Sign-Off Procedure Required before Flowing Flammable Gas To or Turning High Voltage on the CDF Detector Subsystems

(this is a Safety Procedure)

This procedure outlines the steps to be taken to gain approval for flammable gas and high voltage initiation for individual detector subsystems.

Approvals:

(CDF Operations Head)	(Date)
(Particle Physics Division Head)	(Date)
(Accelerator Division Head)	(Date)

Revised 03/26/2008

Expires 03/26/2012

1.0 Controlled Copies of this procedure.

Two controlled copies of this procedure will exist.

One will be held in the CDF Operations Library.

The other will be on the CDF web page at

http://www-cdf.fnal.gov/htbin/cdfproc/listProc

All other copies will be marked, **"INFORMATIONAL COPY ONLY"**

2.0 The Procedure

This procedure is to be carried out as follows. The “Initial System Turn-On Checklist” is completed as described in Section 2.2 Part B of this procedure. This is required each time the detector is moved from the Assembly Hall to the Collision Hall or vice versa and any one subsystem will use Argon/Ethane gas in the new position. The Flammable Gas Sensor Sign-off Sheet must be completed following each detector move. The Crash Button, Shunt Trip, and FIRUS systems are physically undisturbed and need not be tested as a result of moving the detector. However, all four of these systems must be tested yearly as required by CDF II – Proc. 509, “CDF Procedure for Hazardous Atmosphere Alarm System Maintenance”.

After the “Initial System Turn-On Checklist” is approved, the “Detector Start-Up Checklist” may be completed for individual subsystems. The “Detector Start-Up Checklist” is completed as described in Section 2.1 Part A of this procedure. A new “Detector Start-Up Checklist” must be completed and signed each time the detector is moved to or from the Collision Hall or following any major gas system work. Once this checklist is signed for a particular subsystem, gas flow and high voltage for that subsystem may be initiated. At this point, the CDF Operations Manager is responsible to enforce the administrative control of the subsystem operation per Section 2.3 Part C of this procedure.

This procedure has three parts.

Part A is executed by a trained CDF Process Systems Tech with reporting requirements to the CDF Gas Systems Engineer, CDF Operations Head, or CDF Operations Engineer.

Part B is executed by the CDF Gas Systems Engineer, CDF Operations Head, or CDF Operations Engineer and contains restrictions on the detector subsystems in the event of a flammable gas leak or higher than normal oxygen concentration in a subsystem.

> Note: Throughout the remainder of this document, it shall be understood that the CDF Gas Systems Engineer's responsibilities may be alternately performed by either the CDF Operations Head or the CDF Operations Engineer.

Part C is executed by a CDF Operations Manager.

2.1. Procedure Part A:

A trained CDF Process Systems Technician executes Part A of this procedure for each detector subsystem before the CDF Gas Systems Engineer will give permission for flammable gas flow or high voltage. See Section 7.0 of this procedure regarding information on personnel trained to carry out Part A.

> **NOTE:** This procedure represents a minimal requirement for flammable gas and high voltage initiation. The Process Systems Technician or CDF Gas Systems Engineer may conduct any additional checks and should note those checks in the comments section of the check list.

A.1. The Process Systems Tech completes a copy of the "CDF Gas System: Detector Start-Up Checklist" in section 3.0.
The Process Systems Tech notes each exception to the check list along with the reason for the exception.
(A CDF Experimenter may assist the Process Systems Tech, but the Process Systems Tech is in charge and is responsible for the checklist.)

A.2. After completing the checklist, the Process Systems Tech obtains the signature of the CDF Gas Systems Engineer before initiating flammable gas flow.

A.3. The Process Systems Tech posts copies of the completed check list as follows:
a) on associated subsystem gas control panel on the gas platforms,
b) Note in the CDF Gas System electronic logbook.
c) A tag indicating flammable gas permission is placed on the control panel input hose.

The Process Systems Tech places the original check list in the CDF Operations Library in the CDF-II Procedure 13 Check List Notebook.

A.4. The Process Systems Tech must inform the CDF Gas Systems Engineer if **any** of the following conditions occur:

a) O2 concentration greater than 1000 ppm,

b) Leak rate greater than subsystem's allowable leak rate as documented in the "Detector Start-Up Checklist",

c) Lack of return bubbler bubbles,

d) LEL > 20% and this subsystem found to be the cause.

