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OPERATIONAL TEST REPORT, INTEGRATED SYSTEM TEST (VENTILATION UPGRADE)

FT CLIFTON

LOCKHEED MARTIN HANFORD COMPANY, Richland, WA 99352
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Abstract: Operational Final Test Report for Integrated Systems, Project W-030 (Phase 2 test, RECIRC & HIGH-HEAT Modes). Project W-030 provides a ventilation upgrade for the four Aging Waste Facility tanks, including upgraded vapor space cooling and filtered venting of tanks AY101, AY102, AZ101, AZ102.

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REFERENCES

1. WHC-SD-600-FDC-001 Rev. 4, *Functional Design Criteria for the Tank Farm Ventilation Upgrade, Project W-030*.
2. OTP-T-W030-001 Rev. B-3 and B-4, *W-030 Operational Test Procedure, Integrated System Test*.
3. HNF-SD-W030-TD-008 Rev. 1, *PREOPERATIONAL TEST FINAL REPORT, INTEGRATED SYSTEM TEST, VENTILATION UPGRADE*; NUMATEC HANFORD COMPANY, January 16, 1998.
4. HNF-3472 Rev. 0, W030 OPERATIONAL TEST REPORT (PHASE 1), NUMATEC HANFORD COMPANY, November 17, 1998.
5. Hanford Drawing, H-2-131000, Revision 2, (June 1998); DRAWING LIST (FOR W-030 PROJECT)
6. HNF-4563 Rev. 0, W030 OPERATIONAL TEST REPORT FOR CATHODIC PROTECTION, LOCKHEED MARTIN HANFORD COMPANY, Date TBD (not yet released at this writing).

1.0 INTRODUCTION

The overall objective of operational testing is to demonstrate that integrated system operation meets design functions and requirements. Design requirements are defined in WHC-SD-600-FDC-001, *Functional Design Criteria for the Tank Farm Ventilation Upgrade, Project W-030*, reference 1, along with related supplemental criteria. Operational testing is performed and reported in three phases.

This report provides a summary of test results for Phase-2 of the operational integrated system test of the 241-AZ-702 ventilation system. Phase-1 testing, restricted to a stack effluent discharge regulatory limit of 80% of the 1000 scfm design, was previously completed and reported in reference 4. Phase-2 testing (at full unlimited flow) completes all required operational testing for Project W-030 tank ventilation/cooling with the exception of the Air Lift Circular demonstration that will be completed at a later date (to be reported through formal revision of this document). The Cathodic Protection system is being tested separately (reference 6).

Phase-2 testing was performed in accordance with OTP-T-W030-001 Rev. B-5, *W-030 Operational Test Procedure, Integrated System Test* (OTP, reference 2). Testing was performed during October and November of 1998; the RECIRC and HIGH-HEAT Modes were fully tested. Results of each section of the OTP are summarized in the appendices.

Attachment 2 of this report provides a copy of the applicable portions of the test procedure, with actual test data as recorded in the field. It should be noted that the system had been operating successfully for more than six months prior to Phase-2 OTP testing; system startup in March 1998 followed a lengthy and comprehensive preoperational test program (Reference 3). The Phase-1 OTP testing was completed in August 1998; lessons-learned were incorporated into Phase-2 testing.

2.0 DESCRIPTION OF TEST

2.1 System Overview

The system is controlled automatically by the Monitor and Control System (MCS). The test included operation and testing of the following 702-AZ systems:

- Primary Vent (PV) System, K1, consisting of four 500-scfm tank-air-inlet stations with automatic tank-pressure control valve; four tank-air-outlet flow-control valves; a final chiller-cooled moisture condenser, one High-Efficiency Mist Eliminator (HEME), two parallel 1000-cubic feet per minute (scfm) Air Cleanup Trains (each with a 20-HP fan, electric heater, and final filters), and the primary tank exhaust stack monitor; the filters include a primary HEPA, HEGA, and final HEPA (High Efficiency Particulate Air, High Efficiency Gas Adsorber).
- Recirculation Vent System, K4, consisting of four tank-ventilation cooling loops, each including one nominal 580 scfm fan, a cooling condenser, moisture separator, and interconnecting valved piping.

- Recirculation Cooling System, EW, consisting of four recirculation water-glycol cooling loops, each including a redundant pair of recirculation pumps, an evaporative cooling tower, and interconnecting valved piping.
- Primary Vent Condenser Cooling System, AZCW, consisting of one air-cooled water chiller (nominal 40 refrigerant tons), two centrifugal circulating water pumps with expansion tank, one 500-gallon thermal storage tank, and piping connecting these components to the primary vent system condenser.
- Primary Vent Condensate Drain System, consisting of an in-cell 80-gallon condensate collection tank with remote sampling and drain piping connected to in-farm catch tank 241-AZ-151.

Figure 1 shows a simple overall system schematic diagram which is based on W-030 design Process and Instrument Diagrams (P&IDs); a complete list of W-030 drawings is found on the official drawing list on reference 5. For the major components mentioned above, detailed requirements and capacity information may be found in the W-030 procurement specifications, listed in reference 5.

2.2 Scope of Integrated System Test, Phase-2

The system was initially verified to be in normal BYPASS or RECIRC Mode of operation in accordance with approved operating procedures. All instruments were verified to have been calibrated and that tank pit sealing had been completed. The test covered RECIRC and HIGH-HEAT Mode testing at stack flows up to the maximum capability of 1050 scfm, and included the sections noted in Table 1 below. Normal steady-state conditions were observed along with system performance following various defined changes in system configuration. Complete parametric data was recorded at each observed condition.

2.3 Operational Test Procedure (OTP)

The approved OTP was prepared and released as a facility operating procedure document in accordance with HNF-IP-0842. It consists of two parts: Attachment A - BYPASS Mode and Attachment B - RECIRC and HIGH-HEAT Modes. The full OTP text is available on the Hanford Network (PROCINFO). Revision B-5 was prepared specifically for Phase-2. The final OTP section defines testing of the system when challenged by activation of existing Air Lift Circulators in tanks AZ101 and AZ102, to be performed later.

2.4 Issues from Pre-Operational Test (POTP)

Preoperational (cold) testing was accomplished under eight POTP procedures, and completed in October 1997; the integrated system cold test was reported under reference 3. The latter identified several Test Exceptions and other issues for further investigation in final testing as summarized in Table 2 below. Some were closed in Phase-1. The remaining open issues are discussed in 4.2.6 below and are considered resolved and closed with the release of the test report.

Table 1. Summary of Test Objectives

Procedure Section, Mode (See Notes)	Test Objectives OTP-W030-001, Phase-2 and -3
A-11, BYPASS or RECIRC	Ensure PV Train-B can achieve design maximum system flow rate (BYPASS or RECIRC Mode).
A-12, BYPASS or RECIRC	Demonstrate smooth switchover from PV-Train-B to Train-A, using MCS Macro (BYPASS or RECIRC).
A-13, BYPASS or RECIRC	Ensure PV Train-A can achieve design maximum system flow rate (BYPASS or RECIRC Mode).
B-3, RECIRC (3.9-3.24)	Document the system effects of variations over a range of temperature settings for the Primary Vent Condenser (new section added by recent OTP revision).
B-4, AY101 High-Heat	Ensure stable steady-state operation with tank AY101 in High-Heat Mode, others in RECIRC Mode; dry and wet cooling towers.
B-5, AY101 High-Heat	Ensure ability to vary tank pressure-control setpoints during AY101 High-Heat Mode operation.
B-6, AY101 High-Heat	Ensure continued stable steady-state system operation following PV-Train switchover (A to B) with AY101 in High-Heat Mode.
B-7, AY102 High-Heat	Ensure stable steady-state operation with tank AY102 in High-Heat Mode, others in RECIRC Mode; dry and wet cooling towers.
B-8, AY102 High-Heat	Ensure ability to vary tank pressure-control setpoints during AY102 High-Heat Mode operation.
B-9, AZ101 High-Heat	Ensure stable steady-state operation with tank AZ101 in High-Heat Mode, others in RECIRC Mode; dry and wet cooling towers.
B-10, AZ101 High-Heat	Ensure ability to vary tank pressure-control setpoints during AZ101 High-Heat Mode operation.
B-11, AZ101 High-Heat	Ensure continued stable steady-state system operation following PV-Train switchover (B to A) with AZ101 in High-Heat Mode.
B-12, AZ102 High-Heat	Ensure stable steady-state operation with tank AZ102 in High-Heat Mode, others in RECIRC Mode; dry and wet cooling towers.
B-13, AZ102 High-Heat	Ensure ability to vary tank pressure-control setpoints during AZ102 High-Heat Mode operation.
(Later) B-15, AZ102 ALC	Ensure safe and stable steady-state system operation during activation of selected Air-Lift Circulators.

NOTES:

1. Procedure section A-11 refers to Section 11 of Attachment A. This nomenclature is used throughout this report.
2. Sections A-1, A-2, B-1, B-2 were also implemented, but they include only preparation and setup steps.

Table 2. Summary of POTP Test Issues

TE OR ISSUE	DESCRIPTION	STATUS
004	Excessive tank in-leakage	Closed in Phase-1.
019	Spurious "keep-alive" (KA) alarms	Closed in Phase-1.
032	Spurious peer-peer alarms	Closed in Phase-1.
035	Suspect chiller-related data	Closed in Phase-1.
036	Wind-effects on atmosphere reference probe	Closed in Phase-1.
041	LCU-1 erratic behavior	Closed in Phase-1.
045	Spurious KA alarms	Closed in Phase-1.
074	Recirc-loop diff. pressure	Closed. See 4.2.6
086	Spurious stack CAM alarm	Non-recurring. Considered Closed. See 4.2.6
HIGH-HEAT VACUUM	Excessive tank vacuum in HIGH-HEAT Mode	Closed. See 4.2.6
HIGH-HEAT DP	Unexpected DP values across K4 condensers in HIGH-HEAT	Closed. See 4.2.6

3.0 TEST METHOD

3.1 Summary

All test actions were initiated and verified from the appropriate MCS graphic screen on the operator console in the central control room. The central control room is located inside Control Building 241-AZ-271. The test procedure identified when it was necessary to initiate actions or verify response locally. The system was operated in full automatic mode and controlled by the MCS to the maximum extent possible. When switching between operating modes (BYPASS, RECIRC and HIGH-HEAT), designated manual valves were repositioned by operator personnel at the Recirculation (K4) Cooling Modules inside the Tank Farm.

3.2 Test Objectives

The overall objective of operational integrated system testing is to verify satisfactory and stable integrated system operation of the tank ventilation system in all intended modes of service and to collect sufficient baseline operating data to confirm its heat-removal capacity. The primary objective for Phase-2 testing of the OTP is to demonstrate satisfactory system operation in the RECIRC and HIGH-HEAT Modes in accordance with design requirements. Specific objectives by section are listed in Table 1 above.

3.3 Acceptance Criteria

The specific acceptance criteria for each parameter are stated in the OTP data tables and repeated herein in the test results summaries of the appendices to this report.

3.4 Initial Conditions

Before starting this test, the 241-AZ-702 ventilation system was determined to be operating normally in accordance with applicable plant operating procedures, with each tank in the BYPASS or RECIRC Mode. Detailed prerequisite conditions are presented in OTP Section 4.0, included herein as part of Attachment 2; these include:

- pretest briefing;
- walkdown inspection
- document calibration and signature verifications
- component availability
- no interfering MCS alarms

Unless otherwise noted, the nominal setpoints for certain key parameters are as follows:

- Tank vacuum and exhaust flow control valves in automatic mode;
- Tank vacuum set at -2 inches water column (in wc);
- PV Train heaters set for 25 °F (temperature rise across heater);
- PV water chiller set for approximately 36 °F outlet temperature;
- PV Fan speed under auto control based on PV Train inlet vacuum.

4.0 TEST RESULTS

4.1 Summary

The results of the Phase-2 integrated-system operational test are considered fully acceptable. A detailed description of test results is discussed below and in Appendices 1-14 (one for each OTP section performed). Numerous Test Exceptions (TEs) were recorded. These are discussed below and listed in Attachment 1; none significantly influenced test results. There were no Non-Conformance Reports. All tests in this report were performed with all tanks in RECIRC or HIGH-HEAT Modes. No further BYPASS Mode testing was considered necessary following Phase-1 tests. The discussion below is presented in terms and order of the general test objectives. All open issues from preoperational (POTP) and Phase-1 tests are considered closed, also discussed below.

4.2 Discussion

4.2.1 Primary Vent System Maximum Flow.

OTP Sections A-11 (Train-B) and A-13 (Train-A) successfully operated the PV system at peak flow. Results were closely consistent for each train, with both operating within the Acceptance Criteria of 900-1050 scfm. The data was also closely consistent with POTP results (reference 3, Attachment K). Since the status of the K4 cooling system is not documented for this section, its effects on peak system

flow is unknown (e.g. if more or less condensing were taking place). Test Exceptions TE-001 (item 5), -006 (item 4), and -007 were noted, related to PV Condenser DP, main manifold vacuum, and heater temperatures; see discussions in 4.3. The maximum manifold vacuum achieved was about 20 in. wc (a greater vacuum was achieved in Phase-1, 23 in. wc, because of reduced airflow). This performance is considered acceptable. See Appendix-1 and -3 for details.

4.2.2 Primary Vent Train Switchover at Maximum Flow

OTP Sections A-12 and B-6 successfully initiated an automatic switchover from PV Train-B to Train-A and back again. In B-6, tank AY101 was operating in High-Heat Mode. Operator personnel accomplished the change by a simple MCS Macro command at the interface terminal. The same TEs were recorded as described in 4.2.1 except that TE-006 was not encountered in Section B-6 because of a higher degree of system stabilization. See Appendix-2 and -7 for details.

4.2.3 Primary Vent Condenser Evaluation

In Phase-1, TE-001 (item 5) noted higher than expected PV Condenser Air DP. Accordingly, OTP Section B-3 was expanded to include an evaluation of the effects of condensing-rate on air DP. The test was performed with the system in normal RECIRC Mode at maximum stack airflow (although the degree of recirculation-cooling is not known). Initially maximum PV condensing was occurring, then the chiller was stopped and the resulting transient was recorded, during which the Condenser DP decreased and stack airflow increased. Indeed, at the end of the period, total airflow reached its highest level to date as the chiller was re-started. Since the status of the K4 cooling system is not documented for this section, its effects on peak system flow is unknown (e.g. if more or less condensing were taking place). The same TEs as in 4.2.1 were noted. See Appendix 4 for details.

