AUG 21 1996
Sta.4 58

ENGINEERING DATA TRANSMITTAL

1. EDT 616340

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
W-030 Test Review Board	Project W-030, Tank Farm Projects	614739
5. Proj./Prog./Dept./Div.: Project W-030	6. Cog. Engr.: FT Clifton	7. Purchase Order No.: N/A
8. Originator Remarks: Approval of W-030 pre-operational test procedure by W-030 Test Review Board (TRB).		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: AY/AZ TANK FARMS
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: July 26, 1996

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-W030-POTP-007	-	0	W030 AY/AZ TANK FARM PREOP. TEST, VENT BLDG VENT SYSTEM	ESQ	1	1	

16. KEY

Impact Level (F)	Reason for Transmittal (G)		Disposition (H) & (I)	
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.
1	1	Cog. Eng. FT CLIFTON [signature] 7-19-96			
1	1	Cog. Mgr. KA COLOSI [signature] 8/20/96	SR PIERCE [signature]	1	1
1	1	QA HM CHAFIN [signature] 8-13-96	GP HOPKINS [signature] 7/30/96	1	1
			TG HOWELL [signature] 7/22/96	1	1
1	1	Env. GC CRUMMEL [signature] 8/14/96	KA EALDEN [signature]	1	1
1	1	Safety WP NELSON [signature] 7/29/96			

18.	19.	20.	21. DOE APPROVAL (if required)
[signature] 7-19-96 Signature of EDT Originator / Date	[signature] 8/20/96 Authorized Representative for Receiving Organization / Date	[signature] 8/20/96 Cognizant/Project Engineer's Manager / Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

BD-7400-172-2 (07/91) GEF097

PREOPERATIONAL TEST, VENT BUILDING VENTILATION SYSTEM

FT Clifton
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 616340 UC: 2030
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Key Words: PROJECT W-030, TEST, VENTILATION, COOLING, UPGRADE

Abstract: Preoperational Test Procedure for Vent Building Ventilation System, Project W-030. Project W-030 provides a ventilation upgrade for the four Aging Waste Facility tanks.

The Vent Building ventilation system provides ventilation, heating, cooling, and zone confinement control for the W-030 Project Vent Building.

The tests verify correct system operation and correct indications displayed by the central Monitor and Control system.

Release Approval   Date 8/20/96

DATE: AUG 21 1996
HANFORD RELEASE
STA: 4   ID: 58

Release Stamp

Approved for Public Release

Revision No. 0 Effective Date ________

Author/Cognizant Engineer

T.G. HOWELL
Print Name/Signature

APPROVAL DESIGNATOR SQ

PROCEDURE APPROVAL BY TEST REVIEW BOARD (TRB)

TRB Chair	Date 7-19-96	TWRS Operations	Date 7-31-96
TWRS Engineering	Date 8/1/96	TWRS Safety	Date 7-30-96
Construction Projects Startup	Date 22 July 96	Quality Assurance	Date 8-13-96
Project Management	Date 8/20/96	N/A ICF-KH Construction	Date

The original signatures are on file.

TABLE OF CONTENTS PAGE

1.0 PURPOSE

1.1 This procedure has been prepared to verify the Ventilation Building Ventilation System and the Stack Monitor System operates in accordance with system design.

2.0 INFORMATION

2.1 SCOPE

2.1.1 This procedure will demonstrate the operation of the following in the Ventilation Building Ventilation System:

- Exhaust Train controls and monitoring,filter pressure differential monitoring and alarms, damper controls and interlocks, and fan controls, interlocks and performance.
- Vent Building air conditioning unit operation, Vent Building room pressure monitoring and controls.
- Vent Building ventilation stack monitor operation, controls and alarms.

2.1.2 The Ventilation Building Ventilation system and the Stack Monitor System interface with each other and the Monitoring and Control System.

2.1.3 This procedure will demonstrate the operation of system interlocks and controls both local and remote as applicable.

2.2 TERMS AND DEFINITIONS

2.2.1 HS - Hand Switch
2.2.2 LOI - Local Operator Interface device
2.2.3 MCS - Monitoring Control system
2.2.4 PCL - Process Logic Control
2.2.5 PI - Pressure Indicator
2.2.6 POTP - Preoperational Testing Procedure

2.3 RESPONSIBILITIES

2.3.1 The Craft (TWRS Maintenance and/or Construction Forces) personnel are responsible for:

- Providing assistance during POPT testing.
- At least one technician must be a qualified "source user" per WHC-CM-4-14, part 1, section 2.3, to support this test.

2.3.2 Test Director (TD) responsibilities:

- Provides the equipment found in STEP 4.8 of this POTP.
- Safe and productive accomplishment of the tests necessary to achieve startup.
- Ensure safe working conditions and practices.
- Ensure compliance with test documents, Operational Safety Requirements/Documents (OSRs/OSDs) during testing.
- Communicate and coordinate the tests with the East Tank Farm Shift Manager.
- Ensure appropriate review/approval of any modifications to test procedures are completed prior to returning to work
- Direct line of communication and centralized point of control during normal, abnormal, and casualty situations.
- Conducts pre-job planning meeting as necessary.
- Scheduling/rescheduling of the test as required.
- Delegates any of the above responsibilities as needed to a deputy.

2.3.3 The Test Engineering Personnel (TEP) responsibilities:

- Providing technical support during testing.
- Providing programming support during testing.
- Forcing data in PLC program during testing.
- Direct preoperational testing
- Review test documents to validate acceptance
- Prepare post testing documents
- Records equipment status and data per this procedure.
- Conducts pre-job system walkdown.

2.3.4 Operations Personnel (OP) responsibilities:

- Observing test activities for training purposes.

2.3.5 Quality Control (QC) responsibilities:

- Witnessing the performance of the test procedure.

2.4 CHANGE CONTROL

2.4.1 Test procedure administrative or editorial changes required during testing may be accommodated as exceptions in the released test report, if the changes will not affect operating facility safety, function, or performance and will not compromise or influence test data. Requirement changes, changes to acceptance criteria, or changes to Danger, Caution, Special Precautions, or other safety or evironmental instructions in test procedures prepared as supporting documents must be made by engineering change notice.

2.5 EXCEPTIONS

2.5.1 Exceptions to results or to the test procedure will be given a sequential number and recorded on Attachment M, Test Exception log sheet. A test exception report, Attachment L, will be filled out to record and disposition each test exception.

2.6 REFERENCES

2.6.1 The following documents were used to write or are referenced in this procedure:

- Project W-030 Startup Test Plan Rev 0, WHC-SD-W030-SUP-003
- H-2-131073 Rev 1, Sht 1 and 2, AZ702 Vent Bldg. Vent Sys.
- H-2-131077-1, Rev. 1, Sht 1 of 1, AZ702 Vent Bldg. Vent Sys.
- H-2-131081 Rev 1, Sht 1 of 1, AZ702 Vent Bldg. Vent Sys.
- Tank Farm Ventilation Upgrade, W-030-C2
- Tank Farm Ventilation Upgrade, W-030-C3
- W-030-P04

2.7 ENVIRONMENTAL

2.7.1 Hazardous and mixed waste should be disposed of according to TO-100-052, or by calling Environmental Waste Operations at 372-1208.

2.8 SAFETY

Warning - In addition to contamination hazards, operators should be aware of the possibility of coming into contact with poisonous snakes and spiders.

2.8.1 The following administrative procedures control work performed in this POTP:

- Safety Manual, WHC-CM-1-10
- Industrial Hygiene Manual, WHC-CM-1-11.
- Tank Farm Health and Safety Plan, (HASP) WHC-SD-WM-HSP-002

2.9 RADIATION AND CONTAMINATION CONTROL

2.9.1 The work covered by this procedure is performed outside of the tank farm and does not require entry into a radiation/contamination control area.

2.9.2 When using the check sources, follow the precautions listed in the "source user briefing" sheet.

2.10 QUALITY ASSURANCE

2.10.1 No Quality Assurance witness, holdpoints or verifications are required in this procedure. Quality Assurance shall review and approve the test procedure, the final test report and the disposition of all test exceptions.

2.11 GENERAL INFORMATION

2.11.1 None

2.12 LIMITS AND PRECAUTIONS

2.12.1 If during performance of this procedure, any of the following conditions are found, **immediately** notify the assigned TD and TEP:

- Any equipment malfunction which could prevent fulfillment of it's functional requirements.
- Personnel error or procedural inadequacy which could prevent fulfillment of procedural requirements.

2.12.2 The TD and TEP may choose to stop work and place equipment in a safe condition based on the significance of the malfunction, error or inadequacy.

2.12.3 Contact TD and TEP for additional instructions if changing plant conditions affect work or delays in work extend past end of the (testing) shift.

2.12.4 If any waste is generated during performance of this instruction consult Facility/Plant/Area Hazardous Waste Coordinator for specific instructions to ensure compliance with WHC and DOE environmental standards, as applicable, for correct disposal.

2.12.5 Comply with WHC and plant/facility specific lock and tag or over-tagging requirements, as applicable.

2.12.6 All Measuring and Test Equipment (M&TE) used during performance of this procedure to collect qualitative data with the **exception** of "timing devices", shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label.
- Be capable of the desired range.
- Have an accuracy (consistent with state-of-the-art limitations) equal to or greater than the accuracy specified in the procedure.

2.12.7 Timing measurements shall be made with commercially available timing devices.

2.12.8 The Test Engineer has overall control of the testing process and change record authorization for this POTP. The Test Engineer is responsible for conducting the test, data collection, and ensuring compliance with all POTP requirements.

2.12.9 All test data readings are to be taken and recorded for each location where the capability exists (i.e. local instrument, LOI, OS).

3.0 RECORDS

3.1 This POTP as well as all completed attachments/appendices will be filed as a permanent test record.

4.0 PREREQUISITES

NOTE: Unless otherwise specified, prerequisite actions may be performed in any order.

4.1 Perform a pretest briefing for all personnel involved in the performance of this POTP.
Test Director ______________________

4.2 Perform a walkdown inspection of the systems tested by this POTP.
Test Engineer ______________________

4.3 Communication between the control room and equipment locations has been verified.
Test Director ______________________

4.4 The official POTP copy and all other photocopies that will be used during testing have been verified to be the latest approved/released document revision.
Test Director ______________________

4.5 The Test Engineer has verified, by reviewing the TAG LOGBOOK and walkdown of RWS systems being tested, that all components within and including the test boundary have been "BLUE" tagged.
Test Engineer ______________________

4.6 All open items have been evaluated and verified to not affect the POTP performance (Quality Assurance Nonconformance Reports <NCRs>, Construction Punch Lists, outstanding Engineering Change Notices <ECNs>, Startup-originated Design Change Requests <CRs>, Test Deficiency Reports, and Master System Punch List items).
Test Director ______________________

4.7 All personnel who will be involved with this procedure have provided the required signature verification information in Attachment J.
Test Director ______________________

4.8 Verify that the vent cell roof hatch has be closed and sealed.

Test Director ____________________

4.9 EQUIPMENT/INSTRUMENTS

4.9.1 Digital Multi Meter
Manufacturer: __________ Model No.______
Serial No. ______ Calibration Date ______
Calibration Due Date ______

4.9.2 Checkout the "check sources" from the HPT office when needed for performing the portion of this test applicable to the Beta Monitor.

5.0 PROCEDURE

5.1 The Vent Building Ventilation System testing shall be performed using Attachments A through H of this procedure.

5.2 The Vent Building Stack Monitor System testing shall be performed using Attachment I of this procedure.

ATTACHMENT A

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Appendix A.

Test Engineer ______________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Appendix B.

Test Engineer ______________________ Date __________

2 PROCEDURE

2.1 **SELECT** Damper MK-AZ702K3-2A **NORMAL** on MCS graphic 20BldExh.v.

2.2 **SELECT** Damper MK-AZ702K3-2A **AUTO** on MCS graphic 20BldExh.v.

2.3 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.4 **VERIFY** the following:

- Damper MK-AZ702K3-2A stays **CLOSED**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2A

Test Engineer ______________________ Date __________

2.5 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.6 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.7 **VERIFY** the following:

- Damper MK-AZ702K3-2A **OPENS**.
- MCS indicates **OPEN** for Damper MK-AZ702K3-2A

Test Engineer ______________________ Date __________

2.8 **SIMULATE** a pressure differential >1.5" w.c. at PDE-AZ702K303-1A.

2.9 **VERIFY** that Damper MK-AZ702K3-2A stays **OPEN**.

Test Engineer ______________________ Date __________

2.10 **REMOVE** simulation from PDE-AZ702K303-1A.

2.11 **SIMULATE** a pressure differential >5" w.c. at PDE-AZ702K304-1A.

2.12 **VERIFY** that Damper MK-AZ702K3-2A stays **OPEN**.

Test Engineer ____________________________ Date ____________

2.13 **REMOVE** simulation from PDE-AZ702K304-1A.

2.14 **SIMULATE** a high radiation level at RE-AZ702K3-1.

2.15 **VERIFY** that Damper MK-AZ702K3-2A stays **OPEN**.

Test Engineer ____________________________ Date ____________

2.16 **SELECT** Damper MK-AZ702K3-2B **NORMAL** on MCS graphic 20BldExh.v.

2.17 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.18 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.19 **SELECT** Exhaust fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.20 **SELECT** Exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.21 **SELECT** Exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.22 **VERIFY** the following:

- Damper MK-AZ702K3-2A **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2A

Test Engineer ____________________________ Date ____________

2.23 **REMOVE** simulation from RE-AZ702K3-1.

2.24 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.25 **SELECT** exhaust fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.26 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.27 **SELECT** Damper MK-AZ702K3-2B **CLOSE** on MCS graphic 20BldExh.v.

2.28 **OPEN** Damper MK-AZ702K3-2A by selecting **OPEN** on MCS graphic 20BldExh.v.