(Report to the CDF Operations Manager if the CDF Gas Systems Engineer cannot be contacted immediately.)

2.2. Procedure Part B:

The CDF Gas Systems Engineer is responsible for this part of the procedure.

B.1. The CDF Gas Systems Engineer must not authorize any gas flow until the "Initial Systems Turn-On Checklist" is signed by a CDF Operations Head. Put the completed checklist in the CDF-II Procedure 13 Check List Notebook.

B.2. After the Process Systems Tech completes each "Detector Start-Up Checklist:, the CDF Gas Systems Engineer signs the checklist form before allowing flammable gas flow and signs a second time before allowing high voltage on the detector subsystem.

B.2.a. Prior to allowing flammable gas flow, the subsystem high voltage is disabled and is to remain off until the subsystem 95% purge with flammable gas is complete. The CDF Operations Manager is responsible for disabling the subsystem high voltage. The CDF Gas Systems Engineer verifies that the Safety System Flammable Gas Alarms Panel switch settings in the Process Systems Control Room are appropriate for the desired overall system status. Permission to flow flammable gas shall be indicated as in section A.3.

The volume changes required to achieve a 95% purge varies from one subsystem to another and is a function of how a given subsystem is segmented. Reference CDF Note # 5488, *"Purging Serially Segmented Chamber Systems"*, authored by Patrick Lukens. The required volume changes for each CDF subsystem are documented in the Detector Start-Up Checklist table. Also included in the table are suggested purge flow rates. Several of the subsystems are able to achieve a 95% purge within a 24 hour period at the suggested rates. These rates have proven to be successful in that the subsystem supply pressures are acceptable. One obvious exception to the 24 hour purge period is the COT subsystem.

B.2.b. A signature is required from a subsystem representative before flammable gas flow is permitted. The purpose of this signature is two-fold. It confirms that the subsystem flammable gas chamber system has been physically unmodified during the inerting 95% purge prior to starting flammable gas flow and is a written acknowledgment that notification of flammable gas flow to their subsystem has been given.

B.2.c. Prior to allowing high voltage, the CDF Gas Systems Engineer verifies subsystem operating conditions. This includes checking that the subsystem O2 concentration is acceptable and that the 95% purge with flammable gas is complete. Notify the CDF Operations Manager of allowed high voltage conditions.

B.3. If any of the conditions in Part A, step A.4. are subsequently reported by the Process Systems Tech, the CDF Gas Systems Engineer makes a **written**

determination concerning the operating safety of the detector subsystem in question.

B.3.a. Such a determination may allow continued gas flow and continued high voltage during investigation, or continued gas flow with administrative shutdown of the high voltage on the detector. The Gas Systems Engineer is authorized to initiate shutdown by the shift crew but is to contact the CDF Operations Manager when this occurs.

B.3.b. **The written determination should be placed in the CDF Gas System electronic logbook and a report of the situation should be made to the CDF Operations Manager. An e-mail copy should be sent to the CDF Flammable Gas Committee and the CDF Operations Heads.**

B.3.c. If the CDF Gas Systems Engineer cannot verify the safety of the system, then permission to run the high voltage for the detector subsystem must be withdrawn.

B.3.d. Permission to operate is withdrawn by having the shift crew turn off the High Voltage to the detector subsystem. The operations manager must arrange to have the HV electrically disabled to the detector subsystem and tag out the HV to the detector subsystem. In some circumstances it may also be appropriate to turn off and tag out low voltage power systems. (see also Part C, Step C.2.) The following actions will be taken by the Process Systems Tech when permission to flow flammable gas is withdrawn:
(i) The signed checklist posted on the appropriate gas panel will be removed.
(ii) The tag indicating flammable gas permission will be removed from the control panel input hose and replaced with a dated “caution” tag indicating permission to flow flammable gas has been removed and by whom.
(iii) Flow of a nonflammable gas will be initiated by moving the hose tagged in (ii) above.

B.4. The CDF Gas Systems Engineer reinstates permission to reenergize high voltage only after the oxygen level or leak rate is reduced to acceptable levels, the Process Systems Tech completes a new checklist, and the results are posted as described in A.3.

2.3. Procedure Part C:

The CDF Operations Manager is responsible for this part of the procedure.