4.2.4 High-Heat Mode Steady State.

Steady-State High-Heat Mode operation was tested in Appendices B-4, B-7, B-9, and B-12 for all tanks. Each tank was successfully operated in High-Heat Mode for the first time. Table-6 below summarizes key parameters for each tank in each test. The target tank-vacuum setpoint of 2.0 in wc was able to be tightly-controlled for each tank in High-Heat; however, for AZ102 (with the least inleakage) the least vacuum obtainable was 2.3 in wc with its inlet valve full open. In most cases, the other three tanks experience minimal impact when any tank is in High-Heat, however, certain negative effects are notable; with other tanks in High-Heat :

- Tank AY101 is the most impacted; its exhaust valve moves from a mid-range position to full open in attempting to achieve setpoint and in some cases falls short; tank vacuum is diminished when AZ tanks are in High-Heat,
- AY102 does not lose vacuum, but its exhaust valve moves from mid-range to near-full-open,
- even tight-sealed AZ102 cannot maintain vacuum setpoint when AZ101 is in High-Heat.

A concern raised in pre-operational testing appears laid to rest, i.e., excessive tank vacuum in High-

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Heat Mode. This final testing reveals sufficient tank inleakage to preclude this problem. In the former tests, as postulated in the test report (reference 3), the problem was apparently due to the DP losses in the temporary test apparatus.

Test Exceptions -001 (item 5), -006 (items 1 - 5), -007 were noted. See 4.3 for discussion. See Appendices 5, -8, -10, and -13 for all High-Heat detailed test results.

A point of interest in Table-6 is that AZ102 is sufficiently leak-tight that the inlet-station control valve is continuously admitting air, even at the relatively-modest exhaust rate of 110 scfm (suggesting that its normal exhaust rate could be reduced).

In High-Heat Mode, the airflow through the tank, Condenser and Fan is once-through and therefore is precisely known to be 500 scfm because of the K1-2 flow control. Using this data, the flow characteristics of the Fan and Condenser might be "calibrated" to then evaluate their performance in RECIRC mode. Some attempt has been made to do this in the appendices, however, there is insufficient data for a comprehensive analysis.

4.2.5 Change Tank Pressure Setpoints in High-Heat Mode

OTP Sections B-5, B-8, B-10, B-13 successfully demonstrated the ability to change tank-vacuum setpoints (over a range from 0.5 to 3.0 inches wc) for a tank operated in High-Heat Mode. Due to the flow resistance (DP) of the tank inlet stations, the minimum vacuum was limited, depending on the amount of uncontrolled inleakage. TE-008 documents this circumstance for all tanks. Table-3 summarizes the results. See appendices 6, 9, 11, 14 for detailed results.

TABLE 3 - SUMMARY OF TANK VACUUM ACHIEVED (See 4.2.5; Acceptance Criteria = Setpoint ± 0.5)				
Tank Vacuum Achieved, in. wc	AY101	AY102	AZ101	AZ102
Minimum (Setpoint = 0.5)	1.3	1.2	1.7	2.3
Maximum (Setpoint = 3.0)	2.9	3.0	3.0	3.0

4.2.6 Previous Open Issues.

As stated in 2.4 above, Phase-1 OTP testing left several open issues. These are discussed below.

1. Remaining POTP Issues.

- TE-074 identified three K4 fans exhibiting DP values (at 16-17 inches wc) outside the acceptance criteria of < 16 in. wc. The TE report noted deferral of this to the Project

W030 OAC Punchlist, Item 45. However, this TE was actually resolved in the final report (reference 3) via re-testing, with corrected criteria and should have been closed. Even so, the test report text (par. 4.3.2 and Appendix 7 of reference 3) describes other similar violations which were not noted in a TE report.

Accordingly, and subsequent to this OTP, the acceptance criteria was expanded to cover this unanticipated fan performance, but new additional TEs were found (TE-006). Table- 4 provides a comparison of values from the POTP test with those obtained in this OTP test.

Since generally speaking, fan DP is inversely proportional to its flow rate, the data is consistent with K4 Condenser DP data (as shown in Table 4) and with the fan curve (see Figure 2 in Attachment 3). Increasing Condenser DP reflects greater airflow, with a corresponding decrease in Fan DP. However, there is insufficient data for a comprehensive comparison. This issue was not considered in Phase-1 since very little RECIRC testing was done at that time.

The current data is somewhat consistent with the POTP for all fans and is now believed to be normal; the TEs have been accepted on the basis that until now, the actual operating characteristics of this equipment were only speculative. The currently observed performance characteristics were not fully anticipated.

- b) TE-086 identified several spurious alarms of the stack Continuous Air Monitor (CAM). This was deferred to final testing to be investigated if repeated (par. 4.3.4, reference 3). However, no further alarms occurred, and thus, the TE is considered closed.
- c) One of two non-TE issues to be further investigated was the effect of excessive tank-vacuum created during High-Heat testing. As speculated in the POTP test report (reference 3, par. 4.3.1), this problem was apparently related to the temporary test apparatus. It did not occur in this test, and is considered closed. See 4.2.4.
- d) The second non-TE issue (Appendix 7 of reference 3) pertains to unexpected DP values across the K4 Condensers in High-Heat Mode, i.e., the DP is much lower in High-Heat Mode than in RECIRC. Even though the acceptance criteria was widened in this OTP (based on Phase-1 experience), additional TEs were encountered (TE-006).

Table-5 provides a comparison of values from the POTP test with those obtained in this OTP test. The table also compares the DP with the maximum condensing (WET tower), and minimum condensing (DRY tower) modes, using the cooling water temperature as the distinguishing basis. Even though the towers were wet in the POTP test, minimal condensing is assumed since the moisture loading was very low (only ambient outdoor air was used). It is noted that the highest DP values occur in RECIRC Mode (peak airflow) with maximum condensing; in RECIRC Mode with minimal condensing, the DP is slightly less (less airflow). The lowest DPs are seen in High-Heat Mode with minimal condensing (less airflow, fixed at 500 scfm). However, there is

insufficient data for a comprehensive comparison.

The current data is somewhat consistent with the POTP for all K4 condensers and is now believed to be normal; the TEs have been accepted on the basis that until now, the actual operating characteristics of this equipment were only speculative. The currently observed performance characteristics were not fully anticipated.

2. Phase-1 OTP Issues

- a) In the Phase-1 OTP test report (reference 4), TE-001 listed 10 items (related to OTP Attachment-B, Table 3-1) where acceptance criteria was inappropriate, and it promised resolution in Phase-2 (i.e., lessons learned). As a result, the Phase-2 OTP was revised accordingly prior to testing, correcting most of the applicable acceptance criteria throughout the document for those tests not yet performed; one item was missed however, resulting in several Test Exceptions noted herein. See Attachment 1 for more discussion.
- b) Appendix 1 (reference 4) discussion suggests that better inlet-station data would be expected in Phase 2, since the inlet stations were tagged as out-of-service during phase-1 tests. Better data was obtained in these tests; but some data was still unobtainable for similar reasons.
- c) Appendix 2 (reference 4) recommended exploring the problem of excessive DP across the PV Condenser. This was accomplished in this OTP and reported herein in Appendix 4.

4.2.7 Other OTP Issues

- a) The OTP data tables include many sections for which no data was available. In all of these cases, the problem relates to inlet stations that are out of service for administrative reasons. This missing data is not believed to significantly detract from test results.
- b) Many hand-recorded data entries appear suspect due to inconsistency with other data, or representing physically impossible conditions. These include tank AZ102 data in OTP Table 12-2 (data is inconsistent with Table 12-1) and numerous entries concerning the K4 Condenser cooling water temperatures (where water temperature decreases across the condenser). These have been noted in appendices and in Attachment 2 herein.
- c) Not all intended K4 cooling data was collected since it appears that in some cases the Cooling Towers were not functioning properly. This is evidenced by observing water temperatures that should be very near ambient dry-bulb with a DRY tower, or near wet-bulb with a WET tower. Without this data, it is not possible to fully analyze K4 heat removal capabilities.

FIGURE 1
702 AZ System Diagram

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TABLE 4 - K4 FAN DP COMPARISON (See 4.2.6; Current Acceptance Criteria = 15-18 in. wc)								
Operating Condition (2)	AY101		AY102		AZ101		AZ102	
	OTP	POTP	OTP	POTP	OTP	POTP	OTP	POTP
RECIRC, WET	15.5-17	(2)	16.2	(2)	17.4	(2)	16.2	(2)
RECIRC, DRY	14.1-15.1	17.3	13.9	17.2	16.9	16.5	15.6	11.9 (1)
HI-HEAT, WET	19.5	(4)	no data	(4)	no data	(2)	16.8 (3)	(2)
HI-HEAT, DRY	no data	(4)	19.4	(4)	20.6	21.8 (1)	19.1	16.9

(1) Below Acceptance Criteria limit (16 ± 4) in POTP.

(2) See Table 5 for other notes.

TABLE 5 - K4 CONDENSER DP COMPARISON (See 4.2.6; Current Acceptance Criteria = 8 - 12 in. wc)								
Operating Condition (2)	AY101		AY102		AZ101		AZ102	
	OTP	POTP	OTP	POTP	OTP	POTP	OTP	POTP
RECIRC, WET	11.6-12.9	(2)	12.6	(2)	12.3	(2)	12.3	(2)
RECIRC, DRY	10.3-11.2	10.9	10.2	10.8	11.8	10.1	11.7-12	8.3
HI-HEAT, WET	8.2	(4)	no data	(4)	no data	(2)	6.2 (3)	(2)
HI-HEAT, DRY	no data	(4)	5.5	(4)	4.6	3.4 (1)	6.2	4.6 (1)

(1) Below Acceptance Criteria limit (10 ± 4) in POTP.

(2) Assumptions:

a) Cooling Tower WET or DRY based on observed water temperatures;

b) POTP tower is effectively DRY since process air stream moisture loading is very low.

(3) Suspect data, as many recorded values in OTP Table 12-2 inconsistent. (4) Not tested.

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TABLE 6 - SUMMARY CONDITIONS FOR HIGH-HEAT MODE

(See 4.2.4)

Notes: 1. PV Manifold vacuum = 19.5 - 20.3 in. wc., PV Airflow = 950 - 1000 scfm.
2. Tank vacuum setpoint= 2.0 in. wc.
3. Values in brackets represent RECIRC Mode data prior to High-Heat Mode (if change was notable); PV manifold vacuum was 14 in. wc during RECIRC Mode.

Tank/Condition	AY101	AY102	AZ101	AZ102
AY101 in High-Heat	See Appendix 5			
Tank Vacuum, in wc	2.0 [1.3]	0.8	1.1	2.0
Exh., scfm (Setpoint)	492-502 (500)	208-215 (220)	108-116 (110)	108-120 (110)
Exh. (K1-2) Valve % Open	45% [77]	99% [56]	26% [24]	61% [43]
Inlet (K1-1) Valve % Open	55% [0]	nr(1)	0%	22%
AY102 in High-Heat	See Appendix 8			
Tank Vacuum	1.7 [1.4]	2.0 [1.2]	1.3	2.1
Exh., scfm (Setpoint)	194-207 (200)	497-503 (500)	110-118 (110)	109-116 (110)
Exh. (K1-2) Valve % Open	100% [51]	35% [41]	23%	27%
Inlet (K1-1) Valve % Open	0%	36% [0]	0%	22%
AZ101 in High-Heat	See Appendix 10			
Tank Vacuum	0.8 [1.0]	0.7	2.0 [0.9]	1.5 [2.1]
Exh., scfm (Setpoint)	173-181 200	210-214 (210)	497-508 (500)	81-83 (110)
Exh. (K1-2) Valve % Open	100% [41]	86% [37]	32% [19]	100% [25]
Inlet (K1-1) Valve % Open	0%	nr(1)	60% [0]	0% [22]
AZ102 in High-Heat	See Appendix 13			
Tank Vacuum	0.7 [1.0]	0.8	0.9	2.3 [1.9]
Exh., scfm (Setpoint)	163-169 (200)	193-198 (220)	106-108 (110)	495-505 (500)
Exh. (K1-2) Valve % Open	100% [89]	99% [85]	67% [26]	39% [100]
Inlet (K1-1) Valve % Open	0%	0%	nr(1)	97% [02]

- (1) The K1-1 valve position not recorded due to inoperative inlet station; however, the value is assumed to be 0%, since the tank vacuum was below setpoint.

4.3 Test Exceptions

It may appear that many Test Exceptions were encountered during the test. In fact, there was a small group of TEs which repeatedly occurred in almost every section due to inappropriate acceptance criteria. The current acceptance criteria have evolved as the system characteristics at all modes have become more fully understood. A summary discussion of these TEs is presented below; the individual approved TE Reports are included in Attachment 1. Also, appropriate notations are shown as footnotes to the summary data tables in the appendices. All have been accepted with approved dispositions.

TE-001, item # 5. Primary Vent (K1) Condenser Air Differential Pressure (DP) exceeds acceptance criteria limit of ≤ 11 inches wc at maximum flow rates. This TE was first documented and accepted in Phase 1; following that test, the limit was increased from 10 in. wc. to the current limit. The current TEs are approved herein as accepted also, based on the fact that this testing for the first time pushed the system to its true limits. This TE is noted in 14 data tables of this report, always at peak PV system flow.

TE-006, item #1. All four K4 Vent Condenser Air DPs slightly exceed acceptance criteria limit of 8-12 inches wc when operating in RECIRC Mode with the cooling towers in WET Mode (maximum condensing). This performance has been accepted on the basis that the condition is not unexpected and is consistent with similar findings for the PV condenser; and this is the first experience with this condition on most of the tanks (although AY102 was tested in Phase 1). This condition is noted in 7 data tables of this report. It should be noted however, that the data recorded in Phase 2 for AY102 is inconsistent with Phase 1; the reason is unknown.

TE-006, Item #2. Three of the four K4 Vent Condensers Air DPs were below the acceptance criteria when operating in High-Heat Mode with the cooling tower in DRY Mode (minimum condensing). This condition is acceptable and is believed to result from lower airflow in the High-Heat Mode (500 scfm) than in RECIRC Mode (the airflow reduction is due to the increased system resistance effected by throttling the tank exhaust flow control [K1-2] valve) and because the DP is observed to be lower with minimum condensing. These results are quite consistent with the results of pre-operational tests. No other High-Heat data is available. When cooling towers were in WET Mode, DP was within or above the limit for those tanks having valid data. This exception is noted in 5 data tables of this report.

TE-006, item #3. All four K4 Vent Fan Air DPs displayed values outside the acceptance criteria (15-18 inches wc) under different circumstances. Each exceed the limit when operating in High-Heat Mode (19.1 - 20.6); this condition is acceptable as normal, as it is believed to be due to increased system resistance discussed above (item #2). One set of data for AZ102 exhibited a lower DP value (Table 13-3), but this data is suspect due to several inconsistencies. In RECIRC Mode, Each fan exhibited a lower DP when little condensing was taking place (DRY Tower) than with maximum condensing; and AY101 and AY102 both were below the limit; otherwise all were within the limit. This exception is noted in 10 data tables of this report (plus 2 more where it would have appeared had the parameter been displayed therein).