2.29 **SIMULATE** a pressure differential >1.5" w.c. at PDE-AZ702K303-1A.

2.30 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.31 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.32 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.33 **SELECT** exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.34 **VERIFY** the following:

- Damper MK-AZ702K3-2A **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2A

Test Engineer ______________________ Date __________

2.35 **REMOVE** simulation from PDE-AZ702K303-1A.

2.36 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.37 **SELECT** exhaust fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.38 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.39 **SELECT** Damper MK-AZ702K3-2B **CLOSE** on MCS graphic 20BldExh.v.

2.40 **OPEN** Damper MK-AZ702K3-2A by selecting **OPEN** on MCS graphic 20BldExh.v.

2.41 **SIMULATE** a pressure differential >5" w.c. at PDE-AZ702K304-1A.

2.42 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.43 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.44 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.45 **SELECT** exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.46 **VERIFY** the following:

- Damper MK-AZ702K3-2A **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2A

Test Engineer ______________________ Date ____________

2.47 **REMOVE** simulation from PDE-AZ702K304-1A.

2.48 **SELECT** exhaust fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.49 **SELECT** Damper MK-AZ702K3-2B **CLOSE** on MCS graphic 20BldExh.v.

2.50 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

2.51 **SELECT** Damper MK-AZ702K3-2A **AUTO** on MCS graphic 20BldExh.v.

Appendix A

Electrical Line-up

BREAKER/SWITCH NO.	BREAKER/SWITCH LOCATION	REQUIRED POSITION
1	Vent Bldg. Exhaust Fan AZ702-K3-5-1A in Panelboard PP-16 located in E/I Room	CLOSED
2	Vent Facility Panelboard PP-5 in E/I Room	CLOSED
3	Vent Bldg. Air Conditioning Unit AZ702-K2-6-1 in Panelboard 16 in E/I Room.	CLOSED
4	Vent Bldg. Exhaust Fan AZ702-K3-5-1B in Panelboard PP-16 located in E/I Room	CLOSED

Appendix B

Damper/Valve Line-up

DAMPER/VALVE NO.	LOCATION	REQUIRED POSITION
MK-AZ702K3-1A	Filter Train A inlet isolation damper located in building filter room.	OPEN
MK-AZ702K305-1A	Exhaust Fan AZ702-K3-5-1A Discharge Damper located in building filter room.	OPEN
HV-AZ702K3-1A1	PDE-AZ702K303-1A Isolation valve located in building filter room.	OPEN
HV-AZ702K3-1A2	PDE-AZ702K303-1A/PDE-AZ702K304-1A Isolation valve located in building filter room.	OPEN
HV-AZ702K3-1A3	PDE-AZ702K304-1A Isolation valve located in building filter room.	OPEN
MK-AZ702K3-1B	Filter Train B inlet isolation damper located in building filter room.	OPEN
MK-AZ702K305-1B	Exhaust Fan AZ702-K3-5-1B Discharge Damper located in building filter room.	OPEN
HV-AZ702K3-1B1	PDE-AZ702K303-1B Isolation valve located in building filter room.	OPEN
HV-AZ702K3-1B2	PDE-AZ702K303-1B/PDE-AZ702K304-1B Isolation valve located in building filter room.	OPEN
HV-AZ702K3-1B3	PDE-AZ702K304-1B Isolation valve located in building filter room.	OPEN
HV-AZ702K2-1A	PDE-AZ702K2-1 Isolation valve located in Stack Monitor room.	OPEN
HV-AZ702K2-2A	PDE-AZ702K2-2 Isolation valve located in Stack Monitor room.	OPEN

DAMPER/VALVE NO.	LOCATION	REQUIRED POSITION
HV-AZ702K2-3A	PDE-AZ702K2-3 Isolation valve located in Stack Monitor room.	OPEN
HV-AZ702K3-1A	PDE-AZ702K3-1 Isolation valve located in Stack Monitor room.	OPEN
HV-AZ702K3-1B	PDE-AZ702K3-1 Isolation valvelocated in Filter Room B.	OPEN
HV-AZ702K204-1A	PDE-AZ702K204-1 Isolation valve located in Primary Vent Filter Room A.	OPEN
HV-AZ702K204-1B	PDE-AZ702K204-1 Isolation valve located in Primary Vent Filter Room A.	OPEN
HV-AZ702K204-2A	PDE-AZ702K204-2 Isolation valve located in Primary Vent Filter Room B.	OPEN
HV-AZ702K204-1B	PDE-AZ702K204-2 Isolation valve located in Primary Vent Filter Room B.	OPEN

ATTACHMENT B

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Attachment A, Appendix A.

Test Engineer ______________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ______________________ Date __________

2 PROCEDURE

2.1 **Fan AZ702-K3-5-1A Control from Local control switch HS-AZ702K305-1A1.**

2.1.1 **OPEN** manual damper MK-AZ702K3-1A.

Test Engineer ______________________ Date __________

2.1.2 **OPEN** manual damper MK-AZ702K305-1A.

Test Engineer ______________________ Date __________

2.1.3 **VERIFY** local control switch HS-AZ702K305-1A1 in the STOP position.

Test Engineer ______________________ Date __________

2.1.4 **SET** fan AZ702-K3-5-1A flow control FIC-702K3-3A to 925 scfm on MCS graphic 20BldExh.v..

2.1.5 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.1.6 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.1.7 **SELECT** Air Conditioning Unit AZ702-K2-6-1 **AUTO** on MCS graphic 20BldExh.v.

2.1.8 **SELECT** Exhaust Fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

2.1.9 **SELECT** Exhaust Fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.1.10 **SELECT** Exhaust Fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.1.11 **VERIFY** that fan AZ702-K3-5-1A does **NOT START**.

Test Engineer ______________________ Date __________

2.1.12 **PLACE** local control switch HS-AZ702K305-1A1 in the **START** position.

2.1.13 **VERIFY** the following:

2.1.13.1 Exhaust Fan AZ702-K3-5-1A **STARTS**.
2.1.13.2 Air Conditioning Unit AZ702-K2-6-1 **STARTS**.

Test Engineer ______________________ Date __________

2.1.14 After a stabilization period of 15 minutes **RECORD** the following data:

2.1.14.1 for exhaust fan AZ702-K3-5-1A:

Motor Current	________	Amps. (II-702K35-1A)
Motor Voltage	________	Volts. (M. & T. E.)
Total Airflow	________	cfm (FIC-702K3-3A)

2.1.14.2 for air conditioning unit AZ702-K2-6-1:

Motor Current	________	Amps. (M. & T. E.)
Motor Voltage	________	Volts. (M. & T. E.)
Total Airflow	________	cfm (M. & T. E.)

2.1.15 Allow exhaust fan AZ702-K3-5-1A to operate for sufficient length of time needed to obtain system air flow, vibration and bearing temperature data. **RECORD** on Exhibit A data sheets.

2.1.16 **SELECT** Exhaust Fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.1.17 **VERIFY** that exhaust fan AZ702-K3-5-1A does **NOT STOP**.

Test Engineer ______________________ Date __________

2.1.18 **SIMULATE** an air flow <200 cfm at FIT-702K3-3A.

2.1.19 **VERIFY** that exhaust fan AZ702-K3-5-1A does **NOT STOP**.

Test Engineer ______________________ Date __________

2.1.20 **REMOVE** simulation from FIT-702K3-3A .

Test Engineer ______________________ Date __________

2.1.21 **PLACE** local control switch HS-AZ702K305-1A1 in the **STOP** position.

2.1.22 **VERIFY** the following:

2.1.22.1 Exhaust Fan AZ702-K3-5-1A **STOPS**.
2.1.22.2 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.

Test Engineer ______________________ Date __________

2.2 **Fan AZ702-K3-5-1A Control from MCS**

2.2.1 **SELECT** Damper MK-AZ702K3-2B **AUTO** on MCS graphic 20BldExh.v.

2.2.2 **SELECT** Exhaust Fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.2.3 **SELECT** Exhaust Fan AZ702-K3-5-1B **AUTO** on MCS graphic 20BldExh.v.

2.2.4 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

2.2.5 **SELECT** Damper MK-AZ702K3-2A **AUTO** on MCS graphic 20BldExh.v.

2.2.6 **PLACE** the local handswitch HS-AZ702K305-1A1 in **REMOTE**.

2.2.7 **SELECT** Exhaust Fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.2.8 **VERIFY** the following:

2.2.8.1 Damper MK-AZ702K3-2A **OPENS.**
2.2.8.2 Fan AZ702-K3-5-1A **STARTS**.
2.2.8.3 Air Conditioning Unit AZ702-K2-6-1 **STARTS**.

Test Engineer ______________________ Date __________

2.2.9 **SELECT** Exhaust Fan AZ702-K3-5-1A **OVERRIDE** on MCS graphic 20BldExh.v.

2.2.10 **SIMULATE** an air flow <200 cfm at FIT-702K3-3A.

2.2.11 **VERIFY** that exhaust fan AZ702-K3-5-1A does **NOT STOP**.

Test Engineer ______________________ Date __________

2.2.12 **SELECT** Exhaust Fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

2.2.13 **VERIFY** the following:

2.2.13.1 Exhaust fan AZ702-K3-5-1A **STOPS**.
2.2.13.2 Damper MK-AZ702K3-2A **CLOSES.**
2.2.13.3 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.
2.2.13.4 Exhaust fan AZ702-K3-5-1B **STARTS**.
2.2.13.5 Damper MK-AZ702K3-2B **OPENS.**
2.2.13.6 Air Conditioning Unit AZ702-K2-6-1 **RE-STARTS**.

Test Engineer ______________________ Date __________

2.2.14 **REMOVE** simulation from FIT-702K3-3A.

Test Engineer ______________________ Date __________

2.2.15 **SELECT** exhaust fan AZ702-K3-5-1A **AUTO** on MCS graphic 20BldExh.v.

2.2.16 **OPEN** circuit breaker no. 4 in Panelboard PP-16 to **SIMULATE** failure of exhaust fan AZ702-K3-5-1B.

2.2.17 **VERIFY** the following:

2.2.17.1 Exhaust fan AZ702-K3-5-1B **STOPS**.
2.2.17.2 Damper MK-AZ702K3-2B **CLOSES.**
2.2.17.3 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.
2.2.17.4 Exhaust fan AZ702-K3-5-1A **STARTS**.
2.2.17.5 Damper MK-AZ702K3-2A **OPENS.**
2.2.17.6 Air Conditioning Unit AZ702-K2-6-1 **RE-STARTS**.

Test Engineer ______________________ Date __________

2.2.18 **SELECT** exhaust fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.2.19 **VERIFY** the following:

- exhaust fan AZ702-K3-5-1A **STOPS**.
- damper MK-AZ702K3-2A **CLOSES.**

Test Engineer ______________________________ Date ___________

Exhibit A

System: Vent Bldg. Exhaust - Train A.	Fan No.: AZ702-K3-5-1A	Fan Type: Centrifugal
Drive Type: Belt.	Service: Vent Building Ventilation	

Equipment		Test Data	Design	Actual
Fan		Total Flow (cfm)	1000	
Make/Model	American Fan Co RB-303-3575-24	Disch. SP (ins. w.g.)		
Size		Suct. SP (ins. w.g.)		
Serial No.		Fan Total Press. (Ins. w.g.)		
		Fan RPM	3600	
Motor				
Make/Frame	Westinghouse /FR256T	RPM	1755	
Phase	3	Volts	230/460	
SF		FLA	46/23	
HP	2			

Vibration						
Location	Vertical		Horizontal		Axial	
	Disp. (Mils)	Vel. (Ins/sec)	Disp. (Mils)	Vel. (Ins/sec)	Disp. (Mils)	Vel. (Ins/sec)
Motor O/B						
Motor I/B						
Fan O/B						
Fan I/B						

Any supporting Pitot Traverse Data sheets and/or vibration spectrum printouts are to be appended to this data sheet.

ROOM/FILTER PRESSURE DIFFERENTIALS (ins. w.c)

PDI-702K2-1		PDI-702K2-7		PDI-702K24-2		PDI-702K34-1A	
PDIC-702K2-2		PDI-702K2-8		PDIC-702K3-1		PDI-702K33-1B	
PDIC-702K2-3		PDI-702K24-1		PDI-702K33-		PDI-702K34-1B	

ATTACHMENT C

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up in Attachment A, Appendix A.

Test Engineer ______________________________ Date ____________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ______________________________ Date ____________

1.3 **OPEN** manual damper MK-AZ702K3-1A.

Test Engineer ______________________________ Date ____________

1.4 **OPEN** manual damper MK-AZ702K305-1A.

Test Engineer ______________________________ Date ____________

1.5 **VERIFY** local control switch HS-AZ702K305-1A1 in the **REMOTE** position.

Test Engineer ______________________________ Date ____________

1.6 **SET** fan AZ702-K3-5-1A flow control FIC-702K3-3A960 scfm on MCS graphic 20BldExh.v.

1.7 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

1.8 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

1.9 **SELECT** Air Conditioning Unit AZ702-K2-6-1 **AUTO** on MCS graphic 20BldExh.v.

1.10 **SELECT** exhaust fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

1.11 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2 PROCEDURE

2.1 **START** the Building Vent System by selecting exhaust fan AZ702-K3-5-1A **START** command on MCS graphic 20BldExh.v.

2.2 **WAIT** 10 minutes for system to stabilize.

2.3 **SIMULATE** an increasing pressure differential at PDE-AZ702303-1A until PDAH-AZ702303-1A annunciates at the MCS.

2.4 **RECORD** pressure differential reading at PDI-AZ702303-1A.

PDI-AZ702303-1A ________Ins. w.c.(0.3 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.5 **INCREASE** pressure differential simulation at PDE-AZ702303-1A until PDAHH-AZ702303-1A annunciates at the MCS.

2.6 **RECORD** pressure differential reading at PDI-AZ702303-1A.

