FRONTERA
SPACE

Frontera Space Emergency Procedure: Electrical Fires

Revision: 01

Frontera Space Document: 000019

12/10/2025

1 PURPOSE

This procedure defines the required response actions for smoke, fire, electrical faults, or abnormal thermal events occurring in areas where such conditions are not expected, including the PTSD stand and associated support systems.

The procedure establishes:

- Immediate control-room actions
- Emergency stop and stand safing requirements
- Remote identification and suppression protocols
- FireX usage hierarchy
- Personnel accountability and evacuation requirements
- Emergency coordination and communications
- SCAPE entry criteria when safety systems are compromised
- Stabilization, verification, and return-to-safe-state criteria

These actions ensure personnel safety, prevent uncontrolled escalation, and maintain control of hazardous systems involving toxic chemicals.

2 SCOPE

This procedure applies to:

- All personnel working in or around the PTSD stand
- All operations involving hypergolics, oxidizers, pressurants, purges, and ignition systems
- All electrical power, control, monitoring, and fire-suppression systems
- All test, conditioning, troubleshooting, and recovery activities

Compliance with this procedure and associated training is mandatory.

3 TRIGGERING CONDITIONS

This procedure shall be initiated immediately upon:

- Observation of smoke in any area where smoke is not expected
- Detection of fire, overheating, or electrical arcing
- Electrical faults with visible smoke or odor
- Loss of confidence in system state combined with thermal indicators

Smoke in unexpected areas shall be treated as a potential fire or energized-equipment failure until proven otherwise.

4 IMMEDIATE CONTROL ROOM ACTIONS

Upon detection:

1. The Control Room shall announce “Smoke on the Test Stand”.
2. An emergency stop shall be initiated immediately.
3. The stand shall be placed into a fully safed configuration, including:
    - Halting all testing and pressurization
    - De-energizing ignition sources
    - Isolating electrical power as designed
    - Closing or venting fluid systems via fail-safe logic

If operations are on stand, they should immediately evacuate to the fence line.

5 REMOTE IDENTIFICATION & ASSESSMENT

All assessment shall be conducted remotely using:

- Fixed and PTZ camera systems
- Instrumentation and telemetry
- Safety-system and alarm logs

Personnel shall not approach the stand or open enclosures during initial assessment.

The objective is to identify, if possible:

- The source of smoke or fire
- Whether the event is electrical, thermal, or process-related
- Whether the condition is localized or spreading

6 FIRE SUPPRESSION (FIREX) DECISION LOGIC

The Control Room shall determine whether FireX suppression is capable of stopping the fire.

FireX shall be applied remotely and in the following order:

1. Local FireX directed at the affected tank, subsystem, or equipment if the fire appears localized and controllable.
2. Full-area FireX to the stand if:

- The fire is spreading,
- The source cannot be positively isolated, or
- Local suppression is insufficient or uncertain.

Manual fire suppression is prohibited during active fire conditions.

7 STAND SAFING, PURGE, AND PASSIVATION

Following FireX application:

1. The stand shall remain in a safed state.
2. All lines shall be purged as part of stabilization.
3. IPA purge is permitted only if:
    - IPA lines are not involved in the fire, and
    - The flare stack is not involved in the fire.
4. If IPA systems or the flare stack are involved, IPA purge is prohibited.
5. The system shall be passivated using water/ nitrogen/vacuum and safed with nitrogen (N_2).
6. Electrical systems and components shall be inhibited from interaction with the stand while in a safed state.

8 SAFETY MONITORING & LOGGING

Immediately following emergency stop:

- All safety-system logs shall be opened and actively monitored, including:
    - Toxic-gas detectors
    - Fire detection systems
    - Pressure and temperature sensors
- Logs shall be reviewed for evidence of chemical release or abnormal trends.

9 EMERGENCY NOTIFICATION & PERSONNEL ACCOUNTABILITY

- If the fire is not identified and contained via the FireX system 911 shall be called to notify emergency responders for awareness and standby support.
- Responders shall be informed of:

  - The hazardous materials present
  - Current stand status
  - Nature of the hazard
- The Control Room shall:
  - Confirm personnel safety
  - Verify all personnel are accounted for
  - Confirm stand evacuation status
  - Log personnel status

10 SAFETY OFFICER ROLE & EMERGENCY MUSTER

The Safety Officer/Test Director shall:

- Remain continuously on communications
- Report to the designated PPE container / emergency muster location
- Relay real-time status of:
  - Stand condition
  - Alarm readings
  - FireX deployment
  - Personnel accountability

The Safety Officer shall maintain command oversight until the stand is returned to a safe state.

11 COMPROMISED SAFETY SYSTEMS & SCAPE ENTRY

If stand safety systems are suspected to be compromised, including:

- Loss of sensor reliability
- Loss of control authority
- Inability to confirm valve or system state

Then:

- SCAPE PPE is mandatory for any entry.
- Entry is permitted only to:

  - Verify safe state
  - Confirm no release of chemical agents
- Portable gas detectors appropriate to the chemicals present shall be used.
- No corrective or repair actions are permitted during SCAPE verification entry.

12 Exclusion Zones & Re-Entry Restrictions

- The stand shall remain in an evacuated state during active hazards.
- No personnel may re-enter until:
  - Fire is confirmed extinguished
  - Systems are safed and passivated
  - Monitoring confirms no chemical release
  - Safety Officer grants clearance

13 13. Documentation & Reporting

Following stabilization:

- Record:
  - Timeline of the event
  - Smoke/fire source (if identified)
  - FireX deployment actions
  - Stand configuration and purge actions
  - Personnel locations and PPE posture
- A formal incident report shall be completed within **24 hours**.
- Root-cause analysis shall be initiated.
- Corrective actions shall be tracked to closure via QA processes.

14 Return-to-Operations Authorization

Operations may resume only when:

- The stand is confirmed in a safe state

- All hazards are eliminated
- Safety systems are verified operational
- Safety Officer grants clearance
- Test Director issues formal return-to-operations authorization

15 PROGRAM MAINTENANCE

This document shall be:

- Reviewed annually
- Updated following any smoke, fire, or electrical incident
- Revised upon system or facility changes