TE-006, item #4. PV Heater Differential Temperature (DT) (and/or the related heater outlet

temperature) exceeded the limit of 25 ± 2 °F (or the calculated outlet ± 2) on several occasions in 4 data tables of this report related to the first 4 test segments of the OTP. This is considered acceptable, as the system apparently had not fully stabilized when these data points were recorded. Control was fully maintained thereafter.

TE-006, item #5 Procedural error; Data table 7-2 calls for PV Train-A data, but instructions call for Train-B in service.

TE-007. PV Manifold (Filter Train inlet header) vacuum setpoint was not achieved on many occasions and was outside the limit of "Setpoint ± 0.5 ". This condition is considered acceptable since the setpoint is arbitrary, and in most cases, it is set higher than the fan is capable in order to force the fan to operate at maximum speed (to ensure maximum system flow). This exception is noted in 15 data tables of this report. In two instances, this TE was cited to explain why AY101 exhaust flow is below setpoint (as noted in Tables 10-2 and 13-2 herein).

TE-008. In High-Heat Mode, tank vacuum cannot be reduced below a certain value, which depends on tank tightness and inlet-station DP. In each of the 4 test sections confirming the ability to change tank vacuum setpoints in High-Heat Mode, the minimum setpoint levels called for could not be achieved. This is acceptable, since tank vacuum remained within safe limits and there is no known purpose for achieving these minimum values in High-Heat Mode. The test objective, to demonstrate the ability to easily change setpoints, was met.

TE-009. Tank exhaust flow was below setpoint limits (± 20 scfm) on tanks AY101 and AZ102 when AZ101 is in High-Heat Mode. This is acceptable since the flow setpoints are somewhat arbitrary and tank vacuum was safely maintained (albeit marginal). This TE was cited in 3 tables of this report.

TE-010. As with TE-009, tank exhaust flow was below setpoint limits (± 20 scfm) on tanks AY101 and AY102 in peak-flow situations and is acceptable for the same reasons. This TE was cited in 3 tables of this report.

5.0 Conclusions and Recommendations

The 241-702-AZ system operates satisfactorily as expected in all modes. The following primary objectives and design requirements were demonstrated, and related recommendations are offered:

1. The Primary Vent (PV) exhaust system, Trains A & B, provides within 10% of the nominal maximum air flow rate of 1000 scfm under normal operating conditions; and the PV Trains can be easily switched by simple operator action at the MCS operator terminal.

Recommendation: Peak flow may be affected by the degree of recirculation (K4) cooling taking place; any such effects should be evaluated.

2. Each tank can be safely operated in both the RECIRC and High-Heat Ventilation Modes and the system performs as designed.

3. While operating in High-Heat Mode,

- exhaust flow from each tank is controlled in a stable manner,
- exhaust flow from each tank is less than in the RECIRC Mode as evidenced by lower Condenser DP and greater Fan DP,
- tank vacuum was not excessive as was experienced during preoperational testing,
- tank vacuum control can be easily adjusted over a wide range of settings for the High-Heat tank without seriously impacting safe operations on the other tanks (even though tank vacuum control in other tanks is somewhat diminished), and
- the PV Fan/Filter Trains can be easily and quickly switched by simple operator command with no noticeable offset in observed parameters.

Recommendation - If High-Heat operation is used often, it is recommended that inlet station HEPA filters be monitored for plugging, so as to ensure against excessive tank vacuum. However, its use should be minimized due to negative impact on other tanks.

4. Recirculation-cooling functions as designed; currently, because of reduced in-tank heat generation, the cooling systems are barely challenged (as evidenced by little or no cooling water temperature increase across the cooling condensers); Cooling Towers can be operated in either WET or DRY Mode, however, during summer conditions, very little cooling takes place in DRY Mode (except for the hottest tanks), or when Tower fans are off. Tank cooling is likely greater in RECIRC Mode than in High-Heat Mode because of greater airflow.

Recommendation - Monitor cooling action to ensure that maximum Cooling Tower effectiveness is realized and that the cooling system is not actually heating the tank.

5. Tank vacuum was easily maintained within acceptance limits, however in some instances, it was marginal due to uncontrolled in-leakage. By comparing overall inlet and outlet flow data, the tanks appear to rate as follows for leak-tightness, from best to worst: AZ102, AZ101, AY101, AY102.

Recommendation - Efforts to seal tank inleakage should be continued.

6. The MCS operator terminals are sufficiently user-friendly to permit the operator to record large amounts of test data very quickly. However, some of the data recorded for this test appear suspect and raise validity questions.

Recommendation - Because this activity leaves room for error, future tests should require that backup data be recorded by the MCS.

7. The PV Condenser exhibits a higher air differential pressure (DP, loss) than expected at peak exhaust air flow, thereby impacting system capacity. However, the DP was demonstrated to be a function of the degree of condensing taking place (a direct function

of the condensing temperature) and thus could be mitigated by optimizing the moisture removal rate.

Recommendation - Continue to evaluate primary condensing requirements and effects over a range of chiller temperature settings.

This Phase-2 testing completes all required operational testing except for Section B-15, Air Lift Circulators.

APPENDIX 1 - BYPASS/RECIRC Mode, Maximum System Flow, Train-B (Section A-11)**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment A, section 11. The test demonstrated system capability to achieve design maximum airflow with Primary Vent (PV) Fan/Filter Train-B in service (see Appendix 3 for discussion of identical test using Train-A).

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in normal RECIRC Mode and stable. Important setpoints were verified or established as follows:

- PV Fan/Filter Train-B in service;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set for -30 in. wc or as required for stable operation;
- Tank exhaust (outlet) flow rates at designated minimum levels.

While ensuring that the system remains stable, AY101 and AY102 tank exhaust flow control valves were adjusted to obtain the design exhaust stack flow rate of 1050 scfm or the maximum achievable. After achieving and maintaining initial stable conditions for a minimum of 15 minutes, parametric data was recorded in Table 11-1; results are summarized in section 4 below.

3.0 TEST OBJECTIVES

With PV Train-B in operation, establish and document stable system operation in the BYPASS or RECIRC Mode at the maximum achievable exhaust stack flow; obtain baseline data and demonstrate system capability.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in the tables below; important setpoints are shown for controlled variables. All test objectives were met; three minor Test Exceptions (TEs) were noted; the TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Although the system did manage to achieve a maximum flow within acceptance criteria, it fell short of the design rate of 1000 scfm. Important data parameters are summarized in Tables 1-1, 1-2, 1-3 below.

The difference between tank exhaust (outlet) air flow rates and the inlet rates is due to tank inleakage and is seen to be consistent in most of the data of all the OTP sections. The difference between the stack exhaust flow and sum of the tank outlet flows is believed attributable to exhaust from Catch Tank 241-AZ-151.

APPENDIX 1 - BYPASS/RECIRC Mode, Maximum System Flow, Train-B (Section A-11)

5.0 CONCLUSION

At the RECIRC Mode conditions established for this test, Train B maximum PV system flow rate is 929 scfm, slightly less than the 1000 scfm design goal. The actual operating status of the recirculation systems is undocumented; optimizing K4 cooling may improve peak PV system flow rate.

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APPENDIX 1 - BYPASS/RECIRC Mode, Maximum System Flow, Train-B (Section A-11)

Table 1-1 Primary Vent Filter Train-B and Stack, OTP Section A-11 (OTP Table 11-1)

Parameter	Actual Value	Setpoint Value	Acceptance Criteria	TE (Note)
PV Manifold Vacuum, in. wc	20.7	30	Setpoint ± 0.5	007 (1)
Heater Differential Temperature, ° F	29	25	Setpoint ± 2	006 (2)
Filter Differential Pressure, HEPA #1, in. wc	0.8	N/A	<5	-
HEGA, in. wc	1.5	N/A	<1.75	-
HEPA #2, in. wc	0.7	N/A	<5	-
Exhaust Fan Speed, rpm	3632	N/A	N/A	-
Motor Load, %	52	N/A	N/A	-
Exhaust Stack Air Flow, scfm	929	N/A	900-1050	-
Temperature, ° F	87	N/A	N/A	-

- (1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.
 (2) Test Exception TE-006, item #4; heater differential temperature is outside of acceptance criteria due to insufficient stabilization at peak flow; this condition also led to 2 other TEs not recorded here. Test objective is not impacted. See 4.3.

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APPENDIX 1 - BYPASS/RECIRC Mode, Maximum System Flow, Train-B (Section A-11)

Table 1-2 Primary Vent System, Condenser & HEME, OTP Section A-11 (OTP Table 11-1)

Parameter	Actual Value	Acceptance Criteria	TE (Note)
Condenser Water	-	-	-
Flow, gpm	119	95-130	-
Inlet Temperature, ° F	37	35-55	-
Outlet Temperature, ° F	40	N/A	-
Condenser Air	-	-	-
Differential Pressure, in. wc	11.9	≤ 11	001 (1)
Inlet Temperature, ° F	80	N/A	-
Outlet Temperature, ° F	45	40-60	-
Condensate Flow, gpm	0.1	N/A	-
HEME Differential Pressure, in. wc	4.5	<10	-
(1) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.			

Table 1-3 Waste Tank Conditions, OTP Section A-11 (OTP Table 11-1)

Parameter	AY101	AY102	AZ101	AZ102	Acceptance Criteria
Inlet Flow, scfm	73	95	nr (1)	0	< outlet flow
Vacuum, in. wc	2.0	1.9	1.3	2.0	0.5-3.0
Outlet Flow, scfm	329	344	109	113	setpoint ±20
Setpoint, scfm	340	340	110	110	N/A
Control Valve Position, % Open	100	92	19(2)	22	>20% open

(1) Inlet station out of service, no data available.

(2) Considered too close to the limit to justify a TE (i.e., within system accuracy).

APPENDIX 2 - BYPASS\RECIRC Mode, PV Train Switchover, B to A, Section A-12**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment A, section 12. The test demonstrated acceptable system performance in RECIRC Mode during Primary Vent (PV) Fan/Filter Train switchover (B to A) while operating at maximum PV system flow rate.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in normal RECIRC Mode and stable following testing of OTP section A-11. Important setpoints were verified or established as follows:

- ~ PV Fan/Filter Train B in service at maximum flow;
- ~ PV Manifold Controller setpoints (PIC-AZK1-1A/1B), set for -30 in. wc or as required for stable operation;
- ~ Tank Flow rates at designated minimum levels.

After ensuring that the system was stable, parametric data was recorded and then the standby PV Train (A) was placed into service using the MCS Macro command. After stabilization, final data was recorded. The macro command performs all of the necessary MCS logic functions in a predetermined order so as to accomplish a near-bumpless transfer.

3.0 TEST OBJECTIVES

Ensure that stable system operation can be demonstrated before and after a normal PV Train switchover in the RECIRC Mode at maximum system flow.

4.0 TEST RESULTS

Stable control was established and observed before and after the changeover action. Setpoints are shown in the table for relevant controlled variables. Important recorded data is given in tables 2-1 and 2-2 below; initial and final values were similar. Results were satisfactory as shown in the tables below. Test objectives were met. Two minor TEs were noted which do not affect test results or objectives; see 4.3 above and Attachment 1 for discussion.

It is noted that stable control was maintained even though the PV manifold pressure setpoints of the two trains were slightly different.

5.0 CONCLUSIONS

The test objective was met. The PV Fan/Filter Trains can be easily switched by operator personnel using the MCS macro command with no system instability expected.

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APPENDIX 2 - BYPASS\RECIRC Mode, PV Train Switchover, B to A (Section A-12)

Table 2-1. System Conditions, OTP Section A-12 (OTP Table 12-1)

Parameter	Initial value PV Train B	Final value PV Train A	Acceptance Criteria	TE (Note)
PV Manifold Vacuum, in. wc (Setpoint)	20.7 (30)	20.8 (25)	Setpoint $\pm$ 0.5	007 (1)
PV Stack Flow, scfm	929	935	900-1050	-
Heater Diff. Temp., ° F (Setpoint = 25)	29	25	Setpoint $\pm$ 2	006 (2)
PV Condenser Diff. Press., in. wc	11.9	11.4	$\leq$ 11	001 (3)
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3. (2) Test Exception TE-006, item #4; See Table 1-1 above. (3) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.				

Table 2-2. Waste Tank Conditions, OTP Section A-12 (OTP Table 12-1)

Parameter	AY101	AY102	AZ101	AZ102	Acceptance Criteria
Inlet Flow, scfm, Initial Final	73 98	95 78	nr (1)	0 0	< outlet
Tank Vacuum, in. wc , Initial & Final (Setpoint=2.0)	2	1.9	1.3	2	0.5 - 3.0
Outlet Flow, scfm, Initial Final	329 338	344 341	109 111	110 114	setpoint $\pm$ 20
- Setpoint, scfm	340	340	110	110	N/A
(1) Not recorded; Inlet station out of service, no data available					

APPENDIX 3 - BYPASS/RECIRC Mode, Maximum System Flow, Train-A (Section A-13)**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment A, section 13. The test demonstrated system capability to achieve design maximum air flow with Primary Vent (PV) Fan/Filter Train-A in service (see Appendix 1 for results of identical test using Train-B).

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in normal RECIRC Mode and stable. Important setpoints were verified or established as follows:

- PV Fan/Filter Train-A in service;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set for -30 in. wc or as required for stable operation;
- Tank Exhaust flow rates returned to designated minimum levels.

While ensuring that the system remains stable, AZ101 and AZ102 tank exhaust flow control valves were adjusted to obtain the design exhaust stack flow rate of 1050 scfm or the maximum achievable. After obtaining initial stable conditions, parametric data was recorded in Table 13-1; results are summarized in section 4 below.

3.0 TEST OBJECTIVES

With PV Train-A in operation, establish and document stable system operation in the BYPASS or RECIRC Mode at the maximum achievable exhaust stack flow from each tank; obtain baseline data and demonstrate system capability.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in the tables below; important setpoints are shown for controlled variables. All test objectives were met; three minor Test Exceptions (TEs) were noted; the TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Although the system did manage to achieve a maximum flow within acceptance criteria, it fell short of the design rate of 1000 scfm. Important data parameters are summarized in Tables 3-1, 3-2, 3-3 below.

5.0 CONCLUSIONS

At the RECIRC Mode conditions established for this test, Train B maximum PV system flow rate is 923 scfm, slightly less than the 1000 scfm design goal. The actual operating status of the recirculation systems is undocumented; optimizing K4 cooling may improve peak PV system flow rate.