PDI-AZ702303-1A ________Ins. w.c.(0.5 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.7 **REMOVE** simulation from PDE-AZ702303-1A.

Test Engineer ______________________________ Date ____________

2.8 **SIMULATE** an increasing pressure differential at PDE-AZ702304-1A until PDAH-AZ702304-1A annunciates at the MCS.

2.9 **RECORD** pressure differential reading at PDI-AZ702304-1A.

PDI-AZ702304-1A ________Ins. w.c.(3.0 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.10 **INCREASE** pressure differential simulation at PDE-AZ702304-1A until PDAHH-AZ702304-1A annunciates at the MCS.

2.11 **RECORD** pressure differential reading at PDI-AZ702304-1A.

PDI-AZ702304-1A ________Ins. w.c.(5.0 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.12 **REMOVE** simulation from PDE-AZ702304-1A.

Test Engineer ______________________________ Date ____________

ATTACHMENT D

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Attachment A, Appendix A.

Test Engineer ________________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ________________________ Date __________

2 PROCEDURE

2.1 **SELECT** Damper MK-AZ702K3-2B **NORMAL** on MCS graphic 20BldExh.v.

2.2 **SELECT** Damper MK-AZ702K3-2B **AUTO** on MCS graphic 20BldExh.v.

2.3 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.4 **VERIFY** the following:

- Damper MK-AZ702K3-2B stays **CLOSED**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2B

Test Engineer ________________________ Date __________

2.5 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.6 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.7 **VERIFY** the following:

- Damper MK-AZ702K3-2B **OPENS**.
- MCS indicates **OPEN** for Damper MK-AZ702K3-2B

Test Engineer ________________________ Date __________

2.8 **SIMULATE** a pressure differential >1.5" w.c. at PDE-AZ702K303-1B.

2.9 **VERIFY** that Damper MK-AZ702K3-2B stays **OPEN**.

Test Engineer ________________________ Date __________

2.10 **REMOVE** simulation from PDE-AZ702K303-1B.

2.11 **SIMULATE** a pressure differential >5" w.c. at PDE-AZ702K304-1B.

2.12 **VERIFY** that Damper MK-AZ702K3-2B stays **OPEN**.

Test Engineer ______________________________ Date ___________

2.13 **REMOVE** simulation from PDE-AZ702K304-1B.

2.14 **SIMULATE** a high radiation level at RE-AZ702K3-1.

2.15 **VERIFY** that Damper MK-AZ702K3-2B stays **OPEN**.

Test Engineer ______________________________ Date ___________

2.16 **SELECT** Damper MK-AZ702K3-2A **NORMAL** on MCS graphic 20BldExh.v.

2.17 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.18 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.19 **SELECT** Exhaust fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.20 **SELECT** Exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.21 **SELECT** Exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.22 **VERIFY** the following:

- Damper MK-AZ702K3-2B **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2B

Test Engineer ______________________________ Date ___________

2.23 **REMOVE** simulation from RE-AZ702K3-1.

2.24 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.25 **SELECT** exhaust fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.26 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.27 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

2.28 **OPEN** Damper MK-AZ702K3-2B by selecting **OPEN** on MCS graphic 20BldExh.v.

2.29 **SIMULATE** a pressure differential >1.5" w.c. at PDE-AZ702K303-1B.

2.30 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.31 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.32 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.33 **SELECT** exhaust fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.34 **VERIFY** the following:

- Damper MK-AZ702K3-2B **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2B

Test Engineer ______________________________ Date ___________

2.35 **REMOVE** simulation from PDE-AZ702K303-1B.

2.36 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.37 **SELECT** exhaust fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.38 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.39 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

2.40 **OPEN** Damper MK-AZ702K3-2B by selecting **OPEN** on MCS graphic 20BldExh.v.

2.41 **SIMULATE** a pressure differential >5" w.c. at PDE-AZ702K304-1B.

2.42 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.43 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.44 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.45 **SELECT** exhaust fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.46 **VERIFY** the following:

- Damper MK-AZ702K3-2B **CLOSES**.
- MCS indicates **CLOSED** for Damper MK-AZ702K3-2B

Test Engineer ______________________________ Date ____________

2.47 **REMOVE** simulation from PDE-AZ702K304-1B.

2.48 **SELECT** exhaust fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.49 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

2.50 **SELECT** Damper MK-AZ702K3-2B **CLOSE** on MCS graphic 20BldExh.v.

2.51 **SELECT** Damper MK-AZ702K3-2B **AUTO** on MCS graphic 20BldExh.v.

ATTACHMENT E

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Attachment A, Appendix A.

Test Engineer ______________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ______________________ Date __________

2 PROCEDURE

2.1 **Fan AZ702-K3-5-1B Control from Local control switch HS-AZ702K305-1B1.**

2.1.1 **OPEN** manual damper MK-AZ702K3-1B.

Test Engineer ______________________ Date __________

2.1.2 **OPEN** manual damper MK-AZ702K305-1B.

Test Engineer ______________________ Date __________

2.1.3 **VERIFY** local control switch HS-AZ702K305-1B1 in the STOP position.

Test Engineer ______________________ Date __________

2.1.4 **SET** fan AZ702-K3-5-1B flow control FIC-702K3-3B to 925 scfm on MCS graphic 20BldExh.v.

2.1.5 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.1.6 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.1.7 **SELECT** Air Conditioning Unit AZ702-K2-6-1 **AUTO** on MCS graphic 20BldExh.v.

2.1.8 **SELECT** exhaust fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.1.9 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.1.10 **SELECT** exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.1.11 **VERIFY** that fan AZ702-K3-5-1B does **NOT START**.

Test Engineer ________________________________ Date ____________

2.1.12 **PLACE** local control switch HS-AZ702K305-1B1 in the **START** position.

2.1.13 **VERIFY** the following:

2.1.13.1 Exhaust Fan AZ702-K3-5-1B **STARTS**.
2.1.13.2 Air Conditioning Unit AZ702-K2-6-1 **STARTS**.

Test Engineer ________________________________ Date ____________

2.1.14 After a stabilization period of 15 minutes **RECORD** the following data for exhaust fan AZ702-K3-5-1B:

Motor Current	__________	Amps. (II-702K35-1B)
Motor Voltage	__________	Volts. (M. & T. E.)
Total Airflow	__________	cfm (FIC-702K3-3)

2.1.15 Allow exhaust fan AZ702-K3-5-1B to operate for sufficient length of time needed to obtain system air flow, vibration and bearing temperature data. **RECORD** on Exhibit A data sheets.

2.1.16 **SELECT** Exhaust Fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.1.17 **VERIFY** that exhaust fan AZ702-K3-5-1B does **NOT STOP**.

Test Engineer ________________________________ Date ____________

2.1.18 **SIMULATE** an air flow <200 cfm at FIT-702K3-3B.

2.1.19 **VERIFY** that exhaust fan AZ702-K3-5-1B does **NOT STOP**.

Test Engineer ________________________________ Date ____________

2.1.20 **REMOVE** simulation from FIT-702K3-3B .

Test Engineer ________________________________ Date ____________

2.1.21 **PLACE** local control switch HS-AZ702K305-1B1 in the **STOP** position.

2.1.22 **VERIFY** the following:

2.1.22.1 Exhaust Fan AZ702-K3-5-1A **STOPS**.
2.1.22.2 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.

Test Engineer ______________________________ Date ____________

2.2 **Fan AZ702-K3-5-1B Control from MCS**

2.2.1 **SELECT** Damper MK-AZ702K3-2A **AUTO** on MCS graphic 20BldExh.v.

2.2.2 **SELECT** Exhaust Fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

2.2.3 **SELECT** Exhaust Fan AZ702-K3-5-1A **AUTO** on MCS graphic 20BldExh.v.

2.2.4 **SELECT** Damper MK-AZ702K3-2B **CLOSE** on MCS graphic 20BldExh.v.

2.2.5 **SELECT** Damper MK-AZ702K3-2B **AUTO** on MCS graphic 20BldExh.v.

2.2.6 **PLACE** the local handswitch HS-AZ702K305-1B1 in **REMOTE**.

2.2.7 **SELECT** Exhaust Fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.2.8 **VERIFY** the following:

2.2.8.1 Damper MK-AZ702K3-2B **OPENS.**
2.2.8.2 Fan AZ702-K3-5-1B **STARTS**.
2.2.8.3 Air Conditioning Unit AZ702-K2-6-1 **STARTS**.

Test Engineer ______________________________ Date ____________

2.2.9 After a stabilization period of 15 minutes **RECORD** the following data for exhaust fan AZ-K1-5-1B:

Motor Current	__________	Amps. (II-702K35-1B)
Motor Voltage	__________	Volts. (M. & T. E.)
Total Airflow	__________	cfm (FIC-702K3-3A)

2.2.10 At the MCS **SELECT** HS-AZ702K305-1BB **OVERRIDE** command.

2.2.11 **SIMULATE** an air flow <200 cfm at FT-702K3-3B.

2.2.12 **VERIFY** that exhaust fan AZ702-K3-5-1B does **NOT STOP**.

Test Engineer ______________________ Date __________

2.2.13 **SELECT** Exhaust Fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.2.14 **VERIFY** the following:

2.2.14.1 Exhaust fan AZ702-K3-5-1B **STOPS**.
2.2.14.2 Damper MK-AZ702K3-2B **CLOSES.**
2.2.14.3 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.
2.2.14.4 Exhaust fan AZ702-K3-5-1A **STARTS**.
2.2.14.5 Damper MK-AZ702K3-2A **OPENS.**
2.2.14.6 Air Conditioning Unit AZ702-K2-6-1 **RE-STARTS**.

Test Engineer ______________________ Date __________

2.2.15 **REMOVE** simulation from FIT-702K3-3B.

Test Engineer ______________________ Date __________

2.2.16 **SELECT** exhaust fan AZ702-K3-5-1B **AUTO** on MCS graphic 20BldExh.v.

2.2.17 **OPEN** circuit breaker no. 1 in Panelboard PP-16 to **SIMULATE** failure of exhaust fan AZ702-K3-5-1A.

2.2.18 **VERIFY** the following:

2.2.18.1 Exhaust fan AZ702-K3-5-1A **STOPS**.
2.2.18.2 Damper MK-AZ702K3-2A **CLOSES.**
2.2.18.3 Air Conditioning Unit AZ702-K2-6-1 **STOPS**.
2.2.18.4 Exhaust fan AZ702-K3-5-1B **STARTS**.
2.2.18.5 Damper MK-AZ702K3-2B **OPENS.**
2.2.18.6 Air Conditioning Unit AZ702-K2-6-1 **RE-STARTS**.

Test Engineer ______________________ Date __________

2.2.19 **SELECT** exhaust fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.2.20 **VERIFY** the following:

- exhaust fan AZ702-K3-5-1B **STOPS**.
- damper MK-AZ702K3-2B **CLOSES.**

Test Engineer ______________________ Date __________

EXHIBIT A

System:Vent Bldg. Exhaust - Train A.	Fan No.: AZ702-K3-5-1B	Fan Type: Centrifugal
Drive Type: Belt.	Service:Vent Building Ventilation	

Equipment		Test Data	Design	Actual
Fan		Total Flow (cfm)	1000	
Make/Model	American Fan Co RB-303-3575-24	Disch. SP (ins. w.g.)		
Size		Suct. SP (ins. w.g.)		
Serial No.		Fan Total Press. (Ins. w.g.)		
		Fan RPM	3600	

Motor				
Make/Frame	Westinghouse /FR256T	RPM	1755	
Phase	3	Volts	230/460	
SF		FLA	46/23	
HP	2			

Vibration

Location	Vertical		Horizontal		Axial	
	Disp. (Mils)	Vel. (Ins/sec)	Disp. (Mils)	Vel. (Ins/sec)	Disp. (Mils)	Vel. (Ins/sec)
Motor O/B						
Motor I/B						
Fan O/B						
Fan I/B						

Any supporting Pitot Traverse Data sheets and/or vibration spectrum printouts are to be appended to this data sheet.

ROOM/FILTER PRESSURE DIFFERENTIALS (ins. w.c)

PDI-702K2-1		PDI-702K2-7		PDI-702K24-2		PDI-702K34-1A	
PDIC-702K2-2		PDI-702K2-8		PDIC-702K3-1		PDI-702K33-1B	
PDIC-702K2-3		PDI-702K24-1		PDI-702K33-		PDI-702K34-1B	

ATTACHMENT F

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up in Attachment A, Appendix A.

Test Engineer ______________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ______________________ Date __________

1.3 **OPEN** manual damper MK-AZ702K3-1B.

Test Engineer ______________________ Date __________

1.4 **OPEN** manual damper MK-AZ702K305-1B.

Test Engineer ______________________ Date __________

1.5 **VERIFY** local control switch HS-AZ702K305-1B1 in the **REMOTE** position.

Test Engineer ______________________ Date __________

1.6 **SET** fan AZ702-K3-5-1B flow control FIC-702K3-3A 800 scfm.

1.7 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

1.8 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

1.9 **SELECT** Air Conditioning Unit AZ702-K2-6-1 **AUTO** on MCS graphic 20BldExh.v.

1.10 **SELECT** exhaust fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

1.11 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2 PROCEDURE

2.1 **START** by selecting exhaust fan AZ702-K3-5-1B **START** command on MCS graphic 20BldExh.v.

2.2 **WAIT** 10 minutes for system to stabilize.

2.3 **SIMULATE** an increasing pressure differential at PDE-AZ702303-1B until PDAH-AZ702303-1B annunciates at the MCS.

2.4 **RECORD** pressure differential reading at PDI-AZ702303-1B.

PDI-AZ702303-1B ________Ins. w.c.(0.3 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.5 **INCREASE** pressure differential simulation at PDE-AZ702303-1B until PDAHH-AZ702303-1B annunciates at the MCS.

2.6 **RECORD** pressure differential reading at PDI-AZ702303-1B.

