

- \_\_\_ 3. If a can is low or high in temperature, change the speed of the engine and observe what happens.  
\_\_\_ 4. If troubleshooting does not yield a solution, contact Maintenance Engineering.

### NOTE

The current FT-100 is not programmed for an EGT spread shutdown. The desired shutdown limit is  $\pm 90^{\circ}\text{F}$ . Do not operate the engine with an EGT spread in excess of  $\pm 90^{\circ}\text{F}$ . The only exception would be for troubleshooting purposes, when the amount of running time under an EGT spread shutdown condition should be limited to a few minutes.

### Operation of GG Below 6900 rpm

### NOTE

When N1 is below 6900 rpm, the vibration alarm and shutdown limits on the GG FT-100 monitor are tripled.

The minimum allowable GG speed (N1) for steady state operations is 6400 rpm.

The maximum allowable GG vibration during steady state operation, with N1 below 6900 rpm, is 1.5 on the inlet end and 2.0 on the discharge end.

- \_\_\_ 1. If the GG is operated for an extended period of time below 6900 rpm, operational personnel are to be observant of the GG speed and vibration levels.  
\_\_\_ 2. If the GG vibration levels approach the maximum allowable levels specified during steady state operation with N1 below 6900 rpm, change operating conditions as appropriate to increase the GG speed and/or lower the vibrations levels. If this is not possible, take the unit off-line and contact Maintenance Engineering.

**END OF PROCEDURE**

### Records

Completed Procedure OP 4.1.11-01	All records generated as a result of this document will be retained in accordance with the Alyeska Records Retention Schedule.
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**Revision History**

Revision	Date	Revision Summary
3	12/02/09	Update Operation of GG Below 6900 rpm Step #2.
2	02/01/08	Scheduled Review. Update format.
1	04/28/03	Scheduled Review. Formatted to AMS/001.
0	10/30/02	Initial issue of procedure.

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