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APPENDIX 3 - BYPASS/RECIRC Mode, Maximum System Flow, Train-A (Section A-13)

Table 3-1 Primary Vent Filter Train-A and Stack, OTP Section A-13 (OTP Table 13-1)

Parameter	Actual Value	Setpoint Value	Acceptance Criteria	TE (Note)
PV Manifold Vacuum, in. wc	20.8	30	Setpoint ± 0.5	007(1)
Heater Differential Temperature, ° F	24	25	Setpoint ± 2	006(2)
Filter Differential Pressure, HEPA #1, in. wc	0.8	N/A	< 5	-
HEGA, in. wc	1.5	N/A	< 1.75	-
HEPA #2, in. wc	0.7	N/A	< 5	-
Exhaust Fan Speed, rpm	3631	N/A	N/A	-
Motor Load, %	48	N/A	N/A	-
Exhaust Stack Air Flow, scfm	923	N/A	900-1050	-
Temperature, ° F	87	N/A	N/A	-
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.				
(2) Test Exception TE-006, item # 4; See Table 1-1 above.				

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APPENDIX 3 - BYPASS/RECIRC Mode, Maximum System Flow, Train-A (Section A-13)

Table 3-2 Primary Vent System, Condenser & HEME, OTP Section A-13 (OTP Table 13-1)

Parameter	Actual Value	Acceptance Criteria	TE (Note)
Condenser Water	-	-	-
Flow, gpm	119	95-130	-
Inlet Temperature, ° F	38	35-55	-
Outlet Temperature, ° F	40	N/A	-
Condenser Air	-	-	-
Differential Pressure, in. wc	11.6	≤11	001(1)
Inlet Temperature, ° F	80	N/A	-
Outlet Temperature, ° F	44	40-60	-
Condensate Flow, gpm	0.1	N/A	-
HEME Differential Pressure, in. wc	4.6	<10	-
(1) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.			

Table 3-3 Waste Tank Conditions, OTP Section A-13 (OTP Table 13-1)

Parameter	AY101	AY102	AZ101	AZ102	Acceptance Criteria	TE (Note)
Inlet Flow, scfm	106	246	(2)	0	< outlet flow	-
Vacuum, in. wc	2.0	1.9	1.2	1.9	0.5-3.0	-
Outlet Flow, scfm	335	360	111	111	setpoint ± 20	010(1)
Setpoint, scfm	400	400	110	110	N/A	-
Control Valve Position, % Open	100	99	18 (3)	21	>20% open	-

(1) Test Exception TE-010; AY101, AY102 tank exhaust flow low because PV system has reached its limit. See 4.3.

(2) Inlet station out of service, no data available.

(3) Considered too close to the limit to justify a TE (i.e., within system accuracy).

APPENDIX 4 - RECIRC Mode, Primary Vent Condenser Evaluation (B-3)**1.0 INTRODUCTION**

This appendix summarizes results of operational testing performed under OTP Attachment B, Section 3, steps 3.9 - 3.24. The test evaluated system performance characteristics at different condensing temperatures in the PV Condenser, especially the air pressure drop across the condenser. This section was added because other test sections have revealed higher than expected condenser pressure drop.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in normal RECIRC Mode and stable, with PV Train A in service. Important setpoints were verified or established as follows:

- All Cooling Towers in normal WET operation.
- PV Condenser water inlet temperature normal at 38-42 °F;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set for -30 in. wc or as required for minimum tank flow rates;
- Tank outlet flow rates at designated levels to achieve peak stack flow;
- PV Heater differential temperature control set at 20 °F;

With the system operating normally, initial parametric data was recorded. Then the PV condenser water chiller was stopped using an applicable MCS screen command; circulating pumps remained ON. As the condenser water temperature increased, periodic changed-value data was recorded over five intervals to reflect the resulting system transient conditions. The chiller was restarted as planned when the PV stack air temperature reached 100 ° F (so as not to threaten the stack CAM cutout interlock).

3.0 TEST OBJECTIVES

Characterize PV Condenser pressure loss performance over a range of temperatures and document any unusual system effects from same.

4.0 TEST RESULTS

Based on Test Log notes, the chiller was offline about 7 hours beginning at 3:20 AM, Sept. 25, 1998. During this 7-hour transient, Condenser Water Inlet Temperature warmed from 38 °F to 68 °F. With no other imposed changes, Exhaust Fan (stack) flow increased 7% from 942 scfm to 1009 scfm, while Condenser DP decreased from an excessive 12.6 in. wc to only 7.7 in. wc. The PV Manifold vacuum dropped accordingly from 21 to 18 in. wc with no change in fan speed. Relevant data for several key parameters was collected at short intervals by the MCS and has been plotted to more effectively describe the transient. These plots are named Figure 4-1 through 4-4 and are presented in Attachment 3.

The HEME DP increase (from 4.7 to 5.3 in. wc) could be related either to increased air flow or

APPENDIX 4 - RECIRC Mode, Primary Vent Condenser Evaluation (B-3)

increased moisture loading or both. No change was observed in condensate flow rate; this is not surprising because the storage volume of the condensate seal-pot tank would tend to mask short-term fluctuations. Regarding the HEPA/HEGA filters, no significant increase in pressure loss was noted, and no moisture was detected in the filter-plenum sight gages.

The status of the recirculation (K4) cooling systems is not documented for this section; the degree of cooling (condensing) could impact primary cooling performance.

Two unexplained anomalies are noted in the data: (1) Over the course of the test, air temperature entering the PV condenser gradually decreased from 80 °F to 76 °F. There is insufficient data to determine if this change is due simply to the 7% increase of system airflow, or if some system configuration change occurred during the test. (2) Final system stack air flow of 1020 scfm (after restoring chiller operation) is greater than previously achieved.

5.0 CONCLUSIONS

It is clear that there is a direct relationship between condensing temperature and overall system performance; specifically, the air pressure loss (DP) across the condenser appears to be significantly affected by the amount of moisture collecting on the tube surfaces. More data is needed in order to fully document system performance, but it appears certain that peak system airflow could be increased (if needed) by optimizing tank vent cooling. One area that should be further explored is the effect of various degrees of recirculation cooling which directly affects the amount of moisture entering the PV Condenser. These results also fortunately show that the system might be operated safely for several hours with the PV condenser offline.

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APPENDIX 4 - RECIRC Mode, Primary Vent Condenser Evaluation (B-3)

Table 4-1. PV Condenser Conditions, OTP Section B-3 (OTP Table 3-2)

TE	Acceptance Criteria	Final	Max.	60	55	50	45	Initial	Parameter	
									Condenser Water Inlet Temp., °F >	
-	35-75	nr(1)	68	60	55	50	45	38	Cond. Water Actual Inlet Temp. °F	-
-	95-130	nr(1)	121	121	120	119	119	119	Cond. Water Flow Rate, gpm	-
-	N/A	nr(1)	68	60	55	51	46	40	Cond. Water Outlet Temp., °F	-
001(2)	≤ 11 in. wc	nr(1)	7.7	10.3	10.8	11.1	11.4	12.6	Cond. Air Diff. Pressure, in. wc	-
-	N/A	nr(1)	76	78	79	79	79	80	Cond. Air Inlet Temp., °F	-
-	40-80	nr(1)	68	61	57	53	48	44	Cond. Air Outlet Temp., °F	-
-	< 10 in. wc	nr(1)	5.3	5.0	4.9	4.8	4.8	4.7	HME DP, in. wc	-
-	N/A	nr(1)	3.5	3.2	3.2	3.2	3.0	3.0	Filter Train DP, in. wc (sum of 3)	-
-	N/A	nr(1)	0.1	0.1	0.1	0.1	0.1	0.1	Condensate Flow Rate, gpm	-
-	≤ 1050 scfm	1020	1009	958	958	966	963	942	PV Stack Flow, scfm	-
-	≤ 100°F	85	100	94	91	87	83	85	PV Stack Air Temp., °F	-
007(3)	Setpoint ± 0.5	17.9	17.9	19.6	20	20.3	20.6	20.9	PV Manifold Vacuum, in. wc (Setpoint = 30)	-
-	N/A	3556	3629	3633	3630	3630	3628	3632	PV Exhaust Fan Speed, rpm	-
006(4)	Setpoint ± 2	19	19	19	19	19	18	25	PV Heater DT, °F (setpoint=20)	-
(1) Not recorded due to procedural error. (2) TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3. This OTP section explores this issue. (3) TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3. (4) TE-006 Item #4; See Table I-1 above.										

APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 4. The test demonstrated acceptable steady-state system performance with tank AY101 in HIGH-HEAT Mode with its cooling tower in both wet and dry modes. This test is notable in that it marks the first occasion of operating any tank in High-Heat Mode.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in stable operation with all tanks in RECIRC Mode. Important setpoints and conditions were verified or established as follows:

- PV Train-A in service;
- AY101 Cooling Tower in DRY Mode, all others in WET Mode.
- All tank pressure controls set at -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), and tank exhaust flow control valves set as required for designated minimum tank flow rates;

After obtaining initial stable conditions, parametric data was recorded in Table 4-1. Then tank AY101 was placed in HIGH-HEAT Mode according to approved operating procedures. The steps required to place any tank in High-Heat Mode are as follows:

- Align the tank's manual isolation valves (at the K4 equipment module) for once-through air flow (open valves K4-1, K4-2, close K4-3, 1nd K4-4);
- Ensure K4 Fan ON;
- Select High-Heat Mode on the proper MCS screen to ensure correct configuration;
- Increase PV Manifold vacuum setpoint for peak flow (in this case, from -14 to -20 in. wc;
- Set High-Heat tank exhaust flow at 500 scfm.

After reaching observed stable conditions, a second set of data was recorded. The system was then allowed to maintain steady-state conditions for a 4-hour period with data recorded each hour.

In the second part of this test, the AY101 Cooling Tower was placed in WET Mode; parametric data was then recorded in Table 4-2 every 15 minutes for a total of 5 data sets. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Demonstrate and document stable system operation in the RECIRC and HIGH-HEAT Modes for tank AY101 and obtain heat removal data for the purpose of assessing system cooling capability.

APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).**4.0 TEST RESULTS**

Results of the test were satisfactory as shown in tables 5-1 through 5-4 and as discussed below; important setpoints are shown for controlled variables. All test objectives were met, all setpoints were achieved. Stable control was demonstrated at all setpoints for all parameters. Seven minor Test Exceptions (TEs) were noted. The TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. There were no significant effects on the 3 other tanks when AY101 was placed in High-Heat Mode.

4.1 Control of Tank Vacuum

A major concern raised in preoperational testing was the ability to control internal pressure (vacuum) in High-Heat Mode. Reference 3 describes excessive vacuum developed in all tanks due to the limitation of the inlet stations (with their temporary test ducting apparatus) to provide adequate makeup air at the higher exhaust from the tank. This test successfully demonstrated ideal control of tank vacuum: the setpoint of 2.0 in. wc was maintained in a stable manner, with both the inlet and outlet control valves operating in midrange positions.

4.2 Recirculation (K4) Condenser Air Flow

Condenser air flow DP dropped from 11.2 (RECIRC) to 8.2 in. wc (High-Heat), indicating reduced flow from the RECIRC Mode (RECIRC airflow cannot be directly measured). This conclusion is supported by other data: (1) K4 Fan DP is increased (from 15.1 to 19.6 in. wc), and (2) fan motor current is reduced proportionally (5.3 to 4.3 amps). An inspection of the manufacturer's fan curve supports this conclusion and suggests that airflow is much greater than expected (perhaps more than 700 scfm with the cooling tower operating, and more when it is offline). A copy of the curve is included in Figure 2, Attachment 3.

Because air flow through the condenser is precisely known in the High-Heat Mode (500 scfm), its DP characteristics might be used to approximate airflow in RECIRC Mode. Such an analysis is left for others.

4.3 Recirculation (K4) Condenser Cooling

Because the heat load in this tank is much lower than the system design basis, the condenser and cooling tower are hardly taxed. This observation is evidenced by the insignificant rise in cooling water temperature across the condenser. Thus, estimating the effective heat removal can only be based on the airflow conditions (not on cooling water); the following simple assumptions are used to yield approximate results:

- fully saturated tank air at 500 scfm;
- enthalpy based on ASHRAE data for standard pressure at saturated conditions;

APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).

Heat removal depends on the cooling tower operating mode and ambient weather conditions, especially wet-bulb (for tower in WET Mode) and dry-bulb (DRY Mode) temperatures. For this tank and the summerlike ambient conditions at the time, the average heat removal in the WET Mode is estimated at about 34,000 BTU per hour. Heat removal in the RECIRC Mode is expected to be much greater in proportion to the airflow increase, but not approaching the design basis is 1 million BTU per hour. Additional data is needed to fully assess heat removal.

5.0 CONCLUSIONS

The system operates as designed in High-Heat mode.

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APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).

Table 5-1. Tank AY101 Hi-Heat Conditions, OTP Section B-4 (OTP Table 4-1)

Note - Intended AY101 Cooling Tower Mode: DRY (others WET)

Parameter	Initial AY101 RECIRC	Initial AY101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Tank AY101 Condition >>					
AY101 Exhaust Flow Setpoint, scfm	200	500	500	N/A	-
AY101 Exhaust Flow, scfm	191	500	492-502	Setpoint $\pm$ 20	-
AY101 Exh. Valve % Open	77	45	44-45	>20% Open	-
AY101 Inlet Flow, scfm	0	413	384-396	$\leq$ Exh. Flow	-
AY101 Inlet Valve Position, % Open	0	53	55	N/A	-
AY101 Tank Vacuum, in. wc (setpoint=2)	1.3	2	2	0.5 to 3	-
AY101 Recirc Cond. Air Inlet Temp, °F	86	83	82-85	N/A	-
AY101 Recirc Cond. Air Outlet Temp, °F	76	67	67-69	N/A	-
AY101 Recirc Cond. Water Inlet Temp, °F	72	66	66-68	N/A	(1)
AY101 Recirc Cond. Water Outlet Temp, °F	72	65	67-68	N/A	(1)
AY101 Recirc Cond. Water Flow, gpm	217	216	215-217	190-230	-
AY101 Recirc Cond. Air DP, in. wc	11.2	8.2	8.1-8.2	8-12	-
AY101 Recirc Fan DP, in. wc	15.1	19.6	19.5	15-18	006(2)
AY101 Recirc Fan Motor, amps @ 482-486 VAC	5.3	4.3	4.5	N/A	-
(1) Water temperature reflects Cooling Tower likely in WET mode during Hi-Heat test. Also, some water- temperature data quality is suspect (both AY1 and AY2 condensers).					
(2) Test Exception TE-006, Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3.					

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APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).