PDI-AZ702303-1B ________Ins. w.c.(0.5 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.7 **REMOVE** simulation from PDE-AZ702303-1B.

Test Engineer ______________________________ Date ____________

2.8 **SIMULATE** an increasing pressure differential at PDE-AZ702304-1B until PDAH-AZ702304-1B annunciates at the MCS.

2.9 **RECORD** pressure differential reading at PDI-AZ702304-1B.

PDI-AZ702304-1B ________Ins. w.c.(3.0 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.10 **INCREASE** pressure differential simulation at PDE-AZ702304-1B until PDAHH-AZ702304-1B annunciates at the MCS.

2.11 **RECORD** pressure differential reading at PDI-AZ702304-1B.

PDI-AZ702304-1B ________Ins. w.c.(5.0 ins. w.c. expected).

Test Engineer ______________________________ Date ____________

2.12 **REMOVE** simulation from PDE-AZ702304-1B.

Test Engineer ______________________________ Date ____________

ATTACHMENT G

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Attachment A, Appendix A.

Test Engineer ______________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ______________________ Date __________

2 PROCEDURE

2.1 **Air Conditioning Unit AZ702-K2-6-1 Control from Local control switch HS-AZ702K206-1A.**

2.1.1 **VERIFY/PLACE** local handswitch HS-AZ702K206-1A in **STOP** position.

Test Engineer ______________________ Date __________

2.1.2 **SELECT** air conditioning unit AZ702-K2-6-1 **MANUAL** on MCS graphic 19BldSup.v

2.1.3 **SELECT** air conditioning unit AZ702-K2-6-1 **START** on MCS graphic 19BldSup.v

2.1.4 **VERIFY** that air conditioning unit AZ702-K2-6-1 does **NOT START**.

Test Engineer ______________________ Date __________

2.1.5 **PLACE** local handswitch HS-AZ702K206-1A in **START** position.

2.1.6 **VERIFY** that air conditioning unit AZ702-K2-6-1 **STARTS**.

Test Engineer ______________________ Date __________

2.1.7 **SELECT** air conditioning unit AZ702-K2-6-1 **STOP** on MCS graphic 19BldSup.v

2.1.8 **VERIFY** that air conditioning unit AZ702-K2-6-1 does **NOT STOP**.

Test Engineer ______________________ Date __________

2.1.9 **PLACE** local handswitch HS-AZ702K206-1A in **STOP** position.

2.1.10 **VERIFY** that air conditioning unit AZ702-K2-6-1 **STOPS**.

Test Engineer ______________________ Date __________

2.1.11 **PLACE** local handswitch HS-AZ702K206-1A in **REMOTE** position.

2.2 **Air Conditioning Unit AZ702-K2-6-1 Control from MCS**

2.2.1 **SELECT** air conditioning unit AZ702-K2-6-1 **AUTO** on MCS graphic 19BldSup.v

2.2.2 **SELECT** air conditioning unit AZ702-K2-6-1 **START** on MCS graphic 19BldSup.v

2.2.3 **VERIFY** that air conditioning unit AZ702-K2-6-1 does **NOT START**.

Test Engineer ______________________ Date __________

2.2.4 **SELECT** air conditioning unit AZ702-K2-6-1 **MANUAL** on MCS graphic 19BldSup.v

2.2.5 **SELECT** air conditioning unit AZ702-K2-6-1 **START** on MCS graphic 19BldSup.v

2.2.6 **VERIFY** that air conditioning unit AZ702-K2-6-1 **STARTS**.

Test Engineer ______________________ Date __________

2.2.7 **SELECT** air conditioning unit AZ702-K2-6-1 **STOP** on MCS graphic 19BldSup.v

2.2.8 **VERIFY** that air conditioning unit AZ702-K2-6-1 **STOPS**.

Test Engineer ______________________ Date __________

2.2.9 **SELECT** air conditioning unit AZ702-K2-6-1 **AUTO** on MCS graphic 19BldSup.v

2.2.10 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

2.2.11 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

2.2.12 **SELECT** exhaust fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

2.2.13 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

2.2.14 **SELECT** exhaust fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.2.15 **VERIFY** the following:

- exhaust fan AZ702-K3-5-1A **STARTS**.
- air conditioning unit AZ702-K2-6-1 **STARTS**.

Test Engineer ________________________________ Date ____________

2.2.16 **SELECT** Damper MK-AZ702K3-2B **MANUAL** on MCS graphic 20BldExh.v.

2.2.17 **SELECT** Damper MK-AZ702K3-2B **OPEN** on MCS graphic 20BldExh.v.

2.2.18 **SELECT** exhaust fan AZ702-K3-5-1B **NORMAL** on MCS graphic 20BldExh.v.

2.2.19 **SELECT** exhaust fan AZ702-K3-5-1B **MANUAL** on MCS graphic 20BldExh.v.

2.2.20 **SELECT** exhaust fan AZ702-K3-5-1B **START** on MCS graphic 20BldExh.v.

2.2.21 **VERIFY** that exhaust fan AZ702-K3-5-1B **STARTS**.

2.2.22 **SELECT** exhaust fan AZ702-K3-5-1A **STOP** on MCS graphic 20BldExh.v.

2.2.23 **VERIFY** the following:

- exhaust fan AZ702-K3-5-1A **STOPS**.
- air conditioning unit AZ702-K2-6-1 does **NOT STOP**.

Test Engineer ________________________________ Date ____________

2.2.24 **SELECT** exhaust fan AZ702-K3-5-1B **STOP** on MCS graphic 20BldExh.v.

2.2.25 **VERIFY** the following:

- exhaust fan AZ702-K3-5-1B **STOPS**.
- air conditioning unit AZ702-K2-6-1 **STOPS**.

Test Engineer ______________________ Date __________

ATTACHMENT H

1 INITIAL CONDITIONS

1.1 **VERIFY/PERFORM** the electrical line-up detailed in Attachment A, Appendix A.

Test Engineer ________________________ Date __________

1.2 **VERIFY/PERFORM** the valve/damper line-up in Attachment A, Appendix B.

Test Engineer ________________________ Date __________

1.3 **VERIFY/PERFORM** the following switch/control line-up:

1.3.1 **SELECT** Damper MK-AZ702K3-2A **MANUAL** on MCS graphic 20BldExh.v.

1.3.2 **SELECT** Damper MK-AZ702K3-2A **OPEN** on MCS graphic 20BldExh.v.

1.3.3 **PLACE** local handswitch HS-AZ702K305-1A1 in **REMOTE** position.

1.3.4 **SELECT** exhaust fan AZ702-K3-5-1A **NORMAL** on MCS graphic 20BldExh.v.

1.3.5 **SELECT** exhaust fan AZ702-K3-5-1A **MANUAL** on MCS graphic 20BldExh.v.

1.3.6 **PLACE** local handswitch HS-AZ702K206-1A in **REMOTE** position.

1.3.7 **SELECT** air conditioning unit AZ702-K2-6-1 **MANUAL** on MCS graphic19BldSup.v

Test Engineer ________________________ Date __________

1.4 At MCS graphic 20BldExh.v and 19BldSup.v, **SELECT** all system Proportional-integral-derivative (PID) control loops to AUTO mode; **SET** setpoints as follows:

Stack flow	FIC-702K3-3A	925 scfm
	FIC-702K3-3B	925 scfm
Vent Cell DP	PDIC-702K3-1	-0.75 ins. wc
Filter room A DP	PDIC-702K2-2	-0.25 ins. wc
Filter room B DP	PDIC-702K2-3	-0.25 ins. wc

1.5 During system stabilization and related data-collection periods required by this section, entire ventilation building must be isolated (unoccupied and inaccessible, with all exterior and interior doors closed).

1.6 Test Engineer shall VERIFY the atmosphere reference leg located in the stack monitor room is sealed for use.

Test Engineer________________________Date_____

2 PROCEDURE

NOTE: During testing described in this section, Test Engineer will assess system performance compared with design intent and shall describe any evaluations in the Test Log.

2.1 Primary Vent Filter Room A Pressure Control

2.1.1 **START** the building ventilation system by performing the following steps:

2.1.1.1 **SELECT** exhaust fan AZ702-K3-5-1A **START** on MCS graphic 20BldExh.v.

2.1.1.2 **SELECT** air conditioning unit AZ702-K2-6-1 **START** on MCS graphic 19BldSup.v

2.1.2 After a stabilization period of 15 minutes **RECORD** the following data:

- Primary Vent Filter Room A press. diff________Ins. w.c.(PDIC-AZ702K2-2) (-0.25 Ins. w.c. expected)
- Valve MK-AZ702K204-1 position ________ % Open.

NOTE: If system is deemed to operate in an unstable manner, PERFORM system PID loop tuning, step 2.8, then restart this section.

2.1.3 **SIMULATE** an increase of 0.2 Ins. w.c. in Primary Vent Filter Room A pressure at PDE-AZ702K2-2.

2.1.4 **RECORD** the following data:

- Primary Vent Filter Room A press. diff________ Ins. w.c.(PDIC-AZ702K2-2)
- Valve MK-AZ702K204-1 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K2-2 annunciates on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date __________

2.1.5 **ACKNOWLEDGE** PDAL-AZ702K2-2 alarm on MCS graphic 19BldSup.v.

2.1.6 **REMOVE** simulation at PDE-AZ702K2-2.

2.1.7 **RECORD** the following data:

- Primary Vent Filter Room A press. diff________ Ins. w.c.(PDIC-AZ702K2-2)
- Valve MK-AZ702K204-1 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K2-2 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date __________

2.2 Primary Vent Filter Room B Pressure Control

2.2.1 **RECORD** the following data:

- Primary Vent Filter Room B press. diff________ Ins. w.c.(PDIC-AZ702K2-3) (-0.25 Ins. w.c. expected)
- Valve MK-AZ702K204-2 position ________ % Open.

2.2.2 **SIMULATE** an increase of 0.2 Ins. in Primary Vent Filter Room B pressure at PDE-AZ702K2-3.

2.2.3 **RECORD** the following data:

- Primary Vent Filter Room A press. diff________ Ins. w.c.(PDIC-AZ702K2-3)
- Valve MK-AZ702K204-2 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K2-3 annunciates on MCS graphic 19BldSup.v.

Test Engineer ____________________ Date ________

2.2.4 **ACKNOWLEDGE** PDAL-AZ702K2-3 alarm on MCS graphic 19BldSup.v.

2.2.5 **REMOVE** simulation at PDE-AZ702K2-3.

2.2.6 **RECORD** the following data:

- Primary Vent Filter Room A press. diff________ Ins. w.c.(PDIC-AZ702K2-3)
- Valve MK-AZ702K204-2 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K2-3 clears on MCS graphic 19BldSup.v.

Test Engineer ____________________ Date ________

2.3 Primary Vent Cell Pressure Control

2.3.1 **RECORD** the following data:

- Primary Vent Cell press. diff. ________ Ins. w.c.(PDIC-AZ702K3-1) (-0.75 Ins. w.c. expected)
- Valve MK-AZ702K3-1 position ________ % Open.

2.3.2 **SIMULATE** an increase of 0.3 Ins. w.c. in Primary Vent Cell pressure at PDE-AZ702K3-1.

2.3.3 **RECORD** the following data:

- Primary Vent Cell press. diff. ________ Ins. w.c.(PDIC-AZ702K3-1)
- Valve MK-AZ702K3-1 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K3-1 annunciates on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date __________

2.3.4 **ACKNOWLEDGE** PDAL-AZ702K3-1 alarm on MCS graphic 19BldSup.v.

2.3.5 **REMOVE** simulation at PDE-AZ702K3-1.

2.3.6 **RECORD** the following data:

- Primary Vent Cell press. diff. ________ Ins. w.c.(PDIC-AZ702K3-1)
- Valve MK-AZ702K3-1 position ________ % Open.

and **VERIFY**

- PDAL-AZ702K3-1 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date __________

2.3.7 The following steps will test the Vent Cell Pressure Control Override feature. With system continuing to operate as in the prior section, VERIFY Vent Cell DP with respect to atmosphere (PDIC-702K3-1 on MCS graphic 19BldSup.v) at approximately normal DP of -0.75 ins. wc.

Test Engineer______________________Date_____

2.3.8 At MCS graphic 19BldSup.v, **RECORD** Vent Cell exhaust valve position.

Valve MK-702K3-1 ______% Open
Test Engineer______________________Date_____

2.3.9 In Filter Room A at PDE-702K3-2, **SIMULATE** a DP value more negative than the Vent Cell DP (say -1.0 ins. wc). On MCS graphic 19BldSup.v, **VERIFY** Vent Cell exhaust valve OPENS further to maintain a DP more negative than Filter Room A. Allow system to stabilize; **RECORD** values:

Valve MK-702K3-1 ______% Open
Vent Cell DP (PDIC-702K3-1) ______ins. wc

Test Engineer________________________Date_____

2.3.10 **RESTORE** PDE-702K3-2 to actual value (remove simulation). **VERIFY** Vent Cell exhaust valve returns to normal. **REPEAT** above test for Filter Room B, i.e. SIMULATE -1.0"wc at PDIC-702K2-3.
Test Engineer________________________Date_____

2.4 Stack Monitor Room Pressure Monitoring.

2.4.1 **RECORD** the following data:

- Stack Monitor Room press. diff. ________ Ins. w.c.(PDI-AZ702K2-1) (-0.1 Ins. w.c. expected)

2.4.2 **SIMULATE** an increase of 0.6 Ins. w.c. in Stack Monitor Room pressure at PDE-AZ702K2-1.

2.4.3 **RECORD** the following data:

- Stack Monitor Room press. diff. ________ Ins. w.c.(PDI-AZ702K2-1)

and **VERIFY**

- PDAL-AZ702K2-1 annunciates on MCS graphic 19BldSup.v.

Test Engineer ________________________________ Date ____________

2.4.4 **ACKNOWLEDGE** PDAL-AZ702K2-1 alarm on MCS graphic 19BldSup.v.