C.1. Once Flammable gas flow begins, the CDF Operations Manager enforces administrative control of the detector subsystem High Voltages in accordance with proper sign-offs from the CDF Gas Systems Engineer.

C.2. **If the Process Systems Tech reports any of the conditions listed in step A.4. when the CDF Gas Systems Engineer is not available, then the CDF Operations Manager must execute HV shutdown as described in step B.3.d.**

E-mail should be sent to the CDF Flammable Gas Committee summarizing the situation.

3.0 Checklists

3.1

The Process Systems Tech Checklist is on the following page. Copies of the checklist can be found inside the front pocket of the CDF-II Procedure 13 Check List Notebook.

Checklist Section Explanations:

1. Check Mechanical And Electrical Connections:
Verify that all mechanical and electrical connections to the system have been completed. Note especially that tubing is properly connected and is not kinked.

2. Verify Inerting Flow:
If the system requires an inerting flow, verify that this flow has been established.

Note: The COT and CMU require inerting flows before flammable gas flow may be initiated. All other chambers have no inerting system.

3. Verify System Purging:
Verify that the system has been purged with an inert gas for the number of volume changes required for the specific subsystem.

4. Check Oxygen Concentration
Measure the oxygen concentration in the system using the analyzer in relay rack RRG01. The system must be flowing at its documented normal flow rate. Also, the output bubbler must be bubbling or the oxygen concentration cannot be properly measured. Oxygen concentration must be less than 1000 ppm.

5. Check Leak Rate:
To measure the leak rate of a given system, reduce the inerting flow until the output bubbler just stops bubbling in order to measure the leak rate. The leak rate documented should be that measured by the electronic mass flowmeters.

Note: The maximum allowable system leak rate is documented in the “Detector Start-Up Checklist” for each subsystem. Leakage exceeding this rate requires that “large” leaks be located and repaired. Hand held flammable gas detectors may be used to help locate these leaks.

If the detector has sub-systems which utilize an input and output flow meter, the flow into and out of these sub-systems should be verified.

6. Ignition Sources:
Double check that there is no unusual activity (e.g., welding, soldering, brazing, grinding, etc.) being conducted in the vicinity of the detector system.

CDF Gas System:
Detector Start-Up Checklist

This Checklist Is For Which Detector Subsystem (Circle):
Normal Flow rates are shown as SCFH of Argon/Ethane Mix. Allowable **Leak** Rates (to be read by the subsystem supply electronic mass flowmeters) are shown below in SCFH for A/E and N2. The number of volume changes required (**VC req'd**) for a 95% purge are indicated. Suggested **Purge** flow rates in SCFH for achieving volume changes are shown. Each subsystem total **Volume** (cubic feet) is also listed.

System:	COT	SWA	NWA	CMU	TOP	BOT	NWX	SWX	NEX	SEX	IMU	NOT	CLC
Normal:	20.0	5.5	5.5	8.0	3.0	5.0	6.0	6.0	6.0	6.0	8.0	3.0	0.0
Leak(AE):	6.3	1.4	1.4	2.0	1.1	1.1	1.5	1.5	1.5	1.5	2.0	0.5	0.0
Leak(N2):	7.8	1.7	1.7	2.5	1.4	1.4	1.9	1.9	1.9	1.9	2.5	0.6	0.0
VC req'd:	3.0	1.7	1.7	2.2	1.7	1.7	1.7	1.7	1.7	1.7	1.4	1.7	NA
Purge:	40.0	15.0	15.0	25.0	8.0	15.0	10.0	10.0	10.0	10.0	20.0	6.0	NA
Volume:	600.0	195.8	190.4	289.9	108.8	176.8	132.0	132.0	120.0	120.0	324.0	88.0	11.0

1. **Check Mechanical And Electrical Connections**
__ System inspection completed.

2. **Verify Inerting Flow**
__ Inerting flow established. Note: COT system requires completion of the COT Inert Flow Checklist, see page 23.
__ System does not require inerting flow

3. **Verify System Purging**
__ System was sufficiently purged with the required volume changes of Nitrogen.
Note: The CLC system is to be inerted per CDF-II Proc. 318.

4. **Check Oxygen Concentration**
Gas return line measured; oxygen level was _____ ppm O2

5. **Check Leak Rate**
__ System leak rate was measured and found to be _____ SCFH.
__ Above number (in SCFH) is less than allowable leak rate for flowing gas (AE or N2) as documented above.