Table 5-2. System Conditions, AY101 High-Heat, OTP Section B-4 (OTP Table 4-1)

Note - Intended AY101 Cooling Tower Mode: DRY (others WET)

Tank AY101 Condition >>	Initial AY101 RECIRC	Initial AY101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter					
AY101 Exhaust Flow, (from Table 5-1 above)	191	500	492-502	N/A	-
AY102 Exhaust Flow, scfm (setpoint=220)	216	214	208-215	Setpoint ± 20	-
AZ101 Exhaust Flow, scfm (setpoint=110)	108	108	109-116	Setpoint ± 20	-
AZ102 Exhaust Flow, scfm (setpoint=110)	106	112	108-120	Setpoint ± 20	-
AY102 Tank Vacuum, in. wc (setpoint=2)	0.8	0.8	0.8	0.5 to 3	-
AZ101 Tank Vacuum, in. wc (setpoint=2)	1	1.1	1.1	0.5 to 3	-
AZ102 Tank Vacuum, in. wc (setpoint=2)	2.1	2	2	0.5 to 3	-
PV Exhaust Stack Flow, scfm	655	997	995-1000	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint)	14.2 (14)	20.0 (21)	20.1 (21)	Setpoint ± 0.5	007(1)
PV Cond. Air DP, in. wc	8.8	12	12.1	≤ 11	001(2)
PV Cond. Air Inlet Temp., °F	83	81	81	N/A	-
PV Cond. Air Outlet Temp., °F	46	46	45-46	40-60	-
PV Cond. Water Inlet Temp., °F	38	38	38	35-55	-
PV Cond. Water Outlet Temp., °F	40	41	39-40	N/A	-
PV Cond. Water Flow, gpm	118	119	119	95-130	-
PV HEME DP, in. wc	3.2	5	5	< 10	-
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.					
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.					

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APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).

Table 5-3. Tank AY101 HI-Heat Conditions, OTP Section B-4 (OTP Table 4-2)
Note - Intended Cooling Tower Mode : ALL WET

Tank AY101 Condition >>		Initial AY101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
AY101 Exhaust Flow, scfm (setpoint=500)		501	490-501	Setpoint ±20	-
AY101 Exh. Valve % Open		45	45	>20% Open	-
AY101 Inlet Flow, scfm		393	385-399	≤Exh. Flow	-
AY101 Inlet Valve Position, % Open		55	55	N/A	-
AY101 Tank Vacuum, in. wc (setpoint=2)		2	2	0.5 to 3	-
AY101 Recirc Cond. Air Inlet Temp. °F		84	83-85	N/A	-
AY101 Recirc Cond. Air Outlet Temp. °F		67	65-66	N/A	-
AY101 Recirc Cond. Water Inlet Temp. °F		63	62-65	N/A	-
AY101 Recirc Cond. Water Outlet Temp. °F		65	63-65	N/A	(2)
AY101 Recirc Cond. Water Flow, gpm		214	214-216	190-230	(2)
AY101 Recirc Cond. Air DP, in. wc		8.2	8.1-8.2	8-12	-
AY101 Recirc Fan DP, in. wc		19.6	19.6	15-18	006(1)
AY101 Recirc Fan Motor, amps @ 482-486 VAC		4.4	4.3-4.6	N/A	-
(1) Test Exception TE-006, Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3. (2) Some condenser water- temperature data quality is suspect.					

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APPENDIX 5 - HIGH-HEAT Mode, AY101, Steady State (Section B-4).

Table 5-4. System Conditions, AY101 High-Heat, OTP Section B-4 (OTP Table 4-2)

Note - Intended Cooling Tower Mode : ALL WET

Parameter	Tank AY101 Condition >>			
	Initial AY101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
AY101 Exhaust Flow, scfm (from Table 5-3 above)	501	490-501	N/A	-
PV Exhaust Stack Flow, scfm	992	997-1002	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint=21)	20.1	20	Setpoint ±0.5	007(1)
PV Cond. Air DP, in. wc	12.1	12.1	≤11	001(2)
PV Cond. Air Inlet Temp., °F	81	81	N/A	-
PV Cond. Air Outlet Temp., °F	45	45	40-60	-
PV Cond. Water Inlet Temp., °F	39	38-39	35-55	-
PV Cond. Water Outlet Temp., °F	41	39-41	N/A	-
PV Cond. Water Flow, gpm	119	118-119	95-130	-
PV HEME DP, in. wc	5	4.9-5.0	< 10	-
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.				
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.				

APPENDIX 6 - AY101 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-5).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section- 5. The test demonstrated acceptable system performance in HIGH-HEAT Mode over a range of pressure control setpoints for tank AY101.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable condition with tank AY101 in HIGH-HEAT Mode and other tanks in RECIRC Mode. PV Train A was in service. Important setpoints or conditions were verified or established as follows:

- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set as required to achieve designated tank flow rates.
- Tank AY101 exhaust flow control set at 500 scfm;
- Other tank exhaust flow controls set at minimum designated flow rate;
- Tank AY101 pressure control setpoint placed at -0.5 in. wc;
- Other tank pressure control setpoints set for -2.0 in. wc;

After obtaining initial stable conditions, parametric data was recorded. Then the tank pressure control setpoint for tank AY101 was decreased in -0.5 inch wc increments to -3.0. No other variables were changed. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode over a range of tank pressure setpoints.

4.0 TEST RESULTS

Only data for tank AY101 was recorded and results are as expected. Test objectives were met except for minimum tank vacuum control. Initially, with the tank vacuum set for -0.5 in. wc, vacuum was -1.3 in. wc with the inlet pressure control valve full open, i.e. the inlet station was unable to introduce sufficient air to offset the 500 scfm exhaust (TE-008). Only at a setpoint of -1.5 and greater, was the vacuum under control.

5.0 CONCLUSIONS

Changing and controlling tank pressure setpoint in High-Heat Mode is easily done. However, 1.5 in. wc is the lowest vacuum achievable, and this is a function of the inlet station pressure loss and thus the condition of the inlet station HEPA filters.

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APPENDIX 6 - AY101 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-5).

Table 6-1. AY101 Tank Conditions, OTP Section B-5 (OTP Table 5-1).

Tank Vacuum Setpoint, in. wc>>>	0.5	1	1.5	2	2.5	3	Acceptance Criteria	TE (Note)
Parameter								
Tank AY101 Vacuum	1.3	1.3	1.5	2	2.6	2.9	Setpoint $\pm$ 0.2	008(1)
Inlet Flow, scfm	503	501	462	401	317	142	< Tank Exh. Flow	-
Inlet Valve, % Open	100	100	75	59	46	32	N/A	-
Exh. Flow, scfm (setpoint=500)	503	493	493	494	500	508	Setpoint $\pm$ 20	-
Exh. Valve Position, % Open	42	43	43	45	46	47	> 20% Open	-
(1) Test Exception 008 reflects inappropriate acceptance criteria for tank vacuum set at less than 2 in. wc since the tank air inlet stations are designed with greater than 1-in. wc pressure drop at the required flow rate. Test results are to be expected.								

APPENDIX 7 - AY101 HIGH-HEAT Mode, PV Train Switchover (Section B-6).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 6. The test demonstrated acceptable system performance in HIGH-HEAT Mode during PV Train switchover using the MCS MACRO control.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable manner with AY101 in HIGH-HEAT Mode, all other tanks in RECIRC Mode, and Fan/Filter Train-A in service. The PV manifold pressure and heater temperature setpoints were verified to have matching setpoints. Initial parametric data was recorded in Table 6-1.

While ensuring that the system remains stable, Fan-1B and Heater 1-B were selected and run on the MCS MACRO screen (by design, MCS control of the Filter Train is made by selecting the heater). After system stabilization, a new data set was recorded.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode during changeover to standby PV Train.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in the tables below; important setpoints are shown for controlled variables. All test objectives were met; one minor Test Exception (TE) was noted; the TE does not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Important data parameters are summarized in Tables 7-1 and 7-2 below.

All recorded data is as expected except for AY101 inlet flow which unexplainably increased from 276 to 321 scfm during the transient. The most likely reason is that the system had not fully stabilized when the data was recorded. Setpoint control was maintained for all parameters.

5.0 CONCLUSIONS

The Primary Vent Train switching can be easily accomplished by the operator personnel using automatic MCS action as designed, with no instability.

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APPENDIX 7 - AY101 HIGH-HEAT Mode, PV Train Switchover (Section B-6).

Table 7-1. System Conditions, OTP Section B-6 (OTP Table 6-1)

Parameter	Initial value (Train-A)	Final value (Train-B)	Acceptance Criteria	TE (Note)
PV Manifold Vacuum, in. wc (Setpoint = 21)	20.1	19.3	Setpoint $\pm$ 0.5	007(1)
PV Stack Flow, scfm	998	982	760-1050	-
Heater Diff. Temp., ° F (Setpoint = 25)	24	27	Setpoint $\pm$ 2	-
PV Condenser Diff. Press., in. wc	12.1	11.7	$\leq$ 11	001(1)
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.				
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.				

Table 7-2. Waste Tank Conditions, OTP Section B-6 (OTP Table 6-1)

Parameter		AY101 (HI-HEAT)	AY102	AZ101	AZ102	Acceptance Criteria
Inlet Flow, scfm,	Initial	276	*	0	0	N/A
	Final	321	*	0	0	
Tank Vacuum, in. wc (Setpoint=2)	Initial	2.1	0.9	1.1	1.9	0.5-3.0
	Final	2.0	0.9	1.1	2.0	
Outlet Flow, scfm,	Initial	493	212	113	108	setpoint $\pm$ 20
	Final	499	213	112	107	
Setpoint, scfm		500	220	110	100	N/A
Valve position, % Open,	Initial	44	99	26	56	> 20% Open
	Final	44	99	25	54	

* No data; inlet station out of service.

APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 7. The test demonstrated acceptable system performance with tank AY102 in HIGH-HEAT Mode with its cooling tower in both wet and dry modes. This test marks the first occasion of this tank operating in High-Heat Mode.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in stable operation with all tanks in RECIRC Mode. Important setpoints and conditions were verified or established as follows:

- PV Train-B in service;
- All tank pressure controls set at -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), and tank exhaust flow control valves set as required for designated minimum tank flow rates;
- All Cooling Towers in WET Mode.

After obtaining initial stable conditions, parametric data was recorded in Table 7-1. Then tank AY102 was placed in HIGH-HEAT Mode (and its cooling tower placed in DRY Mode) according to approved operating procedures; the steps required to do this are similar to those described in Appendix 5 for tank AY101. After reaching observed stable conditions, a second set of data was recorded. The system was then allowed to maintain steady-state conditions for a 4-hour period with data recorded each hour.

In the second part of this test, the AY102 Cooling Tower was placed in WET Mode; parametric data was then recorded in Table 7-2 every 15 minutes for a total of 5 data sets. Results are summarized in Section- 4 below.

3.0 TEST OBJECTIVES

Demonstrate and document stable system operation in the RECIRC and HIGH-HEAT Modes for tank AY102 and obtain heat removal data for the purpose of assessing system cooling capability.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in tables 8-1 through 8-4 and as discussed below; important setpoints are shown for controlled variables. All test objectives were met, all setpoints were achieved. Stable control was demonstrated at all setpoints for all parameters. Thirteen minor Test Exceptions (TEs) were noted. The TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Results were generally consistent with those of Appendix 5. There were no significant effects on the 3 other tanks when AY102 was placed in High-Heat Mode.

APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).**4.1 Control of Tank Vacuum**

As discussed in Appendix 5, this test also successfully demonstrated ideal control of tank vacuum: the setpoint of 2.0 in. wc was maintained in a stable manner, with both the inlet and outlet control valves operating in midrange positions.

4.2 Recirculation (K4) Condenser Air Flow

Condenser air flow DP dropped from 12.6 (RECIRC) to 5.5 in. wc (High-Heat), indicating reduced flow from the RECIRC Mode (RECIRC airflow cannot be directly measured). This conclusion is supported by other data: The K4 Fan DP is increased from 16.2 to 19.5 in. wc (fan motor current was not affected). Using the approach discussed in Appendix 5, RECIRC-Mode air flow is again estimated to be greater than 700 scfm, but an analysis is left for others.

4.3 Recirculation (K4) Condenser Cooling

Because the heat load in this tank is much lower than the system design basis, the condenser and cooling tower are hardly taxed, as evidenced by the insignificant rise in cooling water temperature across the condenser. For this tank and the summerlike ambient conditions at the time, the average heat removal in the DRY Mode is NIL (in fact, some data suggests the tank air is being WARMED by the cooling water); heat removal in the WET mode cannot be assessed since the data indicates that the tower was only operated in the DRY Mode during High-Heat operation, however it might be expected to similar to that of Tank AY101 as discussed in Appendix 5. The cooling capacity of this condenser also has a design basis of 1 million BTU per hour. Additional data is needed to fully assess heat removal.

5.0 CONCLUSIONS

The system operates as designed in High-Heat mode.

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APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).

Table 8-1. Tank AY102 Hi-Heat Conditions, OTP Section B-7 (OTP Table 7-1)

Tank AY102 Condition >>	Initial AY102 RECIRC	Initial AY102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter					
<i>Required AY102 Cooling Tower Mode</i>	<i>WET</i>	<i>DRY</i>	<i>DRY</i>	<i>N/A</i>	-
AY102 Exhaust Flow Setpoint, scfm	210	500	500	N/A	-
AY102 Exhaust Flow, scfm	212	499	497-503	Setpoint ±20	-
AY102 Exh. Valve % Open	41	35	35	> 20% Open	-
AY102 Inlet Flow, scfm	0	115	115	< Exh. Flow	-
AY102 Inlet Valve Position, % Open	0	36	36	N/A	-
AY102 Tank Vacuum, in. wc (setpoint=2)	1.2	2	2.1	0.5 to 3	-
AY102 Recirc Cond. Air Inlet Temp. °F	80	81	79-82	N/A	-
AY102 Recirc Cond. Air Outlet Temp. °F	64	83	81-86	N/A	-
AY102 Recirc Cond. Water Inlet Temp. °F	61	78	83-85	N/A	(4)
AY102 Recirc Cond. Water Outlet Temp. °F	65	81	82-85	N/A	(4)
AY102 Recirc Cond. Water Flow, gpm	209	219	218	190-230	-
AY102 Recirc Cond. Air DP, in. wc	12.6	5.5	5.4-5.5	8-12	006(2)
AY102 Recirc Fan DP, in. wc	16.2	19.5	19.4	15-18	006(3)
AY102 K4 Fan Motor, amps @ 477-483 VAC	4.2	4	4.2	N/A	-
(1) All other Cooling Towers WET. (2) Test Exception TE-006, Item #1 and 3; K4 Condensers DP higher than expected in RECIRC Mode (with WET Tower) and Fan DP higher than expected in High-Heat. See 4.3. (3) Test Exception TE-006, Item #2; AY102 K4 Condenser DP is lower than expected in High-Heat Mode. (4) Some condenser water- temperature data quality is suspect (both AY1 and AY2 condensers).					