2.4.5 **REMOVE** simulation at PDE-AZ702K2-1.

2.4.6 **RECORD** the following data:

- Stack Monitor Room press. diff. ________ Ins. w.c.(PDI-AZ702K2-1)

and **VERIFY**

- PDAL-AZ702K2-1 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date ____________

2.5 Zone Pressure Monitoring.

2.5.1 **RECORD** the following data:

- Zone I to Zone II press. diff. ________ Ins. w.c.(PDI-AZ702K2-7) (0.5 Ins. w.c. expected)
- Zone II to Zone IV press. diff. ________ Ins. w.c.(PDI-AZ702K2-8) (0.15 Ins. w.c. expected)

2.5.2 **DISCONNECT** ¼" tubing at low and high side connections to the following instruments:

- PDE-AZ702K2-2
- PDE-AZ702K2-3

Test Engineer ______________________________ Date ____________

2.5.3 **VERIFY** the following:

- PDAH-AZ702K2-7 annunciates on MCS graphic 19BldSup.v.
- PDAL-AZ702K2-8 annunciates on MCS graphic 19BldSup.v.

Test Engineer ______________________________ Date ____________

2.5.4 **ACKNOWLEDGE** PDAH-AZ702K2-7 and PDAL-AZ702K2-8 alarms on MCS graphic 19BldSup.v.

2.5.5 **RECONNECT** ¼" tubing at low and high side connections to the following instruments:

- PDE-AZ702K2-2
- PDE-AZ702K2-3

Test Engineer ______________________ Date __________

2.5.6 **VERIFY** the following:

- PDAH-AZ702K2-7 clears on MCS graphic 19BldSup.v.
- PDAL-AZ702K2-8 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________ Date __________

2.5.7 **DISCONNECT** ¼" tubing at low and high side connections to PDE-AZ702K3-1.

Test Engineer ______________________ Date __________

2.5.8 **VERIFY** that PDAL-AZ702K2-7 annunciates on MCS graphic 19BldSup.v.

Test Engineer ______________________ Date __________

2.5.9 **ACKNOWLEDGE** PDAL-AZ702K2-7 alarm on MCS graphic 19BldSup.v.

2.5.10 **RECONNECT** ¼" tubing at low and high side connections to PDE-AZ702K3-1.

Test Engineer ______________________ Date __________

2.5.11 **VERIFY** that PDAL-AZ702K2-7 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________ Date __________

2.5.12 **DISCONNECT** ¼" tubing at low and high side connections to PDE-AZ702K2-1.

Test Engineer ______________________ Date __________

2.5.13 **VERIFY** that PDAH-AZ702K2-8 annunciates on MCS graphic 19BldSup.v.

Test Engineer ______________________ Date __________

2.5.14 **ACKNOWLEDGE** PDAH-AZ702K2-8 alarm on MCS graphic 19BldSup.v.

2.5.15 **RECONNECT** ¼" tubing at low and high side connections to PDE-AZ702K2-1.

Test Engineer ______________________ Date __________

2.5.16 **VERIFY** that PDAH-AZ702K2-8 clears on MCS graphic 19BldSup.v.

Test Engineer ______________________ Date __________

2.6 Emergency Cooling Valves Function

2.6.1 On MCS graphic 22BldTmp.v, **RECORD** the following data:
- o Room temperature (E&I-A) _____F (TI-702K2-2)
- o Room temperature (E&I-B) _____F (TI-702K2-1)
- o Room temperature (E&I-A) _____F (TI-702K2-3)

(expected range 60-85 F)

2.6.2 At MCS graphic 22BldTmp.v, **VERIFY** the following HSs and MOVs CLOSED:
- o HS-AZ702K2-7, MK-AZ702-K2-7A, -7B
- o HS-AZ702K2-6, MK-AZ702-K2-6A, -6B
- o HS-AZ702K2-8, MK-AZ702-K2-8A, -8B

Test Engineer______________________Date_____

2.6.3 At MCS graphic 22BldExh.v, **SELECT** remote handswitch HS-AZ702K2-7 OPEN.

2.6.4 **VERIFY** valves MK-AZ702K2-7A, -7B OPEN within 20 seconds.

Test Engineer______________________Date_____

2.6.5 **REPEAT** prior two steps. **VERIFY** repeatability.

Test Engineer______________________Date_____

2.6.6 At MCS graphic 22BldTmp.v, **SELECT** remote handswitch HS-AZ702K2-6 OPEN.

2.6.7 **VERIFY** valves MK-AZ702K2-6A, -6B OPEN within 20 seconds.

Test Engineer______________________Date_____

2.6.8 **REPEAT** prior two steps. **VERIFY** repeatability.

Test Engineer______________________Date_____

2.6.9 At MCS graphic 22BldTmp.v, **SELECT** remote handswitch HS-AZ702K2-8 OPEN.

2.6.10 **VERIFY** valves MK-AZ702K2-8A, -8B OPEN within 20 seconds.

Test Engineer________________________Date_____

2.6.11 **REPEAT** prior two steps. **VERIFY** repeatability.

Test Engineer________________________Date_____

2.6.12 At MCS graphic 22BldTmp.v, **SELECT** remote handswitches HS-AZ702K2-6, -7, -8 NORMAL. **VERIFY** all six related valves closed.

Test Engineer________________________Date_____

2.6.13 At TT-AZ702K2-2 IN E&I ROOM-A, **SIMULATE** a temperature increase until TAHH alarm occurs on MCS graphic 22BldTmp.v.

2.6.14 **VERIFY** valve MK-AZ702K2-7A OPEN on MCS graphic 22BldTmp.v.

2.6.15 For prior step, **RECORD** temperature indication at TAHH alarm point:

TI-AZ702K2-2 _______F (expected, 110 F)

2.6.16 At TT-AZ702K2-1 IN E&I ROOM-A, **SIMULATE** a temperature increase until TAHH alarm occurs on MCS graphic 22BldTmp.v.

2.6.17 **VERIFY** valve MK-AZ702K2-6A OPEN on MCS graphic 22BldTmp.v.

2.6.18 For prior step, **RECORD** temperature indication at TAHH alarm point:

TI-AZ702K2-1 _______F (expected, 110 F)

2.6.19 At TT-AZ702K2-3 IN E&I ROOM-A, **SIMULATE** a temperature increase until TAHH alarm occurs on MCS graphic 22BldTmp.v.

2.6.20 **VERIFY** valve MK-AZ702K2-8A OPEN on MCS graphic 22BldTmp.v.

2.6.21 For prior step, **RECORD** temperature indication at TAHH alarm point:

TI-AZ702K2-3 _______F (expected, 110 F)

2.7 Vent Building Vent System MCS MACRO Test

2.7.1 **PLACE** system in automatic mode as follows: At MCS graphic 20BldExh.v, **SELECT** all components to NORMAL.

2.7.2 At MCS graphic 27mBld.v, **SELECT** AC "ON", and Fan 1A "ON". **RUN** MACRO, **VERIFY** system STARTS with AC and Fan 1A ON.

Test Engineer________________________Date______

2.7.3 At MCS graphic 27mBld.v, **SELECT** AC and Fan 1B "ON". **RUN** MACRO and **VERIFY** AC and Fan 1B are ON, Fan 1A OFF.

Test Engineer________________________Date______

2.7.4 At MCS graphic 27mBld.v, **SELECT** AC OFF, Fan 1B ON. **RUN** MACRO. **VERIFY** AC is OFF and Fan 1B stays ON.

Test Engineer________________________Date______

2.8 Final Tuning of System PID Controls by MCS Cognizant Engineer

2.8.1 At MCS graphic 20BldExh.v and 19BldSup.v, **SELECT** all PID controls in AUTO mode. At MCS graphic 27mBld.v, **SELECT** AC "ON", and Fan 1A "ON". **RUN** MACRO, **VERIFY** system STARTS with AC and Fan 1B ON. **RUN** system for 10 minutes to stabilize; **MAINTAIN** Vent Bldg. in isolation mode during this entire section.

Test Engineer________________________Date______

2.8.2 At MCS graphic 20BldExh.v and 19BldSup.v, **RECORD** the following data:

Stack flow	FIC-702K3-3A	____scfm
	FIC-702K3-3B	____scfm
Vent Cell DP	PDIC-702K3-1	____ins. wc
Filter room A DP	PDIC-702K2-2	____ins. wc
Filter room B DP	PDIC-702K2-3	____ins. wc
Stack Mon. room DP	PDI-702K2-1	____ins. wc
Zone I/II DP	PDI-702K2-7	____ins. wc
Zone II/IV DP	PDI-702K2-8	____ins. wc

2.8.3 At MCS Engineering station, TUNE PID loops as follows. RECORD initial PID rate settings for above controllers in the table below. Then REPEAT for Train B.

ADJUST the Proportional, Integral and Derivative control gains for stable control of each loop. This will first be performed on each individual loop, and may have to be repeated when the loops operate interactively. Use an empirical technique and include the following steps:

- Increase the loop gain, forcing the system to oscillate, and determine the maximum gain and oscillation frequency.
- Adjust the P, I, D rates for desired system performance and test various transients for stability and desired operation.

PARAMETER	INITIAL PID RATES	
	Train A	Train B
Stack flow, FIC-702K3-3A		
Stack flow, FIC-702K3-3B		
Vent Cell diff press, PDIC-702K3-1		
Filter Room-A diff press, PDIC-702K2-2		
Filter Room-B diff press, PDIC-702K2-3		

2.8.4- **PERFORM** the upset actions described below in order to determine system response to each. **RECORD** observations, corresponding PID adjustment settings, and final system response observations; **PERFORM** PID tuning according to the following criteria.

- Stack flow- Maintain indicated stack airflow at 925 +/- 50 scfm, under steady-state conditions; during defined upset conditions (as described below), flow shall remain between the high and low alarm levels. Control should be tuned for a highly stable flow signal.

- Vent Cell pressure- Maintain indicated Vent Cell DP (with respect to atmosphere) at -0.75 +/- 0.1 ins. wc under steady-state conditions; normal DP shall be automatically restored following each defined upset condition such that no alarm occurs, during or following the upset. Override control shall activate within 15 seconds after abnormal DP occurs, and restore safe and stable DP within another 15 seconds (i.e. Zone I/II DP negative).

- Filter Room pressure- Maintain indicated Filter Room DP at -0.25 +/- 0.05 ins. wc (to atmosphere) under steady-state conditions; normal DP shall be automatically restored following each defined upset condition, such that no alarm occurs, during or following the upset. Also, no Zone-II/IV alarm shall occur.

- Stack Monitor Room pressure- Maintain indicated room DP at -0.1 +/- 0.05 ins. wc (to atmosphere) under steady-state conditions; normal DP shall be automatically restored following each defined upset condition such that no alarm occurs, during or following the upset. Also, no Zone-II/IV alarm shall occur.

2.8.5 **RECORD** data for Upset-1; **STOP** AC unit; RE-START after 5 minutes:

____
____
______________________________.

2.8.6 **RECORD** data for Upset-2; **HOLD** open outer door to E&I room A:

____
____
______________________________.

2.8.7 **RECORD** data for Upset-3; **HOLD** open outer door to E&I room B:

____
____
______________________________.

2.8.8 **RECORD** data for Upset-4; **OPEN** interior door between E&I room A and Stack Monitor room (hold 10 seconds):

____
____
______________________________.

2.8.9 **RECORD** data for Upset-5; **BRIEFLY OPEN** both outer doors to Fan Room A (hold 10 seconds):

____
____
______________________________.

2.8.10 **RECORD** data for Upset-6; **BRIEFLY OPEN** both outer doors to Fan Room B (hold 10 seconds):

____

____

____.

2.8.11 **RECORD** data for Upset-7; **SWITCH** exhaust fans:

____

____

____.

2.8.12 **VERIFY** that all PID control adjustments are complete.

MCS Cog. Engineer______________________________ Date ______
Test Engineer ______________________________ Date ______

2.9 Alarm Logic Timing Checks by MCS Cognizant Engineer

2.9.1 At MCS graphic 20BldExh.v and 19BldSup.v, **SELECT** all PID controls in AUTO mode, Fan 1A to STOP. At MCS graphic 27mBld.v, **SELECT** AC "OFF", and Fan 1B "ON". **RUN** MACRO, verify system STARTS with AC OFF and Fan 1B ON. **RUN** system for 10 minutes to stabilize; maintain Vent Bldg. in isolation mode during this entire section. **PREPARE** MCS alarm printer to print alarms as noted below.

Test Engineer_________________________Date______

2.9.2 At MCS graphic 20BldExh.v, **SELECT** Fan 1B to STOP. **RECORD** alarm level and time required for each of the following alarms to occur after fan STOP command.

Stack flow	FAL-FIC-702K3-3A	____scfm	___seconds
	FAL-FIC-702K3-3B	____scfm	___seconds
Vent Cell DP	PDAL-PDIC-702K3-1	____ins. wc	___seconds
Filter room A DP	PDAL-PDIC-702K2-2	____ins. wc	___seconds
Filter room B DP	PDAL-PDIC-702K2-3	____ins. wc	___seconds
Stack Mon. room	DPPDAL-PDI-702K2-1	____ins. wc	___seconds
Zone I/II DP	PDAL-PDI-702K2-7	____ins. wc	___seconds
Zone II/IV DP	PDAL-PDI-702K2-8	____ins. wc	___seconds

2.9.3 **VERIFY** that all alarm logic timing is satisfactory.

MCS Cog. Engineer______________________________ Date ______
Test Engineer ______________________________ Date ______

1.0 **INITIAL CONDITIONS**

1.1 Vent and Balance group are available to support testing.

Test Engineer: ____________________

2.0 **VERIFY** all system instrumentation in Appendix A is calibrated and has a current calibration tag affixed to each instrument and that all system loop calibrations are complete.