6. **Ignition Sources**
__ No unusual ignition sources are present.

COMMENTS/EXCEPTIONS:

Checklist completed by:_____ Date: _____

Acknowledgement of
Subsystem Start-Up by:_____ Date: _____
(Subsystem Representative)
Permission for Detector
Gas Flow given by:_____ Date: _____
(CDF Gas Systems Engineer)
Permission for Detector
High Voltage given by:_____ Date: _____
(CDF Gas Systems Engineer)

3.2

The Gas Systems Engineer Checklist is on the following page.

CDF Gas System:
Initial System Turn-On Checklist

1. _____Crash Button Testing Sign-Off Sheet has been completed (pp.17-18).
2. _____Shunt Trip Testing Sign-Off Sheet has been completed (p.19).
3. _____Flammable Gas Sensor Sign-Off Sheet has been completed (pp.20-21).
4. _____FIRUS Testing Sign-Off Sheet has been completed (p.22).
5. _____Items 1 - 4 have been placed in the CDF-II Procedure 13 Check List Notebook.
6. _____Approval has been given by the Flammable Gas Safety Committee.
7. _____Approval has been given by the Particle Physics Division Head.
8. _____Approval has been given by the Accelerator Division Head.
9. _____Items 6 - 8 have been placed in the CDF Operational Readiness Clearance documentation.
10. The following CDF Group Supervisors have been notified of Flammable Gas Flow and reminded of the restrictions on ignition sources (welding, soldering, brazing, grinding, etc.) in the areas affected:
    _____CDF Operations Manager
    _____CDF Building Manager
    _____CDF Process Systems Supervisor
    _____CDF Operations Engineer
    _____CDF Operations Head

COMMENTS:

CHECK LIST EXCEPTIONS: (List each exception and state reason)

Checklist
Completed by:_____Date: _____
(CDF Gas Systems Engineer)

Permission for Gas
Systems Flow given by:_____Date: _____
(CDF Operations Head)

4.0 Deviations

None are allowed.

5.0 Required Training and Authorized Training Personnel.

A. Process Systems Tech training

Training is required.

Authorized training personnel:
CDF Gas Systems Engineer

The training should be documented on a standard Fermilab Training Form and the Training Expiration date should be tied to the end date of the Collider Run (e.g. "the end of Collider Run II").
The completed forms must be inserted in the CDF Operations Library copy of this procedure.

B. CDF Gas Systems Engineer, CDF Operations Head, CDF Operations Engineer, and CDF Operations Manager training

Read Sections 2 and 3 of this procedure with a CDF Operations Head.

The training should be documented on a standard Fermilab Training Form and the Training Expiration date should be tied to the end date of the Collider Run (e.g. "the end of Collider Run II").
The completed forms must be inserted in the CDF Operations Library copy of this procedure.

6.0 Training Materials.

No written materials exist.

One of the authorized training personnel must give a training lecture using sections 2 and 3 of this procedure.

This lecture must include a tour with stops and instruction at:

1. CDF Gas Systems Monitoring View Node and the oxygen analyzer.
2. CDF 720' and 730' Gas Platforms.
3. Hand held flammable gas detector.

7.0 List of Trained People for this procedure.

Eventually the list may reside in a lab-wide database.

Until that time, a list of trained personnel for this procedure should be kept in the CDF Operations Library of the procedure in a separate section at the end of the procedure.

8.0 References and Supporting Documentation.

For layout of the subsystem gas distribution area piping and instrumentation, see the following Fermilab drawings:

(1) 2563.9-ME-194461, CDF-Gas Flow Schematic, Platform (730 ft.)
(2) 2563.9-ME-194462, CDF-Gas Flow Schematic, Platform (720 ft.)
(3) 2563.372-MD-382228, CDF-CLC Piping and Instrumentation Diagram

9.0 Sign-Off Sheets.

The following pages contain the sign-off sheets required to complete this procedure.

CDF Collision Hall, Assembly Hall, and Storage Shed Crash Button Testing Sign-Off Sheet

The crash button actions taken for any of those located in the Collision Hall and Assembly Hall / Assembly Building are the same. However, the actions taken depend on the detector location. The detector location is designated with a switch located on Relay Rack 1 in the Process Systems Control Room.