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APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).

Table 8-2. System Conditions, AY102 High-Heat, OTP Section B-7 (OTP Table 7-1)

Note - Intended Cooling Tower Mode: WET

Tank AY102 Condition >>		Parameter	Initial AY102 RECIRC	Initial AY102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
		AY102 Exhaust Flow, scfm (from Table 8-1 above)	212	499	497-503	N/A	-
		AY101 Exhaust Flow, scfm (setpoint=200)	199	194	202-207	Setpoint ±20	-
		AZ101 Exhaust Flow, scfm (setpoint=110)	109	114	110-118	Setpoint ±20	-
		AZ102 Exhaust Flow, scfm (setpoint=110)	107	116	109	Setpoint ±20	(1)
		AY101 Tank Vacuum, in. wc (setpoint=2)	1.4	1.7	1.7-1.8	0.5 to 3	-
		AZ101 Tank Vacuum, in. wc (setpoint=2)	1.2	1.3	1.4	0.5 to 3	-
		AZ102 Tank Vacuum, in. wc (setpoint=2)	2.1	2.1	2.0	0.5 to 3	-
		PV Exhaust Stack Flow, scfm	688	963	947-955	760-1050	-
		PV Exhaust Manifold Vacuum, in. wc (setpoint)	16.4 (16.4)	20.4 (21)	20.3 (21)	Setpoint ±0.5	-
		PV Cond. Air DP, in. wc	10.5	12.1	12.0	≤ 11	001(2)
		PV Cond. Air Inlet Temp, °F	81	84	84-85	N/A	-
		PV Cond. Air Outlet Temp, °F	44	47	46-47	40-60	-
		PV Cond. Water Inlet Temp, °F	38	38	38	35-55	-
		PV Cond. Water Outlet Temp, °F	40	41	40-41	N/A	-
		PV Cond. Water Flow, gpm	119	118	119	95-130	-
		PV HEME DP, in. wc	3.1	4.9	4.8	< 10	-
(1)	No data for intervals 1-3 due to defective instrument.						
(2)	Test Exception TE-001, item #5: PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.						

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APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).

Table 8-3. Tank AY102 Hi-Heat Conditions, OTP Section B-7 (OTP Table 7-2)

Note - Intended Cooling Tower Mode : ALL WET

Parameter	Tank AY102 Condition >>>	Initial AY102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
AY102 Exhaust Flow, scfm	(setpoint=500)	502	498-508	Setpoint ±20 scfm	-
AY102 Exh. Valve % Open		35	34-35	> 20% Open	-
AY102 Inlet Flow, scfm		(1)	(1)	< Exh. Flow	(1)
AY102 Inlet Valve Position, % Open		(1)	(1)	N/A	(1)
AY102 Tank Vacuum, in. wc	(setpoint=2)	2.2	2.1-2.2	0.5 to 3 in. wc	-
AY102 Recirc Cond. Air Inlet Temp. °F		79	79-81	N/A	(2)
AY102 Recirc Cond. Air Outlet Temp. °F		86	77-81	N/A	(2)
AY102 Recirc Cond. Water Inlet Temp. °F		84	81-85	N/A	(2)
AY102 Recirc Cond. Water Outlet Temp. °F		84	81-87	N/A	(2)
AY102 Recirc Cond. Water Flow, gpm		218	217-219	190-230	-
AY102 Recirc Cond. Air DP, in. wc		5.5	5.4-5.5	8-12	006(3)
AY102 Recirc Fan DP, in. wc		19.3	19.4-19.5	15-18	006(4)
AY102 Recirc Fan Motor Current, amps @ 482-486 VAC		4.2	4.1-4.3	N/A	-
<p>(1) No data; inlet station out of service.</p> <p>(2) Water temperature reflects Cooling Tower non-functional or in DRY mode during Hi-Heat test (fan may be off). Also, some condenser air and water- temperature data quality is suspect.</p> <p>(3) Test Exception TE-006 Item #2; K4 Condenser DP is lower than expected in High-Heat Mode. See 4.3.</p> <p>(4) Test Exception TE-006 Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3.</p>					

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APPENDIX 8 - HIGH-HEAT Mode, AY102, Steady State (Section B-7).

Table 8-4. System Conditions, AY102 High-Heat, OTP Section B-7 (OTP Table 7-2)

Note - Intended Cooling Tower Mode : ALL WET

Tank AY102 Condition >>	Initial AY102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter				
AY102 Exhaust Flow, scfm (from Table 8-3 above)	502	498-508	N/A	-
PV Exhaust Stack Flow, scfm	939	943-952	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint=21)	20.5	20.4-20.5	Setpoint ±0.5	007(1)
PV Cond. Air DP, in. wc	11.9	12	≤ 11	001(2)
PV Cond. Air Inlet Temp., °F	84	85	N/A	-
PV Cond. Air Outlet Temp., °F	46	46	40-60	-
PV Cond. Water Inlet Temp., °F	38	37-39	35-55	-
PV Cond. Water Outlet Temp. °F	40	39-41	N/A	-
PV Cond. Water Flow, gpm	119	118-119	95-130	-
PV HEME DP, in. wc	4.8	4.8	< 10	-
(1) Test Exception TE-007; PV Manifold vacuum setpoint is slightly above fan capability; see par. 4.3. Recording this TE is questionable, since this instrument is associated with the standby PV Filter Train.				
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.				

APPENDIX 9 - AY102 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-8).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section- 8. The test demonstrated acceptable system performance in HIGH-HEAT Mode over a range of pressure control setpoints for tank AY102.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable condition with tank AY102 in HIGH-HEAT Mode and other tanks in RECIRC Mode. PV Train B was in service. Important setpoints or conditions were verified or established as follows:

- Tank AY102 exhaust flow control set at 500 scfm;
- Other tank exhaust flow controls set at minimum designated flow rate;
- Tank AY102 pressure control setpoint placed at -0.5 in. wc;
- Other tank pressure control setpoints set for -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set as required to achieve designated tank flow rates.

After obtaining initial stable conditions, parametric data was recorded. Then the tank pressure control setpoint for tank AY102 was decreased in -0.5 inch wc increments to -3.0. No other variables were changed. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode over a range of tank pressure setpoints.

4.0 TEST RESULTS

Only data for tank AY102 was recorded and results are as expected and similar to AY101 (Appendix 6). Test objectives were met except for minimum tank vacuum control. Initially, with the tank vacuum set for -0.5 in. wc, vacuum was -1.2 in. wc with the inlet pressure control valve full open, i.e. the inlet station was unable to introduce sufficient air to offset the 500 scfm exhaust (TE-008). Only at a setpoint of -1.5 and greater, was the vacuum under control.

5.0 CONCLUSIONS

Changing and controlling tank pressure setpoint in High-Heat Mode is easily done. However, 1.5 in. wc is the lowest vacuum achievable, and this is a function of the inlet station pressure loss and thus the condition of the inlet station HEPA filters.

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APPENDIX 9 - AY102 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-8).

Table 9-1. AY102 Tank Conditions, OTP Section B-8 (OTP Table 8-1).

Tank Vacuum Setpoint, in. wc>>	0.5	1	1.5	2	2.5	3	Acceptance Criteria	TE (Note)
Parameter								
Tank AY102 Vacuum	1.2	1.2	1.5	1.9	2.5	3	Setpoint $\pm$ 0.2	008(1)
Inlet Flow, scfm	(2)	(2)	(2)	(2)	(2)	(2)	< Tank Exh. Flow	(2)
Inlet Valve, % Open	100	100	51	28	34	0	N/A	-
Exh. Flow, scfm (setpoint=500)	506	504	500	495	505	501	Setpoint $\pm$ 20	-
Exh. Valve Position, % Open	31	31	31	32	34	34	> 20% Open	
(1) Test Exception TE-008; reflects inappropriate acceptance criteria for tank vacuum set at less than 2 in. wc since the tank air inlet stations are designed with greater than 1-in. wc pressure drop at the required flow rate. Test results are to be expected. (2) Not recorded, Inlet station out of service, no data available..								

APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 9. The test demonstrated acceptable system performance with tank AZ101 in HIGH-HEAT Mode with its cooling tower in both wet and dry modes. This test marks the first occasion of this tank operating in High-Heat Mode.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in stable operation with all tanks in RECIRC Mode. Important setpoints and conditions were verified or established as follows:

- PV Train-B in service;
- All tank pressure controls set at -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B) and tank exhaust flow set as required for designated minimum tank flow rates;
- All Cooling Towers in WET Mode, all others in WET Mode.

After obtaining initial stable conditions, parametric data was recorded in Table 9-1. Then tank AZ101 was placed in HIGH-HEAT Mode (and its cooling tower placed in DRY Mode) according to approved operating procedures; the steps required to do this are similar to those described in Appendix 5 for tank AY101. After reaching observed stable conditions, a second set of data was recorded. The system was then allowed to maintain steady-state conditions for a 4-hour period with data recorded each hour.

In the second part of this test, the AZ101 Cooling Tower was placed in WET Mode; parametric data was then recorded in Table 9-2 every 15 minutes for a total of 5 data sets. Results are summarized in Section- 4 below.

TEST OBJECTIVES

Demonstrate and document stable system operation in the RECIRC and HIGH-HEAT Modes for tank AZ101 and obtain heat removal data for the purpose of assessing system cooling capability.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in tables 10-1 through 10-4 and as discussed below; important setpoints are shown for controlled variables. All test objectives were met, all setpoints were achieved. Stable control was demonstrated at all setpoints for all parameters. Thirteen minor Test Exceptions (TEs) were noted. The TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Results were generally consistent with those of Appendix 5. There were no significant effects on the 3 other tanks when AZ101 was placed in High-Heat Mode.

APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).**4.1 Control of Tank Vacuum**

As discussed in Appendix 5, this test also successfully demonstrated ideal control of tank vacuum: the setpoint of 2.0 in. wc was maintained in a stable manner, with both the inlet and outlet control valves operating in midrange positions.

4.2 Recirculation (K4) Condenser Air Flow

Condenser air flow DP dropped from 12.6 (RECIRC) to 5.5 in. wc (High-Heat), indicating reduced flow from the RECIRC Mode (RECIRC airflow cannot be directly measured). This conclusion is supported by other data: The K4 Fan DP is increased from 16.2 to 19.5 in. wc (fan motor current was not affected). Using the approach discussed in Appendix 5, RECIRC flow is again estimated to be greater than 700 scfm, but the analysis is left for others.

4.3 Recirculation (K4) Condenser Cooling

Because the heat load in this tank is lower than the system design basis, the condenser and cooling tower are hardly taxed, as evidenced by the small rise in cooling water temperature across the condenser. Thus, estimating the effective heat removal can only be based on the airflow conditions (not on cooling water); the following simple assumptions are used to yield approximate results:

- fully saturated tank air at 500 scfm;
- enthalpy based on ASHRAE data for standard pressure at saturated conditions;

Heat removal depends on the cooling tower operating mode and ambient weather conditions, especially wet-bulb (for tower in WET Mode) and dry-bulb (DRY Mode) temperatures. For this tank and the summerlike ambient conditions at the time, the average heat removal in the DRY Mode is estimated at about 130,000 BTU per hour. Heat removal with the tower in the WET Mode cannot be directly determined since no such data was taken during this High-Heat test, but it would be expected to substantially greater. Heat removal in the RECIRC Mode is expected to be greater still in proportion to the airflow increase but not approaching the design basis is 1.6 million BTU per hour. Additional data is needed to fully assess heat removal.

5.0 CONCLUSIONS

The system operates as designed in High-Heat mode.

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APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).

Table 10-1. Tank AZ101 Hi-Heat Conditions, OTP Section B-9 (OTP Table 9-1)

Tank AZ101 Condition >>	Initial AZ101 RECIRC	Initial AZ101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE Note)
Parameter					
<i>AZ101 Required Cooling Tower Mode</i>	<i>WET</i>	<i>DRY</i>	<i>DRY</i>	<i>NA</i>	(1)
AZ101 Exhaust Flow Setpoint, scfm	110	500	500	N/A	-
AZ101 Exhaust Flow, scfm	108	508	497-503	Setpoint ± 20	-
AZ101 Exh. Valve % Open	19 (4)	32	32	>20% Open	(4)
AZ101 Inlet Flow, scfm	0	286	284-287	$\leq$ Exh. Flow	-
AZ101 Inlet Valve Position, % Open	0	60	60	N/A	-
AZ101 Tank Vacuum, in. wc (setpoint=2)	0.9	2	2	0.5 to 3	-
AZ101 Recirc Cond. Air Inlet Temp. °F	122	121	122-123	N/A	-
AZ101 Recirc Cond. Air Outlet Temp. °F	87	88	89-90	N/A	-
AZ101 Recirc Cond. Water Inlet Temp. °F	85	85	88-90	N/A	(5)
AZ101 Recirc Cond. Water Outlet Temp. °F	86	86	88-91	N/A	(5)
AZ101 Recirc Cond. Water Flow, gpm	335	334	331-337	300-340	-
AZ101 Recirc Cond. Air DP, in. wc	11.8	4.7	3.7-4.6	8-12	006(2)
AZ101 Recirc Fan DP, in. wc	16.9	20.6	20.6	15-18	006(3)
AZ101 Recirc Fan Motor, amps @ 483-490 VAC	4.9	3.8	3.8-3.9	N/A	-
(1) All other Cooling Towers WET. (2) Test Exception TE-006 Item #2; K4 Condenser DP is lower than expected in High-Heat Mode. (3) Test Exception TE-006 Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3. (4) Considered too close to the limit to justify a TE (i.e., within system accuracy). (5) Water temperature reflects Cooling Tower non-functional or in DRY mode during initial (fan may be off). Also, some condenser air and water- temperature data quality is suspect. (AY1, AY2, and AZ2 condensers).					

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APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).