Test Engineer: ____________________

3.0 **VERIFY** the SYSTEM IS ALIGNED for preoperational testing in accordance with Appendix B.

Test Engineer: ____________________

4.0 **CYCLE** all MANUAL VALVES, listed in Appendix C, full travel and verify proper operation.

Test Engineer: ____________________

4.1 **RECORD** ALL Valve Deficiencies in Attachment K, Test Log.

5.0 **VENTILATION BUILDING VENTILATION STACK MONITOR**

5.1 **VERIFY** that system has been energized for a minimum of one hour prior to recording data in in step 5.29.

Test Engineer: ____________________

5.2 **VERIFY** flow and sample probe assembly is correctly oriented and securely mounted in place.

Test Engineer.: ____________________

5.3 **VERIFY** instrumentation cabinet is securely mounted to floor/pad.

Test Engineer.: ____________________

5.4 **VERIFY** all signal connections between flow and sample probe and instrumentation/control cabinet are correct. These include Record sample transport line, Beta sample transport line, total and static pressure signal lines, stack temperature signal, power wiring, and signal wiring.

Test Engineer.: ____________________

5.5 **VERIFY** sample exhaust from cabinet is routed back to the stack.

Test Engineer: ____________________

5.6 **VERIFY** incoming electrical power is connected to the terminal blocks TB-1 and TB-2.

Test Engineer: ____________________

5.7 **VERIFY** all wiring for remote signals is properly connected to terminal block TB-6.

Test Engineer.: ____________________

5.8 **VERIFY** stack exhaust fan status wiring is connected to terminal block TB-4.

Test Engineer.: ____________________

5.9 **VERIFY** PUMP AUTO/OFF selector switches AZ702K3-11-1 and AZ702K3-11-2 are in the OFF position.

Test Engineer.: ____________________

5.10 **PLACE** Power Switch SW-1 in the ON position.

5.11 **VERIFY** POWER ON light L-1 is ON.

Test Engineer.: ____________________

5.12 **VERIFY** sample cabinet heater fan starts.

Test Engineer.: ____________________

5.13 **PLACE** Power Switch SW-2 in the ON position.

5.14 **VERIFY** instrumentation cabinet cooling fan starts.

Test Engineer.: ____________________

5.15 **ENERGIZE** the Power Module.

5.16 **VERIFY** displays in FT-1, FT-2, and FT-3 are ON.

Test Engineer.: ____________________

5.17 Place Power Switch SW-3 in the ON position.

5.18 **VERIFY** display in Beta monitor is ON.

Test Engineer.: ____________________

5.19 **DEPRESS** alarm acknowledge button PB-1 **AND VERIFY** the light in the button comes ON.

Test Engineer.: ____________________

5.20 **VERIFY** that a building exhaust fan is running.

Test Engineer.: ____________________

5.21 **PLACE** Sample Pump AZ702-K3-11-1 local control switch HS-AZ702K311-1 in AUTO.

5.22 **VERIFY** Sample Pump AZ702-K3-11-1 starts.

Test Engineer.: ____________________

5.23 **PLACE** Sample Pump AZ702-K3-11-2 local control switch HS-AZ702K311-2 in AUTO.

5.24 **VERIFY** Sample Pump AZ702-K3-11-2 starts.

Test Engineer.: ____________________

5.25 **STOP** the building exhaust fan by placing it's control switch in OFF on graphics 20 bldExh.v.

5.26 **VERIFY** Sample Pumps AZ702-K3-11-1 and AZ702-K3-11-2 stop.

Test Engineer.: ____________________

5.27 **PLACE** Sample Pump local control switches HS-AZ702K311-1 and HS-AZ702K311-2 in OFF.

5.28 **DEPRESS** alarm acknowledge but PB-1 **AND VERIFY** the light in the button goes OFF.

Test Engineer.: ____________________

5.29 Sample Flow Control Loop

NOTE - Record required data for this section on Appendix D

5.29.1 **START** a building ventilation exhaust fan from graphics screen 20BldExh.v.

5.29.2 **PLACE** Sample Pump local control switches HS-AZ702K311-1 and HS-AZ702K311-2 in auto.

5.29.3 **VERIFY** Sample Pumps AZ702-K3-11-1 and AZ702-K3-11-2 start.

Test Engineer.: ____________________

5.29.4 **ADJUST** Ventilation Stack Flow to approximately 960 SCFM using the stack flow controller for the operating exhaust fan on graphics screen 20BldExh.v.

5.29.5 **CALCULATE** percent of full scall (%FS) stack flow using stack flow (SCFM) displayed on FI-AZ702K3-3 and the following formula:

NOTE - 1050 SCFM represents full scale stack flow.

%FS Stack Flow = (Displayed SCFM ÷ 1050 SCFM) X 100

5.29.6 **RECORD** the value for displayed stack flow and the %FS Stack Flow calculated in step 5.29.5.

Test Engineer.: ____________________

5.29.7 **CALCULATE** Ideal Output of V/I-1 channel 1 using %FS calculated in step 5.29.5 and the following formula:

Ideal Output = (%FS Stack Flow ÷ 100) x 16.00 mA + 4mA

5.29.8 **USING** a DMM, **MEASURE AND RECORD** the output of V/I -1 channel 1.

Test Engineer.: ____________________

5.29.9 **CALCULATE** the percent deviation from the ideal output, caluclated in step 5.29.7. This deviation should be ≤ 2%.

$$\%Deviation = \frac{[Actual\ Output\ (mA) - 4mA] - [Ideal\ Output\ (mA) - 4mA]}{Ideal\ Output\ (mA) - 4\ mA}$$

5.29.10 **RECORD** %Deviation calculated in step 5.29.9.

Test Engineer.: ____________________

5.29.11 **CALCULATE** Ideal Sample Flow for Record and Beta Samples using %FS Stack Flow calculated in step 5.29.5 and the following formula:

NOTE - 2 SCFM represents full scale sample flow.

Ideal Sample Flow = %FS Stack Flow ÷ 100 X 2.00 SCFM

5.29.12 **RECORD** the Ideal Sample Flow calculated in step 5.29.11.

Test Engineer.: ____________________

5.29.13 **RECORD** sample flows as indicated on FIC-AZ702K3-1 and FIC-AZ702K3-2.

Test Engineer.: ____________________

5.29.14 **CALCULATE** the % Deviation, for the Record sample flow, from the Ideal Sample flow calculated in step 5.29.11. This deviation should be ≤ 5%.

$$\textit{Record Sample Flow \% Deviation} = \frac{\textit{Displayed SCFM} - \textit{Ideal SCFM}}{\textit{Ideal SCFM}} \times 100$$

5.29.15 **RECORD** the Record Sample Flow % Deviation calculated in step 5.29.14.

Test Engineer.: ____________________

5.29.16 **CALCULATE** the % Deviation, for the Beta sample flow, from the Ideal Sample flow calculated in step 5.29.11. This deviation should be ≤ 5%.

$$\textit{Beta Sample Flow \% Deviation} = \frac{\textit{Displayed SCFM} - \textit{Ideal SCFM}}{\textit{Ideal SCFM}} \times 100$$

5.29.17 **RECORD** Beta Sample Flow % Deviations calculated in step 5.29.16.

Test Engineer.: ____________________

5.29.18 **CALCULATE** the ideal output for V/I-1 channel 2 using the displayed sample flow recorded in step 5.29.13.

$$\textit{Channel 2 Ideal Output} = \frac{\textit{Displayed SCFM}}{2.00\ \textit{SCFM}} \times 16.00mA + 4.00mA$$

5.29.19 **RECORD** the Channel 2 Ideal Output calculated 5.29.18.

Test Engineer.: ____________________

5.29.20 **CALCULATE** the ideal output for V/I-1 channel 3 using the displayed sample flow recorded in step 5.29.13.

$$\textit{Channel 3 Ideal Output} = \frac{\textit{Displayed SCFM}}{2.00\ \textit{SCFM}} \times 16.00mA + 4.00mA$$

5.29.21 **RECORD** the Channel 3 Ideal Output calculated 5.29.20.

Test Engineer.: ____________________

5.29.22 **USING** a DMM, **MEASURE AND RECORD** the output of V/I -1 channel 2 and 3.

5.29.23 **CALCULATE** the % Deviation from the ideal output for the Record sample flow. This deviation should be ≤2%.

$$\%Deviation = \frac{[Actual\ Output\ (mA) - 4mA] - [Ideal\ Output\ (mA) - 4mA]}{Ideal\ Output\ (mA) - 4\ mA}$$

5.29.24 **RECORD** % Deviation, for the Record sample flow, from ideal output calculated 5.29.23.

Test Engineer.: ____________________

5.29.25 **CALCULATE** the % Deviation from the ideal output for the Beta sample flow. This deviation should be ≤2%.

$$\%Deviation = \frac{[Actual\ Output\ (mA) - 4mA] - [Ideal\ Output\ (mA) - 4mA]}{Ideal\ Output\ (mA) - 4\ mA}$$

5.29.26 **RECORD** % Deviation, for the Beta sample flow, from ideal output calculated in step 5.29.25.

Test Engineer.: ____________________

5.29.27 **CALCULATE** the percent full scale (%FS) stack temperature using stack temperature indicated on TI-AZ702K3-1.

NOTE - 150°F represents full scale stack temperature.

$$\%\ FS\ Stack\ Temperature = \frac{Displayed\ °F}{150°F} \times 100$$

5.29.28 **RECORD** Full stack temperature and %FS Stack Temperature calculated in step 5.29.27.

Test Engineer.: ____________________

5.29.29 **CALCULATE** the ideal output of V/I -2 channel 2 using the %FS Stack Temperature calculated in step 5.29.27.

$$\text{Ideal Output (mA)} = \frac{\text{\%FS Stack Temperature}}{100} \times 16.00mA + 4mA$$

5.29.30 **RECORD** V/I channel 2 Ideal Output calculated in step 5.29.29.

Test Engineer.: ____________________

5.29.31 **USING** a DMM, **MEASURE AND RECORD** the output of V/I -2 channel 2.

Test Engineer.: ____________________

5.29.32 **CALCULATE** the % Deviation, for V/I -2 channel 2, from the Ideal output calculated in step 5.29.29. This deviation should be ≤2%.

$$\text{\%Deviation} = \frac{[\text{Actual Output (mA)} - 4mA] - [\text{Ideal Output (mA)} - 4mA]}{\text{Ideal Output (mA)} - 4\ mA}$$

5.29.33 **RECORD** the % Deviation for V/I -2 channel 2 calculated in step 5.29.32.

Test Engineer.: ____________________

5.29.34 **REMOVE** all DMMs and reconnect all wiring.

Test Engineer.: ____________________

5.30 Beta Monitor

NOTE - Record all data from this section on Appendix E.

5.30.1 **INSTALL** a known check source into remote detector head and allow sufficient time for monitor to perform count.

5.30.2 **CALCULATE** the ideal output for RE-AZK1-1 using the displayed value. 3.77^-4 DPS represents fullscale value.

$$\text{Ideal Output (mA)} = \frac{\text{Displayed Value}}{3.77\text{^-}4\ DPS\ \text{(Full Scale)}} \times 16.00mA + 4mA$$

5.30.3 **RECORD** the ideal output calculated in step 5.30.2.

Test Engineer.: ____________________

5.30.4 **USING** a DMM, **MEASURE** and **RECORD** the current output of RE-AZK1-1.

Test Engineer.: ____________________

5.30.5 **CALCULATE** the percent deviation from the ideal output calculated in step 5.30.2.

%Deviation = [Actual Output (mA)- 4mA]- [Ideal Output (mA) - 4mA]
Ideal Output (mA) - 4 mA

5.30.6 **RECORD** the actual output and the percent deviation calculated in step 5.30.5.

Test Engineer.: ____________________

5.30.7 **REPEAT** steps 5.30.1 through 5.30.6 for all check sources to be used.

5.30.8 **REMOVE** DMM and reconnect all wiring.

5.30.9 **CREATE** a failure of the Beta Monitor by installing a jumper from 41 RD to H1 RD on the back of the Beta Monitor.

5.30.10 **VERIFY** the following events occur:

- The local horn sounds.
- The local amber beacon flashes (both are on top of the instrumentation cabinet).

Test Engineer.: ____________________

5.30.11 **DEPRESS** the horn acknowledge button PB-1.

5.30.12 **VERIFY** the following events occur:

- The horn stops sounding.
- The amber beacon continues to flash.
- The light in PB-1 is ON.

Test Engineer.: ____________________

5.30.13 **REMOVE** the jumper installed in Step 5.30.10

5.30.14 **VERIFY** the amber beacon stops flashing.

Test Engineer.: ____________________

5.30.15 **DEPRESS** acknowledge button PB-1.

5.30.16 **VERIFY** horn does not sound and light in PB-1 is OFF.

Test Engineer.: ____________________

5.30.17 **CREATE** a high radiation condition of the Beta Monitor by installing a jumper from terminal 40 RD to H1 RD on the back of the Beta Monitor.

5.30.18 **VERIFY** the horn sounds and the local red beacon flashes.

Test Engineer.: ____________________

5.30.19 **DEPRESS** the horn acknowledge button PB-1.

5.30.20 **VERIFY** the following events occur:

- The horn stops sounding.
- The red beacon continues to flash.
- The light in PB-1 is ON.

Test Engineer.: ____________________

5.30.21 **REMOVE** the jumper installed in Step 5.30.17.

5.30.22 **VERIFY** the red beacon stops flashing.

Test Engineer.: ____________________

5.30.23 **DEPRESS** horn acknowledge button PB-1.

5.30.24 **VERIFY** horn does not sound and light in PB-1 is OFF.

Test Engineer.: ____________________

5.31 Test for Accuracy, Zero Drift and Calibration Drift.

5.32 **SELECT** Damper MK-AZ702K3-2A **CLOSE** on MCS graphic 20BldExh.v.