The following actions occur when the detector is positioned in the Collision Hall:

(1) Disables all detector power (both 60 Hz and 400 Hz) and the detector high voltage power supplies in the first floor counting room. Utility power (lights, etc.) is left on.
(2) Disables the flow of argon/ethane into the CDF building.
(3) Places the collision hall ventilation system into purge mode.
(4) Sounds the collision hall evacuate alarm.
(5) Notifies FIRUS of a collision hall alarm.

The following actions occur when the detector is positioned in the Assembly Hall:

(1) Disables all detector power (both 60 Hz and 400 Hz) and the detector high voltage power supplies in the first floor counting room. Utility power (lights, etc.) is left on.
(2) Disables the flow of argon/ethane into the CDF building.
(3) Places the assembly hall ventilation system into purge mode.
(4) Sounds the assembly hall evacuate alarm.
(5) Notifies FIRUS of an assembly hall alarm.

The crash button actions taken for the Gas Storage Shed differs from that of the Collision Hall and Assembly Hall. They are as follows:

(1) Disables the flow of argon/ethane into the CDF Building.
(2) Disables the flow of argon/ethane into the Gas Storage Shed.
(3) Notifies FIRUS of a Gas Storage Shed alarm.

The following crash buttons have been tested and are functional:

Crash Button	**Date Tested**
Collision Hall NW	
Collision Hall SE	
2nd Floor Control Room	
Assembly Hall Main Floor SW entry	
Gas Rack RRG03 Main Emergency	
Gas Storage Shed	

Attest:

CDF Gas Systems Engineer (Date)

CDF Operations Head (Date)

CDF Detector System Shunt Trip Testing Sign-Off Sheet

The electric power shutoff safety system triggers shunt trips in the following systems:

System	**Panel #**
60 Hz to the high voltage racks	PP-B0-3A, PP-B0-3B
400 Hz power	MG-1, MG-2, & MG-3 Output Breakers
* Experimental detector 60 Hz	Breaker PP-B0-8 and Breaker PP-B0-11 located in Panel PHP-B0-2. Breaker PHP-B0-7 located in Panel DHP-B0-2.

The shunted breakers in the following panels physically tripped when a crash button was pressed:

Panel	**Date Tested**
PP-B0-3A	
PP-B0-3B	
MG-1 Output Breaker	
MG-2 Output Breaker	
MG-3 Output Breaker	
Breaker PP-B0-8 in Panel PHP-B0-2	
Breaker PP-B0-11 in Panel PHP-B0-2	
Breaker PHP-B0-7 in Panel DHP-B0-2	

Attest:

_____

CDF Gas Systems Engineer (Date)

_____

CDF Operations Head (Date)

Note: For information on which events trigger the electric power shutoff safety system, please refer to *Operation of the CDF Hazardous Atmosphere Safety System*.

* 60 Hz collision hall building power is not affected by the electric power shutoff safety system.

CDF Collision Hall, Detector System, and Gas Storage Shed Flammable Gas Sensors Sign-Off Sheet

The following collision hall, detector system, and gas storage shed flammable gas sensors have been calibrated and are functional. Two oxygen sensors used for COT inert flow monitoring are included as well.