Table 10-2. System Conditions, AZ101 High-Heat, OTP Section B-9 (OTP Table 9-1)

Note - Intended Cooling Tower Mode: WET

Tank AZ101 Condition >>		Initial AZ101 RECIRC	Initial AZ101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
AZ101 Exhaust Flow, scfm (from Table 10-1 above)		108	508	497-504	N/A	-
AZ101 Exhaust Flow, scfm (setpoint=200)	192	179	173-181	Setpoint ±20	007(1)	-
AZ102 Exhaust Flow, scfm (setpoint)	216 (220)	210 (210)	212-214 (210)	Setpoint ±20	-	-
AZ102 Exhaust Flow, scfm (setpoint=110)	106	82	81-83	Setpoint ±20	010(2)	-
AZ101 Tank Vacuum, in. wc (setpoint=2)	1	0.8	0.8	0.5 to 3	-	-
AZ102 Tank Vacuum, in. wc (setpoint=2)	0.7	0.7	0.7	0.5 to 3	-	-
AZ102 Tank Vacuum, in. wc (setpoint=2)	2.1	1.5	1.5	0.5 to 3	-	-
PV Exhaust Stack Flow, scfm	681	999	989-1002	760-1050	-	-
PV Exhaust Manifold Vacuum, in. wc (setpoint)	12.7 (12.8)	19.6 (21)	19.5 (21)	Setpoint ±0.5	007(1)	-
PV Cond. Air DP, in. wc	6.3	12.4	12.4	≤11	001(3)	-
PV Cond. Air Inlet Temp., °F	81	84	84-85	N/A	-	-
PV Cond. Air Outlet Temp., °F	46	46	46-47	40-60	-	-
PV Cond. Water Inlet Temp., °F	38	38	37-38	35-55	-	-
PV Cond. Water Outlet Temp., °F	40	40	39-41	N/A	-	-
PV Cond. Water Flow, gpm	118	118	118-119	95-130	-	-
PV HEME DP, in. wc	3.3	5	5	< 10	-	-
(1) TE-007; PV Manifold vacuum set above the fan ability; vacuum not adequate to ensure achieving AZ101 exhaust flow setpoint. See 4.3.						
(2) TE-010; AZ101, AZ102 tank exhaust flow low because PV system has reached its limit. See 4.3.						
(3) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.						

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APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).

Table 10-3. Tank AZ101 Hi-Heat Conditions, OTP Section B-9 (OTP Table 9-2)

Note - Intended Cooling Tower Mode: ALL WET

Parameter	Tank AZ101 Condition >>	Initial AZ101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
AZ101 Exhaust Flow, scfm	(setpoint=500)	504	487-508	Setpoint ±20	-
AZ101 Exh. Valve % Open		32	32	>20% Open	-
AZ101 Inlet Flow, scfm		287	281-287	≤Exh. Flow	-
AZ101 Inlet Valve Position, % Open		60	60	N/A	-
AZ101 Tank Vacuum, in. wc	(setpoint=-2)	2	2	0.5 to 3 in. wc	-
AZ101 Recirc Cond. Air Inlet Temp. °F		122	122	N/A	-
AZ101 Recirc Cond. Air Outlet Temp. °F		88	86-89	N/A	-
AZ101 Recirc Cond. Water Inlet Temp. °F		87	85-89	N/A	(1)
AZ101 Recirc Cond. Water Outlet Temp. °F		88	87-90	N/A	-
AZ101 Recirc Cond. Water Flow, gpm		334	331-335	300-340	-
AZ101 Recirc Cond. Air DP, in. wc		4.6	3.9-4.6	8-12	006(2)
AZ101 Recirc Fan DP, in. wc		20.6	20.6-20.7	15-18	006(3)
AZ101 Recirc Fan Motor Current, amps @ 482-486 VAC		4	3.7-3.9	N/A	-
(1) Water temperature reflects Cooling Tower non-functional or in DRY mode during Hi-Heat test (fan may be off).					
(2) Test Exception TE-006, Item #2; K4 Condenser DP is lower than expected in High-Heat Mode. See 4.3.					
(3) Test Exception TE-006 Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3.					

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APPENDIX 10 - HIGH-HEAT Mode, AZ101, Steady State (Section B-9).

Table 10-4. System Conditions, AZ101 High-Heat, OTP Section B-9 (OTP Table 9-2)

Note - Intended Cooling Tower Mode: ALL WET

Tank AZ101 Condition >>		Initial AZ101 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter					
AZ101 Exhaust Flow, scfm (from Table 10-3 above)		504	490-568	N/A	-
PV Exhaust Stack Flow, scfm		991	993-999	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint=21)		19.3	19.4	Setpoint ±0.5	007(1)
PV Cond. Air DP, in. wc		12.4	12.4-12.5	≤11	001(2)
PV Cond. Air Inlet Temp., °F		84	84-85	N/A	-
PV Cond. Air Outlet Temp., °F		46	46	40-60	-
PV Cond. Water Inlet Temp., °F		38	37-39	35-55	-
PV Cond. Water Outlet Temp. °F		40	39-41	N/A	-
PV Cond. Water Flow, gpm		119	118-119	95-130	-
PV HEME DP, in. wc		5	5	< 10	-
(1) Test Exception TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.					
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.					

APPENDIX 11 - AZ101 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-10).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section-10. The test demonstrated acceptable system performance in HIGH-HEAT Mode over a range of pressure control setpoints for tank AZ101.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable condition with tank AZ101 in HIGH-HEAT Mode and other tanks in RECIRC Mode. PV Train B was in service. Important setpoints or conditions were verified or established as follows:

- Tank AZ101 exhaust flow control set at 500 scfm;
- Other tank exhaust flow controls set at minimum designated flow rate;
- Tank AZ101 pressure control setpoint placed at -0.5 in. wc;
- Other tank pressure control setpoints set for -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set as required to achieve designated tank flow rates.

After obtaining initial stable conditions, parametric data was recorded. Then the tank pressure control setpoint for tank AZ101 was decreased in -0.5 inch wc increments to -3.0. No other variables were changed. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode over a range of tank pressure setpoints.

4.0 TEST RESULTS

Only data for tank AZ101 was recorded and results are as expected and similar to AY101 (Appendix 6). Test objectives were met except for minimum tank vacuum control. Initially, with the tank vacuum set for -0.5 in. wc, vacuum was -1.7 in. wc with the inlet pressure control valve full open, i.e. the inlet station was unable to introduce sufficient air to offset the 500 scfm exhaust (TE-008). Only at a setpoint of -1.5 and greater, was the vacuum under control.

5.0 CONCLUSIONS

Changing and controlling tank pressure setpoint in High-Heat Mode is easily done. However, 1.5 in. wc is the lowest vacuum achievable, and this is a function of the inlet station pressure loss and thus the condition of the inlet station HEPA filters.

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APPENDIX 11 - AZ101 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-10).

Table 11-1. AZ101 Tank Conditions, OTP Section B-10 (OTP Table 10-1).

Tank Vacuum Setpoint, in. wc>>	0.5	1.0	1.5	2.0	2.5	3.0	Acceptance Criteria	TE (Note)
Parameter								
Tank AZ101 Vacuum	1.7	1.7	1.7	2.0	2.6	3.0	Setpoint $\pm$ 0.2	008(1)
Inlet Flow, scfm	352	350	353	288	266	220	< Tank Exh. Flow	-
Inlet Valve, % Open	98	98	98	61	52	42	N/A	-
Exh. Flow, scfm (setpoint=500)	507	506	503	507	508	499	Setpoint $\pm$ 20	-
Exh. Valve Position, % Open	32	32	32	32	34	35	> 20% Open	-

(1) Test Exception TE-008; reflects inappropriate acceptance criteria for tank vacuum set at less than 2 in. wc since the tank air inlet stations are designed with greater than 1-in. wc pressure drop at the required flow rate. Test results are to be expected.

APPENDIX 12 - AZ101 HIGH-HEAT Mode, PV Train Switchover (Section B-11).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 11. The test demonstrated acceptable system performance in HIGH-HEAT Mode during PV Train switchover using the MCS MACRO control.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable manner with AZ101 in HIGH-HEAT Mode, all other tanks in RECIRC Mode, and Fan/Filter Train-B in service. The PV manifold pressure and heater temperature setpoints were verified to have matching setpoints. Initial parametric data was recorded in Table 11-1.

While ensuring that the system remains stable, Fan-1A and Heater 1-A were selected and run on the MCS MACRO screen (by design, MCS control of the Filter Train is made by selecting the heater). After system stabilization, a new data set was recorded.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode during changeover to standby PV Train.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in the tables below; important setpoints are shown for controlled variables. All test objectives were met; one minor Test Exception (TE) was noted; the TE does not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Important data parameters are summarized in Tables 7-1 and 7-2 below.

All recorded data is as expected except for AZ101 exhaust flow which unexplainably increased from 495 to 512 scfm during the transient. The most likely reason is that the system had not fully stabilized when the data was recorded. Setpoint control was maintained for all parameters.

5.0 CONCLUSIONS

The Primary Vent Train switching can be easily accomplished by the operator personnel using automatic MCS action as designed, with no instability.

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APPENDIX 12 - AZ101 HIGH-HEAT Mode, PV Train Switchover (Section B-11).

Table 12-1. System Conditions, OTP Section B-11 (OTP Table 11-1)

Parameter	Initial value (Train-B)	Final value (Train-A)	Acceptance Criteria	TE (Note)
PV Manifold Vacuum, in. wc (setpoint = 21)	19	19.4	Setpoint $\pm$ 0.5	007(1)
PV Stack Flow, scfm	999	992	760-1050	-
Heater Diff. Temp., °F (Setpoint = 25)	24	27	Setpoint $\pm$ 2	-
PV Condenser Diff. Press., in. wc	12	12.1	$\leq$ 11	001(2)

(1) TE-007; PV Manifold vacuum setpoint is above fan capability; see par. 4.3.

(2) TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.

Table 12-2. Waste Tank Conditions, OTP Section B-11 (OTP Table 11-1)

Parameter		AY101	AY102	AZ101 (HI-HEAT)	AZ102	Acceptance Criteria	TE (Note)
Inlet Flow, scfm,	Initial	0	(1)	288	0	N/A	(1)
	Final	0	(1)	289	0		
Tank Vacuum, in. wc, (setpoint=2)	Initial	0.8	0.7	2.0	1.5	0.5-3.0	-
	Final	0.8	0.7	2.0	1.5		
Outlet Flow, scfm,	Initial	181	209	495	79	setpoint $\pm$ 20	-
	Final	180	206	512	85		
Setpoint, scfm		200	210	500	110	N/A	-
Vlv., % Open,	Initial	100	80	33	100	> 20% Open	-
	Final	100	80	33	100		

(1) No data, inlet station out of service.

APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section 12. The test demonstrated acceptable system performance with tank AZ102 in HIGH-HEAT Mode with its cooling tower in both wet and dry modes. This test marks the first occasion of this tank operating in High-Heat Mode.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be in stable operation with all tanks in RECIRC Mode. Important setpoints and conditions were verified or established as follows:

- PV Train-A in service;
- All tank pressure controls set at -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B) and tank exhaust flow control set as required for designated minimum tank flow rates;
- All Cooling Towers in WET Mode.

After obtaining initial stable conditions, parametric data was recorded in Table 12-1. Then tank AZ102 was placed in HIGH-HEAT Mode according to approved operating procedures; the steps required to do this are similar to those described in Appendix 5 for tank AY101. After reaching observed stable conditions, a second set of data was recorded. The system was then allowed to maintain steady-state conditions for a 4-hour period with data recorded each hour.

In the second part of this test, the AZ102 Cooling Tower was placed in WET Mode; parametric data was then recorded in Table 12-2 every 15 minutes for a total of 5 data sets. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Demonstrate and document stable system operation in the RECIRC and HIGH-HEAT Modes for tank AZ102 and obtain heat removal data for the purpose of assessing system cooling capability.

4.0 TEST RESULTS

Results of the test were satisfactory as shown in tables 13-1 through 13-4 and as discussed below; important setpoints are shown for controlled variables. All test objectives were met, all setpoints were achieved. Stable control was demonstrated at all setpoints for all parameters. Thirteen minor Test Exceptions (TEs) were noted. The TEs do not affect test results or objectives; see discussion in 4.3 of the summary report and Attachment 1. Results were generally consistent with those of Appendix 5. There were no significant effects on the 3 other tanks when AZ102 was placed in High-Heat Mode.

APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).**4.1 Control of Tank Vacuum**

Stable control of tank vacuum was maintained; however since this tank is apparently more tightly-sealed than the other tanks, tank vacuum reached 2.3 in. wc in High-Heat Mode, with the inlet pressure-control valve full open. The outlet flow control valve was operating in midrange position.

4.2 Recirculation (K4) Condenser Air Flow

Condenser air flow DP dropped from 11.9 (RECIRC, WET Tower) to 6.3 in. wc (High-Heat, DRY Tower), indicating reduced flow from the RECIRC Mode (RECIRC airflow cannot be directly measured). This conclusion is supported by other data: The K4 Fan DP is increased from 15.8 to 19.1 in. wc and fan motor current dropped from 4.5 to 3.8. Using the approach discussed in Appendix 5, RECIRC flow is estimated to also be greater than 700 scfm with no condensing. When the cooling tower was placed in WET Mode (maximum condensing), the Condenser DP doubles to 12.6 in. wc; this inconsistency causes the data of table 13-3 to appear suspect (especially considering the large difference in the condenser inlet temperature in tables 13-1 and 13-3).

4.3 Recirculation (K4) Condenser Cooling

Because the heat load in this tank is lower than the system design basis, the condenser and cooling tower is hardly taxed, as evidenced by the small rise in cooling water temperature across the condenser. Thus, estimating the effective heat removal can only be based on the airflow conditions (not on cooling water); the following simple assumptions are used to yield approximate results:

- fully saturated tank air at 500 scfm;
- enthalpy based on ASHRAE data for standard pressure at saturated conditions;

Heat removal depends on the cooling tower operating mode and ambient weather conditions, especially wet-bulb (for tower in WET Mode) and dry-bulb (DRY Mode) temperatures. For this tank and the summerlike ambient conditions at the time, the average heat removal in the DRY Mode is estimated at about 75,000 BTU per hour. Heat removal with the tower in the WET Mode cannot be directly determined since no reliable data was taken during this High-Heat test (too much inconsistency between tables 13-1 and 13-3). Heat removal in the RECIRC Mode is expected to be substantially greater in proportion to the airflow increase but not approaching the design basis is 1 million BTU per hour. Additional data is needed to fully assess heat removal.

5.0 CONCLUSIONS

The system operates as designed in High-Heat mode. To control tank vacuum, it will be more important for this tank to keep the inlet station HEPA filters clean. More data is needed to assess cooling capacity.

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APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).