5.33 **SELECT** Damper MK-AZ702K3-2A **AUTO** on MCS graphic 20BldExh.v.

5.34 **PLACE** the local handswitch HS-AZ702K305-1A1 in **REMOTE**.

5.35 At the MCS **SELECT** HS-702K35-1A **START** command.

5.36 **VERIFY** the following:

- damper MK-AZ702K3-2A **OPENS.**
- fan AZ702-K3-5-1A **STARTS**.

5.36.1 **INSTALL** the Reference Method Apparatus.

NOTE - The Stack monitoring system will be operated for a 24 hour conditioning period, during which it shall be continuously measuring stack flow.

5.36.2 **RECORD** the start date and time for this portion of the test.
Start Date ____ Time ____

Test Engineer: ____________________

5.36.3 **DURING** the 24 hour test, take three sets of flow measurements at least one hour apart, using the reference method and the monitoring system.

NOTE: Additional data sheets will be provided for this portion of the test.

5.36.4 **COLLECT** Reference Method date using 6-TF-155, Air Flow Test for Tank Farm Stacks and Ducts.

5.36.5 **RECORD** reference method data taken in step 5.36.3 on Appendix H.
Test Engineer: ____________________

5.36.6 **RECORD** data taken in step 5.36.3 on Appendix F.

Test Engineer ____________________

5.36.7 **DURING** the 24 hour test, subject the monitoring system to the manufacturers' specified zero and calibration procedures, after the first set of flow data and after the second set of flow data, to test for calibration drift and zero drift.

5.36.8 **RECORD** the monitoring system output reading (Volts DC) on Appendix G before and after the adjustments in step 5.36.7.

Test Engineer.: ____________________

5.37 **UPON** completion of steps 5.36.1 through 5.36.8 **THEN PERFORM** the following calculations on Appendix F:

5.37.17 **CALCULATE** the mean (average) value of the 3 reference method values (volumetric) using the following equation:

$$\overline{RM}\ (mean\ reference\ method\ value) = \sum_{1}^{3} RM \div 3$$

where, $\sum RM$ *= sum of the individual reference method values.*

5.37.2 **CALCULATE** the individual differences between the 3 pairs of reference method values (*RM*)and the measurement system values (*MS*)using the following equation:

$$d_i = RM - MS$$

5.37.3 **CALCULATE** the sum of the differences of the 3 pairs calculated in step 5.37.2.

$$\sum_{1}^{3} d_i$$

5.37.4 **CALCULATE** the mean value of the differences of the 3 pairs caluclated above, using the following equation:

$$\bar{d}_i\ (mean\ difference) = \sum_{1}^{3} d_i \div 3$$

5.37.5 **CALCULATE** the square of each of the 3 values of d_i calculated in step 5.37.2.

5.37.6 **CALCULATE** the sum of the squares of the differences calculated in step 5.37.5.

$$\sum_{i=1}^{3} d_i^2$$

5.37.7 **PERFORM** the following calculations for both Zero and Calibration on Appendix G:

5.37.8 **CALCULATE** the individual differences between the 2 pairs of successive readings.

5.37.9 **CALCULATE** the sum of the differences of the 2 pairs calculated in step 5.37.8.

$$\sum_{i=1}^{2} d_i^2$$

5.37.10 **CALCULATE** the mean value of the differences for the 2 pairs, using the following equation:

$$\bar{d}_i = \sum_{i=1}^{2} d_i \div 2$$

5.37.11 **CALCULATE** the square of each of the 2 values of d_i calculated in step 5.37.8.

5.37.12 **CALCULATE** the sum of the squares of the differences calculated in step 5.37.11.

$$\sum_{i=1}^{2} d_i^2$$

5.37.13 **CALCULATE** the Relative Accuracy of the measurement system versus the reference method used in the following equation:

$$RA = \frac{|\bar{d}_i| \div cc}{\overline{RM}} X\,100$$

$\overline{RM}$ = arithmatic mean of the reference method.

$\bar{d}_i$ = the absolute value of the mean difference between the reference method values (volumetric) and the corresponding measurement system values (volumetric)

cc = confidence coefficient.

$$Where\ cc = t_{0.025} \frac{Sd}{\sqrt{3}}$$

$T_{0.025}$ for 3 = 4.303

$$Sd = \sqrt{\sum_{1}^{3} d_i^2 - \left[\frac{\left(\sum_{1}^{3} d_i\right)^2}{3}\right]}$$

NOTE - The values of $\overline{RM}$, $\bar{d}_i$, $\sum_{1}^{3} d_i^2$,and $\sum_{1}^{3} d_i$ can be found on Appendix F.

5.37.14 **RECORD** the values calculated for Sd, cc, and RA in Appendix F.

Test Engineer.: ____________________

5.37.15 **CALCULATE** the Zero Drift of the measurement system using the following equation:

$$Zero\ Drift = \left[\frac{|\bar{d}_i| \div cc}{5V}\right] X\ 100$$

where,
$\bar{d}$ = the absolute value of the mean difference between the 2 pairs of successive readings.
cc = confidence coefficient

$$Where\ cc = t_{0.025}\frac{Sd}{\sqrt{2}}$$

$T_{0.025}$ for 2 = 12.706

$$Sd = \sqrt{\sum_{1}^{2} d_i^2 - \left[\frac{\left(\sum_{1}^{2} d_i\right)^2}{2}\right]}$$

NOTE - The values of $\bar{d}_i$, $\sum_{1}^{2} d_i^2$,and $\sum_{1}^{2} d_i$ can be found on Appendix G.

5.37.16 **RECORD** the values calculated for Sd, cc, and Zero Drift on Appendix G.

Test Engineer.: ____________________

5.37.17 **CALCULATE** the Calibration Drift of the measurement system using the following equation:

$$\text{Calibration Drift} = \left[\frac{|\bar{d}_i| \div cc}{5V}\right] X\,100$$

where,

$|\bar{d}_i|$ = the absolute value of the mean difference between the 2 pairs of successive readings.

cc = confidence coefficient

$$\text{Where } cc = t_{0.025}\,\frac{Sd}{\sqrt{2}}$$

$T_{0.025}$ for 2= 12.706

$$Sd = \sqrt{\sum_{1}^{2} d_i^2 - \left[\frac{\left(\sum_{1}^{2} d_i\right)^2}{2}\right]}$$

NOTE - The values of $\bar{d}_i$, $\sum_{1}^{2} d_i^2$,andc $\sum_{1}^{2} d_i$ an be found on Appendix G.

5.37.18 **RECORD** the values calculated for Sd, cc, and Calibration Drift on Appendix G.

5.37.19 **ACCEPTANCE CRITERIA** for Relative Accuracy, Zero Drift, and Calibration Drift are as follows;

- Relative Accuracy <10% of $\overline{RM}$
- Zero Drift <3% of Span
- Calibration Drift <3% of Span

5.38 Stack Monitor Roof Cabinet Cooling Fan

5.38.1 VERIFY that detector head in cabinet is operating.

Test Engineer ______________________ Date ______

5.38.2 VERIFY that internal recirculation fan is OFF when cabinet temperature is below 80 F.

Test Engineer ______________________ Date ______

5.38.3 VERIFY that internal recirculation fan is ON when cabinet temperature is above 100 F.
Test Engineer ______________________ Date ______

5.38.4 VERIFY that internal cabinet temperature is a maximum of 5 F warmer than ambient under the following conditions: Ambient temperature is above 100 F, bright sun fully directed on cabinet for a minimum of 2 hours. RECORD actual conditions.

Ambient outdoor temperature: _____ F
Equilibrium temperature inside cabinet: _____ F
Test Engineer ______________________ Date ______

6.0 SECURE FROM POTP

6.1 **VERIFY** that all temporary test equipment has been removed from the Ventilation Building Ventilation System.

Test Engineer: ____________________

6.2 **VERIFY** that all temporary test equipment has been removed from the Ventilation Building Ventilation Stack Monitor.

Test Engineer: ____________________

APPENDIX A - List of Instrumentation Requiring Calibration Verification

Equipment Number	Functional Description	Signature	Date/Time
FT-AZ702K3-1	Beta Monitor Sampler Flow Transmitter in Monitor Panel in Stack Monitor Room.		
FT-AZ702K3-2	Record Monitor Sampler Flow Transmitter in Monitor Panel in Stack Monitor Room.		
FT-AZ702K3-3A	Stack Discharge Flow Transmitter in Monitor Panel in Stack Monitor Room.		
FT-AZ702K3-3B	Stack Discharge Flow Transmitter in Monitor Panel in Stack Monitor Room.		
PI-AZ702K3-1	Beta Monitor Sampler Pressure Gauge in Monitor Panel in Stack Monitor Room.		
PI-AZ702K3-2	Record Monitor Sampler Pressure Gauge in Monitor Panel in Stack Monitor Room.		
RI-AZ702K3-1	Beta Monitor Sampler Radiation Indicator in E/I Room B		

Appendix B - RWS Manual Valves Alignment

VALVE NUMBER	VALVE NAME	REQUIRED POSITION	INITIALS	IV
HV-AZ702-??	BETA Sample line manual isolation valve in Monitor Panel in Stack Monitor Room.	**OPEN**		
HV-AZ702-??	Record Sample line manual isolation valve in Monitor Panel in Stack Monitor Room.	**OPEN**		

Performed By ______________ ______________ ______________
PRINT NAME INITIALS DATE

Verified BY ______________ ______________ ______________
PRINT NAME INITIALS DATE

APPENDIX C - MANUAL VALVE CYCLE LIST

Valve Number	Valve Description	Signature/ Date/Time
HV-AZ702-??	BETA Sample line manual isolation valve in Monitor Panel in Stack Monitor Room.	
HV-AZ702-??	Record Sample line manual isolation valve in Monitor Panel in Stack Monitor Room.	

APPENDIX D		
STEP	**PARAMETER**	**STACK FLOW**
		960 SCFM
5.29.6	FI-Display (SCFM)	
	%Full Scale Stack Flow	
5.29.7	V/I-1 Channel 1 Ideal Output (mA)	
5.29.8	V/I-1Channel 1 Actual Output (mA)	
5.29.10	V/I-1 Channel 1 % Deviation (≤2%)	
5.29.12	Ideal Record and Beta Sample Flow (SCFM)	
5.29.13	FI-AZ702KE-2 Display (SCFM)	
	FI-AZ702K3-3 Display (SCFM)	
5.29.15	% Deviation Record Sample (≤5%)	
5.29.17	% Deviation Beta Sample (≤5%)	
5.29.19	V/I-1 Channel 2 Ideal Output (mA)	
5.29.21	V/I-1 Channel 3 Ideal Output (mA)	
5.29.22	V/I-1 Channel 2 Actual Output (mA)	
	V/I-1 Channel 3 Actual Output (mA)	
5.29.24	V/I-1 Channel 2 % Deviation (≤2%)	
5.29.26	V/I-1 Channel 3 % Deviation (≤2%)	
5.29.28	TI-AZ702K3-1 Display (°F)	
	% Full Scale Stack Temperature	
5.29.30	V/I-2 Channel 2 Ideal Output (mA)	
5.29.31	V/I-2 Channel 2 Actual Output (mA)	
5.29.33	V/I-2 Channel 2 % Deviation (≤2%)	

APPENDIX E					
STEP	PARAMETER	1ST CHECK SOURCE	2nd CHECK SOURCE	3rd CHECK SOURCE	4th CHECK SOURCE
5.30.3	Displayed Activity				
5.30.3	V/I-2 Channel 1 Ideal Output (mA)				
5.30.3	V/I-2 Channel 1 Actual Output (mA)				
5.30.6	V/I-2 Channel 1 % Deviation (≤2%)				

APPENDIX F

TEST FOR ACCURACY						
RUN NO.	DATE	TIME	REFERENCE METHOD (SCFM)	MEASUREMENT SYSTEM (SCFM)	DIFFERENCE d_i=RM-MS	d_i^2
1						
2						
3						
			$\overline{RM}$ =		$\sum_{1}^{3} d_i$ =	$\sum_{1}^{3} d_i^2$ =
					$\overline{d}_i$ =	

Sd = ____
cc = ____
RA = ____

APPENDIX G

TEST FOR CALIBRATION DRIFT AND ZERO DRIFT										
Run No.	Date	Time	Zero Reading Volts		Difference		Calibration Reading Volts		Difference	
			Before	After	d_i	d_i^2	Before	After	d_i	d_i^2
0										
1										
2										
3										
					$\sum d_i =$	$\sum d_i^2 =$			$\sum d_i =$	$\sum d_i^2 =$
					$\bar{d}_i =$				$\bar{d}_i =$	

Sd: ___
cc: ___
Zero Drift: ___

Sd: ___
cc: ___
Zero Drift: ___

APPENDIX H, 241-AZ-702 BLDG EXHAUST STACK SITE-SPECIFIC DATA	
GENERAL INFORMATION	
Stack:	10" (circular diameter), approx. 16' tall
Flow Test Ports:	FTPs D and E, 3/4" half cplng w/plug, height: approx. 6' (above work platform).
Scaffolding:	Work platform installed for stack access.
Exhaust Fan:	AZ702-K3-5-1A and AZ702-K3-5-1B; 1000 CFM @ 70 °F
HEPA Filter:	AZ702-K3-4-1A and AZ702-K3-4-1B (each w/prefilter in series); see H-2-131271 & H-2-131073.
REFERENCES	
Include the following references if requested by Air Balance (AB), Operations (NPO), or Tank Farm Power Operator (OP) personnel: H-2-131073, P & ID Vent Bldg Ventilation System. TO-060-350, Start, Stop and Operate 241-AZ-702 Building Ventilation System.	
PRECAUTIONS & LIMITATIONS	
No additional precautions & limitations. See 6-TF-155, Section 4.0.	
PREREQUISITES	
No additional prerequisites. See 6-TF-155, Section 6.0.	