Safety System Tag Name	Location	Zero & Span Calibration Date
F_AT_COT_E_OXY	Gas Racks: COT Inert O2 Sensor	
F_AT_IMU_SE	Collision Hall: IMU South East	
F_AT_COT_INERT_R	Gas Racks: COT Inerting, East and West	
F_AT_IMU_SW	Collision Hall: IMU South West	
F_AT_CLC_E	Collision Hall: CLC East	
F_AT_CMEX_NW_BOT	Collision Hall: CMEX Tower, NW bottom	
F_AT_CD_E_TOP	Central Detector: Top East, by Notch	
F_AT_CMEX_NE_BOT	Collision Hall: CMEX Tower, NE bottom	
F_AT_ARCH_N_CENT	Central Detector: North Arches Center	
F_AT_CMEX_SW_BOT	Collision Hall: CMEX Tower, SW Bottom	
F_AT_CRAWL_E	Central Detector: East Crawl Space	
F_AT_CMEX_SE_BOT	Collision Hall: CMEX Tower, SE Bottom	
F_AT_END_E_TOP	Central Detector: East End Wall above 30 deg. crack	
F_AT_CMP_SE_TOP	Collision Hall: CMP Wall, SE Top	
F_AT_END_W_BOT	Central Detector: West End Wall below 30 deg. crack	
F_AT_STOR_C_TOP	Storage Shed: Center Top	
F_AT_IMU_NE	Collision Hall: IMU North East	
F_AT_COT_W_OXY	Gas Racks: COT Inert O2 Sensor	
F_AT_IMU_NW	Collision Hall: IMU North West	
F_AT_COT_INERT_L	Gas Racks: COT Inerting, East and West	
F_AT_CMEX_NW_TOP	Collision Hall: CMEX Tower, NW Top	
F_AT_CLC_W	Collision Hall: CLC West	
F_AT_CMEX_NE_TOP	Collision Hall: CMEX Tower, NE Top	
F_AT_CD_C_TOP	Central Detector: Top Center, under cable trays	
F_AT_CMEX_SW_TOP	Collision Hall: CMEX Tower, SW Top	
F_AT_ARCH_S_CENT	Central Detector: South Arches Center	
F_AT_CMEX_SE_TOP	Collision Hall: CMEX Tower, SE Top	
F_AT_END_E_BOT	Central Detector: East End Wall below 30 deg. crack	
F_AT_CMP_SW_TOP	Collision Hall: CMP Wall, SW Top	

F_AT_CRAWL_W	Central Detector: West Crawl Space	
F_AT_STOR_W_BOT	Storage Shed: West Bottom	
F_AT_END_W_TOP	Central Detector: West End Wall above 30 deg. crack	
F_AT_CMP_NW_TOP	Collision Hall: CMP Wall, NW Top	
F_AT_CMP_NE_TOP	Collision Hall: CMP Wall, NE Top	
F_AT_STOR_E_BOT	Storage Shed: East Bottom	
F_AT_STOR_C_BOT	Storage Shed: Center Bottom	
F_AT_710	710’ Platform	
F_AT_720	720’ Platform	
F_AT_730	730’ Platform	

Attest:

CDF Gas Systems Engineer (Date)

CDF Operations Head (Date)

CDF Collision Hall, Assembly Hall, and Storage Shed FIRUS Testing Sign-Off Sheet

The FIRUS system is sent a high level leak alarm whenever any of the flammable gas detectors read greater than 20% LEL. Three FIRUS signals in the CDF Building area exist. One is for the Gas Storage Shed located directly south of CDF. A second signal is for the CDF Assembly and Collision Halls when the detector is in the Collision Hall. The third signal is again for the CDF Assembly and Collision Halls, but is for when the detector is in the Assembly Hall.

The following FIRUS signals have been tested and are functional with relation to the flammable gas detection system.

FIRUS Signal	**Date Tested**
Gas Storage Shed	
Detector in Collision Hall	
Detector in Assembly Hall	

Attest:

CDF Gas Systems Engineer (Date)

CDF Operations Head (Date)

COT Inert Flow Sign-Off Sheet

The COT inert flow is metered through Dwyer flow controllers. Each quadrant of each end of the COT uses four controllers. Their flow is directed to the 1½, 3½, 5½, and 7½ superlayers. Each of the flow controllers listed below have been set to their designated values. Note that the flow rates required have been corrected for the pressures expected at the controllers.

Verify that COT Inert supply flows (read on FI-4502 and FI-4901) on the 730' platform are each set to 480 scfh Nitrogen.

SUPERLAYER	7_1/2	5_1/2	3_1/2	1_1/2
REQUIRED DWYER SETTING	41 CFH	34 CFH	26 CFH	18 CFH
EAST END TOP RIGHT QUADRANT				
EAST END BOTTOM RIGHT QUADRANT				
EAST END BOTTOM LEFT QUADRANT				
EAST END TOP LEFT QUADRANT				
WEST END TOP RIGHT QUADRANT				
WEST END BOTTOM RIGHT QUADRANT				
WEST END BOTTOM LEFT QUADRANT				
WEST END TOP LEFT QUADRANT				

The COT Inert Sampling System is wired, calibrated, and tested to show that Oxygen sensors (F_AT_COT_E_OXY and F_AT_COT_W_OXY) and Flammable Gas Sensors (F_AT_COT_INERT_R and F_AT_COT_INERT_L) are operating properly.	DATE TESTED

Attest:

CDF Gas Systems Engineer (Date)

CDF Operations Head (Date)