APPENDIX H, DATA SHEET 1

STEP 7.1	INSTRUMENT CALIBRATION DATA	
7.1.1	AIR FLOW INSTRUMENT	HYGROMETER
	Flow Instrument Type	Equipment Number
	WHSL Code Number	WHSL Code Number
	WHSL Cal Due Date	WHSL Cal Due Date
		WHC Cal Due Date
7.1.2	ADDITIONAL INSTRUMENT CALIBRATION DATA	
	COMMENTS: ______	

Initials/Date ______

APPENDIX H, DATA SHEET 2

STEP 7.2	BAROMETRIC PRESSURE READING				
7.2.1	Hanford Weather Forecaster (373-2716)				
7.2.2 7.2.3	Location	Station Number	Elevation (ft)	Time of Reading	Barometric Pressure (in. Hg)
	200 East	6	680		(P_b)
	COMMENTS: ______				

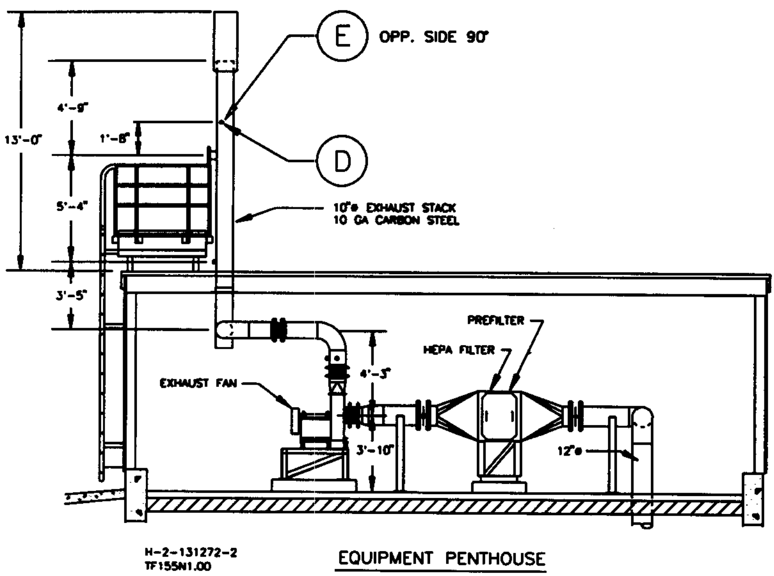
STEP 7.3	INSTALLED INSTRUMENT READINGS			
7.3.1	Operating exh fan:	AZ702-K3-5-1A	AZ702-K3-5-1B	
7.3.2	Instrument	Location	Reading	
	Stack Flow Indicator FI-702-K3-3	241-AZ-271 Graphics Screen 21BldMon.v	(FI-1) (SCFM)	
7.3.3	Instrument calibration sticker current?		YES	NO
	Instrument in proper working condition?		YES	NO
	COMMENTS: ______			

STEP 7.4	PRE-TEST PRESSURE LEAK CHECK		
7.4.3 7.4.6	[Reading ≥ 3.0 in. wg and stable (± 0.2 in. wg) for 15 sec.] Impact Pressure ___ Static Pressure ___	PASS	FAIL
	COMMENTS: ______		

Any supporting Data sheets are to be appended to this data sheet.

Initials/Date ______

241-AZ-702 BLDG VENT	
MEASUREMENT	TEST PORT
Humidity	D
Static Pressure	D
Temperature	D, E
Velocity Pressure	D, E
Stack Diameter:	10 in.
Stack Area:	0.5454 sq ft
Port Elevation:	703 ft



APPENDIX H, Figure 1. 241-AZ 702 Exhaust Stack 296-A-43 Air Flow Test Ports.

APPENDIX H, DATA SHEET 3 (Sheet 1 of 2)

STEP 7.5	STACK AIR FLOW MEASUREMENTS					
	TEST PORT D					
	Relative Humidity:		(RH)		RETEST (IF REQUIRED)	
	Static Pressure:		(P_g)		(P_g)	
	Traverse Points* (in.)	Temp.	Velocity		Velocity	
		ts (°F)	VP (in. wg)	FPM** (ft/min)	VP (in. wg)	FPM** (ft/min)
	1/2					
	1/2					
7.5.2	7/8					
7.5.3	1 1/4					
	1 3/4					
7.5.4	2 1/4					
7.5.5	2 7/8					
	3 3/4					
7.5.6	6 1/4					
	7 1/8					
	7 3/4					
	8 1/4					
	8 3/4					
	9 1/8					
	9 1/2					
	9 1/2					
	TOTAL ts		TOTAL FPM		TOTAL FPM	

* Traverse points are measured relative to internal diameter (i.d.); none may be located within 0.5 in. of stack walls.

** FPM 4005 $\sqrt{VP}$

Any supporting Pitot Traverse Data sheets are to be appended to this data sheet.

Time test completed: ________Initials/Date __________

APPENDIX H, DATA SHEET 3 (Sheet 2 of 2)

STEP 7.5	STACK AIR FLOW MEASUREMENTS					
	TEST PORT E					
	AIR FLOW MEASUREMENTS (CONTINUED)				RETEST (IF REQUIRED)	
	Traverse Points* (in.)	Temp.	Velocity		Velocity	
		ts (°F)	VP (in. wg)	FPM** (ft/min)	VP (in. wg)	FPM** (ft/min)
	1/2					
	1/2					
	7/8					
	1 1/4					
	1 3/4					
7.5.2	2 1/4					
	2 7/8					
7.5.3	3 3/4					
	6 1/4					
7.5.4	7 1/8					
	7 3/4					
7.5.5	8 1/4					
	8 3/4					
7.5.6	9 1/8					
	9 1/2					
	9 1/2		(VP1)		(VP1)	
	TOTAL ts		TOTAL FPM		TOTAL FPM	

* Traverse points are measured relative to internal diameter (i.d.); none may be located within 0.5 in. of stack walls.

** FPM 4005 √VP

Any supporting Pitot Traverse Data sheets are to be appended to this data sheet.

Time test completed: _______ Initials/Date _____________

APPENDIX H, DATA SHEET 4

STEP 7.6	APPENDIX H, PITOT TUBE PERFORMANCE CHECK	
7.6.1 7.6.3 7.6.4	(PASS = P ≤ ± 5%); FAIL = P > ± 5%) P = [(____ - ____) ÷ ____] x 100 = ____ % VP1 VP2 VP1 If P > ± 5% AND VP1 < 0.04 in. wg, air flow retest is NOT required; COG Engineer will determine acceptability of pitot tube performance.	PASS/FAIL
	COMMENTS:	

STEP 7.7	POST-TEST PRESSURE LEAK CHECK	
7.7.1 7.7.2	[Reading ≥ 3.0 in. wg and stable (± 0.2 in. wg) for 15 sec.] Impact Pressure ____ Static Pressure ____	PASS/FAIL
	COMMENTS:	

STEP 7.9	STACK AIR FLOW CALCULATIONS		
7.9.1	Total ts = ts1 + ts2 + ts3 + ...	Total Port D	(Sht 3)
		Total Port E	(Sht 3)
		ts(total) (D + E)	
7.9.2	Average ts = Total ts ÷ 32	ts(avg)	
7.9.3	Velocity (FPM) = 4005 √VP	Data Sheet 3	
7.9.4	Total FPM = FPM1 + FPM2 + FPM3 + ...	Total Port D	(Sht 3)
		Total Port E	(Sht 3)
		FPM(total) (D + E)	
7.9.5	Average FPM = Total FPM ÷ 32	fpm(avg)	
7.9.6	Total CFM = Average FPM x 0.5454 sq ft	cfm(total)	

Any supporting Data sheets are to be appended to this data sheet.

Initials/Date ____________

APPENDIX H, DATA SHEET 5 (Sheet 1 of 2)

COGNIZANT ENGINEER AIR FLOW CALCULATION WORKSHEET

AVERAGE ACTUAL STACK GAS VELOCITY (v_s)

$$v_s = K_p C_p (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$$

AVERAGE STACK GAS DRY VOLUMETRIC FLOW RATE (Q_{sd})

$$Q_{sd} = 60(1-B_{ws}) v_s A \left(\frac{T_{std}}{T_{s(avg)}}\right)\left(\frac{P_s}{P_{std}}\right)$$

$$60(1-B_{ws}) K_p C_p (\sqrt{\Delta P})_{avg} A \left(\frac{T_{std}}{P_{std}}\right)\sqrt{\frac{P_s}{T_{s(avg)} M_s}}$$

Eq. Input	Description	Value
B_{ws}	Stack gas water vapor: $B_{ws} = \left(\frac{RH}{100}\right)\left(\frac{P_{ws}}{P_s}\right)$	
RH	Stack relative humidity, percent	(Sht 3)
P_{ws}	Vapor pressure of H_2O at temperature $t_{s(avg)}$	
K_p	Pitot tube constant: $85.49 \frac{ft}{sec}\left[\frac{(lb)(in.\ Hg)}{(lb\text{-}mole)(°R)(in.\ H_2O)}\right]^{\frac{1}{2}}$	85.49
C_p	Pitot tube coefficient, standard	0.99
$(\sqrt{\Delta P})_{avg}$	Average of velocity pressure sqrt, in. wg: $(\sqrt{\Delta P})_{avg} = fpm_{(avg)} \div 4005$	
$fpm_{(avg)}$	Average stack gas velocity, ft/min	(Sht 4)
A	Cross-sectional stack area, ft^2	0.5454
T_{std}	Standard absolute temperature, °R	528

APPENDIX H, DATA SHEET 5 (Sheet 2 of 2)

COGNIZANT ENGINEER AIR FLOW CALCULATION WORKSHEET		
P_{std}	Standard absolute pressure, in. Hg	29.92
P_s	Absolute stack gas pressure, in. Hg: $P_s = P_b + (P_g \div 13.6)$	
P_b	Barometric pressure at test port, in. Hg	(Sht 2)
P_g	Stack static pressure, in. wg	(Sht 3)
$T_{s(avg)}$	Average absolute stack temperature, °R $T_{s(avg)} = 460 + t_{s(avg)}$	
$t_{s(avg)}$	Average stack gas temperature, °F	(Sht 4)
M_s	Molecular weight stack gas, wet, lb/lb-mole: $M_s = 29(1-B_{ws}) + 18B_{ws}$	
CALCULATION (Q_{sd})		
		Q_{sd} = dscfm

COG Engr Initials/Date: ____________________

APPENDIX H, DATA SHEET 6

STEP 10	DISPOSITION
10.1 10.2	Vent & Balance Reviewer shall ensure Data Sheets are accurate, complete, and legible. __________ V&B Review (print name) __________ Signature ______ Date
10.3	Facility Person-In-Charge (PIC) shall ensure all caps, plugs, and instrumentation have been restored to original configuration and record Work Request Number of items requiring additional maintenance: System configuration restored: __________ Facility PIC ______ Date __________ Work Request Number __________ Work Request Number ______ Date
10.5 10.6	Facility PIC forward work package to Environmental for effluent and emissions calculations (Env. Engr. sign when complete & return work package to Planner): __________ Env. Engr. (print name) __________ Signature ______ Date
COMMENTS:	

Any supporting Data sheets are to be appended to this data sheet.

Effluent Engineering Worksheet (Sheet 1 of 2)

COGNIZANT ENGINEER AIR FLOW DATA ANALYSIS					
RUN	DATE	TIME	Q_{sd}	D_i	$(D_i)^2$
1					
2					
3					
SUM = RUN1 + RUN2 + ...			(ΣQ_{sd})	(ΣD_i)	$[\Sigma(D_i)^2]$
AVG = SUM ÷3			$(\bar{Q}_{sd})$	$(\bar{D}_i)$	

COG Engr Initials/Date: ______________

Effluent Engineering Worksheet (Sheet 2 of 2)

COGNIZANT ENGINEER AIR FLOW DATA ANALYSIS		
95% CONFIDENCE COEFFICIENT (CC) $CC = 4.303\sqrt{\dfrac{\Sigma(D_i)^2 - \left[\dfrac{(\Sigma D_i)^2}{3}\right]}{1 \cdot 3}}$		
Eq. Input	Description	Value
$\Sigma(D_i)^2$	Sum of 3 squared flow rate differences	
ΣD_i	Sum of 3 flow rate differences	
CALCULATION (CC)		
		CC =
PERCENT RELATIVE ACCURACY (RA) $RA = \left[\dfrac{\lvert\overline{D_i}\rvert + CC}{\overline{U_{sd}}}\right] \times 100$		
$\lvert\overline{D_i}\rvert$	Abosolute average flow rate difference	
$\overline{U_{sd}}$	Average reference flow rate	
CALCULATION (RA)		
		RA = %
24-HOUR AIR FLOW TEST RESULTS		
PASS = RA ≤ 10% FAIL = RA > 10%		PASS / FAIL

All persons involved in procedure performance, data recording, and verification or evaluation of test steps shall provide their name, job title, signature, and initials in the following table.

NAME (PRINT)	TITLE	SIGNATURE	INITIAL
	Test Engineer		
	Control Room Operator		
	Local Test Operator		
	Witness		
	Witness		
	Witness		

TEST LOG	TEST NUMBER:	TEST LOG PAGE NUMBER: ___ of ___

TEST TITLE:

TIME/DATE	EVENT DESCRIPTION/SIGNATURE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
DESCRIPTION OF PROBLEM:		
ORIGINATOR: ORG: DATE:	IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION ☐ CONTINUE TE DATE	
DISPOSITION:		
DISPOSITION AND RETEST REQUIREMENTS BY: DATE	DISPOSITION ACTIONS COMPLETE: Verified By: DATE	
QAE CONCURRENCE WITH DISPOSITION (if required): DATE	RETEST COMPLETE: TE DATE	

TEST EXCEPTION LOG				
TE #	DATE	DESCRIPTION	DISPOSITIONED	DATE CLOSED

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