Table 13-1. Tank AZ102 Hi-Heat Conditions, OTP Section B-12 (OTP Table 12-1)

Tank AZ102 Condition >>		Initial AZ102 RECIRC	Initial AZ102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter						
AZ102 Required Cooling Tower Mode		WET	DRY	DRY	N/A	(1)
AZ102 Exhaust Flow Setpoint, scfm		110	500	500	N/A	-
AZ102 Exhaust Flow, scfm		96	495	498-505	Setpoint $\pm$ 20	-
AZ102 Exh. Valve % Open		100	39	39	>20% Open	-
AZ102 Inlet Flow, scfm		0	413	404-409	$\leq$ Exh. Flow	-
AZ102 Inlet Valve Position, % Open		2	98	97	N/A	-
AZ102 Tank Vacuum, in. wc (setpoint=-2)		1.9	2.3	2.3	0.5 to 3	-
AZ102 Recirc Cond. Air Inlet Temp. °F		111	111	111	N/A	-
AZ102 Recirc Cond. Air Outlet Temp. °F		88	88	89-90	N/A	(2)
AZ102 Recirc Cond. Water Inlet Temp. °F		85	86	88-89	N/A	(2)
AZ102 Recirc Cond. Water Outlet Temp. °F		89	88	89-91	N/A	-
AZ102 Recirc Cond. Water Flow, gpm		224	225	224-226	190-230	-
AZ102 Recirc Cond. Air DP, in. wc		11.9	6.3	6.1	8-12	006(3)
AZ102 Recirc Fan DP, in. wc		15.8	19.1	19.0-19.1	15-18	006(4)
AZ102 Recirc Fan Motor Current, amps @ 483-490 VAC		4.5	3.8	3.8-3.9	N/A	-
<p>(1) All other Cooling Towers WET.</p> <p>(2) Water temperature reflects Cooling Tower non-functional or in DRY mode during initial condition (fan may be off). Also, some condenser air and water- temperature data quality is suspect (AY1 and AY2).</p> <p>(3) Test Exception TE-006, Item #2; K4 Condenser DP is lower than expected in High-Heat Mode. See 4.3.</p> <p>(4) Test Exception TE-006, Item #3; K4 Fan DP higher than expected in High-Heat. See 4.3.</p>						

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APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).

Table 13-2. System Conditions, AZ102 High-Heat, OTP Section B-12 (OTP Table 12-1)

Note - Cooling Tower Mode : WET

Tank AZ102 Condition >>	Initial AZ102 RECIRC	Initial AZ102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter					
AZ102 Exhaust Flow, scfm (from Table 13-1 above)	96	495	498-505	N/A	-
AY101 Exhaust Flow, scfm (setpoint=200)	193	165	163-169	Setpoint $\pm$ 20	010(1)
AY102 Exhaust Flow, scfm (setpoint=220)	212	193	195-198	Setpoint $\pm$ 20	-
AZ101 Exhaust Flow, scfm (setpoint=110)	106	106	106-108	Setpoint $\pm$ 20	-
AY101 Tank Vacuum, in. wc (setpoint=2)	1	0.7	0.7	0.5 to 3	-
AY102 Tank Vacuum, in. wc (setpoint=2)	0.9	0.8	0.8	0.5 to 3	-
AZ101 Tank Vacuum, in. wc (setpoint=2)	1	0.9	0.9	0.5 to 3	-
PV Exhaust Stack Flow, scfm	614	998	994-998	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint)	14 14)	19.9 (21)	19.7-19.8 (21)	Setpoint $\pm$ 0.5	007(2)
PV Cond. Air DP, in. wc	9.5	12.6	12.4-12.5	$\leq$ 11	001(3)
PV Cond. Air Inlet Temp., °F	81	85	86-87	N/A	-
PV Cond. Air Outlet Temp., °F	45	46	47	40-60	-
PV Cond. Water Inlet Temp., °F	40	39	38	35-55	-
PV Cond. Water Outlet Temp., °F	41	41	41	N/A	-
PV Cond. Water Flow, gpm	119	119	118-120	95-130	-
PV HEME DP, in. wc	3	5	5	< 10	-
(1) TE-010; AY101, AY102 tank exhaust flow low because PV system has reached its limit. See 4.3. (2) TE-007; PV Manifold vacuum set higher than fan can obtain; vacuum not adequate to achieve AY101 exhaust flow setpoint. See 4.3. (3) TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.					

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APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).

Table 13-3. Tank AZ102 Hi-Heat Conditions, OTP Section B-12 (OTP Table 12-2)
Note - AZ102 Cooling Tower in WET MODE.

Tank AZ102 Condition >>	Initial AZ102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter				
AZ102 Exhaust Flow, scfm (setpoint=500)	500	493-497	Setpoint ±20	-
AZ102 Exh. Valve % Open	39	39	>20% Open	-
AZ102 Inlet Flow, scfm	410	405-412	≤Exh. Flow	-
AZ102 Inlet Valve Position, % Open	97	97	N/A	-
AZ102 Tank Vacuum, in. wc (setpoint=2)	2.4	2.4	0.5 to 3	-
AZ102 Recirc Cond. Air Inlet Temp. °F	84	83-85	N/A	(1)
AZ102 Recirc Cond. Air Outlet Temp. °F	65	64-67	N/A	-
AZ102 Recirc Cond. Water Inlet Temp. °F	65	63-64	N/A	(3)
AZ102 Recirc Cond. Water Outlet Temp. °F	64	66	N/A	(3)
AZ102 Recirc Cond. Water Flow, gpm	226	224-227	190-230	
AZ102 Recirc Cond. Air DP, in. wc	12.6	12.6-12.7	8-12	(1) 006(2)
AZ102 Recirc Fan DP, in. wc	16.8	16.8	15-18	(1)
AZ102 Recirc Fan Motor, amps @ 483-490 VAC	5	4.9-5.1	N/A	(1)
(1) Data inconsistent with Table 13-1 and is suspect. (2) Test Exception TE-006, Item # 1; K4 DP higher than limit in High-Heat Mode, however, this data is suspect based on inconsistency in Condenser inlet temperature compared with Table 13-1. (3) Some condenser-DP and air and water- temperature data quality is suspect. Data reflects inconsistent or impossible conditions (suspect).				

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APPENDIX 13 - HIGH-HEAT Mode, AZ102, Steady State (Section B-12).

Table 13-4. System Conditions, AZ102 High-Heat, OTP Section B-12 (OTP Table 12-2)
Note - AZ102 Cooling Tower in WET MODE.

Tank AZ102 Condition >>	Initial AZ102 HI-HEAT	Intervals 1-4	Acceptance Criteria	TE (Note)
Parameter				
<i>AZ102 Exhaust Flow, scfm (from Table 13-3 above)</i>	500	493-497	N/A	-
PV Exhaust Stack Flow, scfm	991	997-999	760-1050	-
PV Exhaust Manifold Vacuum, in. wc (setpoint=21)	19.6	19.7	Setpoint ± 0.5	007(1)
PV Cond. Air DP, in. wc	12.5	12.5	≤ 11	001(2)
PV Cond. Air Inlet Temp., °F	87	87	N/A	-
PV Cond. Air Outlet Temp., °F	47	46-47	40-60	-
PV Cond. Water Inlet Temp., °F	37	37-39	35-55	-
PV Cond. Water Outlet Temp. °F	40	39-41	N/A	-
PV Cond. Water Flow, gpm	119	119	95-130	-
PV HEME DP, in. wc	4.9	4.9-5.0	< 10	-
(1) Test Exception TE-007; PV Manifold vacuum set higher than fan can obtain; See 4.3.				
(2) Test Exception TE-001, item #5; PV Condenser DP exceeds Acceptance Criteria (AC) limit. See 4.3.				

APPENDIX 14 - AZ102 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-13).**1.0 INTRODUCTION**

This appendix summarizes operational testing performed under OTP Attachment B, Section-13. The test demonstrated acceptable system performance in HIGH-HEAT Mode over a range of pressure control setpoints for tank AZ102.

2.0 DESCRIPTION OF TEST

This paragraph describes OTP requirements for this section. Initial conditions were established as described in 3.4 above. The system was initially verified to be operating in a stable condition with tank AZ102 in HIGH-HEAT Mode and other tanks in RECIRC Mode. PV Train A was in service. Important setpoints or conditions were verified or established as follows:

- Tank AZ102 exhaust flow control set at 500 scfm;
- Other tank exhaust flow controls set at minimum designated flow rate;
- Tank AZ102 pressure control setpoint placed at -0.5 in. wc;
- Other tank pressure control setpoints set for -2.0 in. wc;
- PV Manifold Controller matching setpoints (PIC-AZK1-1A/1B), set as required to achieve designated tank flow rates.

After obtaining initial stable conditions, parametric data was recorded. Then the tank pressure control setpoint for tank AZ102 was decreased in -0.5 inch wc increments to -3.0. No other variables were changed. Results are summarized Section 4 below.

3.0 TEST OBJECTIVES

Establish and document stable system operation in the HIGH-HEAT Mode over a range of tank pressure setpoints.

4.0 TEST RESULTS

Only data for tank AZ102 was recorded and results are as expected and similar to AY101 (Appendix 6). Test objectives were met except for minimum tank vacuum control. As stated earlier, this tank is more tightly sealed than the others. Initially, with the tank vacuum set for -0.5 in. wc, vacuum was -2.3 in. wc with the inlet pressure control valve full open, i.e. the inlet station was unable to introduce sufficient air to offset the 500 scfm exhaust (TE-008). Only at a setpoint of -2.5 and greater, was the vacuum under control.

5.0 CONCLUSIONS

Changing and controlling tank pressure setpoint in High-Heat Mode is easily done. However, 2.5 in. wc is the smallest vacuum achievable, and this is a function of the inlet station pressure loss and thus the condition of the inlet station HEPA filters.

APPENDIX 14 - AZ102 HIGH-HEAT, Change Tank Pressure Setpoints (Section B-13).

Table 14-1. AZ102 Tank Conditions, OTP Section B-13 (OTP Table 13-1).

Tank Vacuum Setpoint, in. wc>>>	0.5	1	1.5	2	2.5	3	Acceptance Criteria	TE (Note)
Parameter								
Tank AZ102 Vacuum	2.3	2.4	2.4	2.4	2.5	3	Setpoint $\pm$ 0.2	008(1)
Inlet Flow, scfm	407	409	408	408	380	282	< Tank Exh.	-
Inlet Valve, % Open	97	98	97	97	68	59	N/A	-
Exh. Flow, scfm (setpoint=500)	509	502	502	506	502	505	Setpoint $\pm$ 20	-
Exh. Valve Position, % Open	39	39	39	39	39	40	> 20% Open	-
(1) TE-008; reflects inappropriate acceptance criteria for tank vacuum set at less than 2 in. wc since the tank air inlet stations are designed with greater than 1-in. wc pressure drop at the required flow rate. Test results are to be expected.								

ATTACHMENTS

1. TEST EXCEPTIONS

2. TEST DATA

3. FIGURES

ATTACHMENT 1

TEST EXCEPTIONS

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See approved copies of actual TE reports on the following pages.

TEST EXCEPTION SUMMARY Phase 1 and 2

TE , Phase	OTP SECTIONS AFFECTED	DESCRIPTION	ACTION
001, 1	A-4,-5,-7,-10 B-3	<i>Inappropriate or incorrect acceptance criteria (AC) for several parameters; all of these were corrected in subsequent OTP revisions.</i>	<i>None. No retest required.</i>
002, 1	A-5,-9	<i>Same.</i>	<i>Same</i>
003, 1	A-4	<i>Exhaust fans unable to generate required header vacuum. AC should have reflected that maximum vacuum was unknown..</i>	<i>None. No retest required.</i>
004, 1	A-5,-7	<i>Various AC was unreasonable for the test or in error.</i>	<i>None. No retest required.</i>
005, 1	A-6	<i>Same.</i>	<i>Same.</i>
001, 2	A-11,-12,-13, B-3,-4, -6,-7,-9,-11,-12	PV Condenser DP exceeds AC limits at peak flow.	None. No retest.
006, 2	A-11,-12,-13, B-3,-4, -7,-9,-12	Various parameters outside AC limits (PV Heater DT, K4 fan DP, K4 Condenser DP).	Same.
007, 2	A-11,-12,-13, B-3,-4, -6,-9,-11,-12	PV inlet manifold vacuum below setpoint AC at peak flow. Similar to TE-003.	Same
008, 2	B-5,-8,-10,-13	Tank vacuum exceeds minimum setpoints AC in High-Heat.	Same
009, 2	B-9,-11	Some tank exhaust flows below setpoint when AZ101 in High-Heat.	Same
010, 2	A-13, B-9,-12	Similar.	Same.

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TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5, Various
sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

T.E. NUMBER:

TE-001

DESCRIPTION OF PROBLEM:

Additional exceptions for Phase-2, similar to Item #5 of TE-001, Phase 1. At peak system airflow, Primary Vent Condenser differential pressure (DP), PDI-AZK18-1, is greater than acceptance criteria (AC) limit of ≤ 11 inches water column (in. wc).

Section	Page	Value observed
A11	183	11.9
A12	191	11.9, 11.4
A13	199	11.6
B3	222, 223	12.6, 11.4, 11.2
B4	240	Same (redundant table)
B4	249	12.1
B6	261	12.1, 11.7
B7	277	12.1, 11.9
B7	287	11.9 - 12.1
B9	304	12.4
B9	313	12.4 - 12.5
B11	325	12 - 12.1
B12	341	12.6 - 12.4
B12	350	12.5

TEST ENGINEER:

See Original OTP for Signatures
This Sheet Included for Reference Only.

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE

See Original OTP for Signatures
This Sheet Included for Reference Only.

ORG:

DATE:

PIC

DATE

DISPOSITION (Completed by Test Engineer):

The disposition for each of these instances is the same. The AC is inappropriate for these tests, as the performance characteristics of the condenser were not fully known prior to the tests; the actual values were consistent throughout. Section B3 of the OTP explores this issue.
No re-test is required.

DISPOSITION AND RETEST REQUIREMENTS BY:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

DISPOSITION ACTIONS COMPLETE:

See Original OTP for Signature
This Sheet Included for Reference Only.

TEST ENGINEER

DATE

TEST DIRECTOR

DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

See Original OTP for Signatures
This Sheet Included for Reference Only.

RETEST COMPLETE:

See Original OTP for Signatures
This Sheet Included for Reference Only.

QA ENGINEER

DATE

TEST DIRECTOR

DATE

Usage Type

Document No.

Rev/Mod

Page

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B-5

344-348

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TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5, Various sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

TE-006

Page 1 of 3

DESCRIPTION OF PROBLEM:

Certain parameters gave data readings outside acceptance criteria (AC) allowed in various data tables.

See attached list of occurrences.

TEST ENGINEER:

See Original OTP for Signatures.
This Sheet Included for Reference Only.IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUESee Original OTP for Signatures.
This Sheet Included for Reference Only.

ORG:

DATE:

PIC

DATE

DISPOSITION (Completed by Test Engineer):

Acceptable. AC is inappropriate (too stringent) for the these tests as system performance for certain parameters was not fully developed and understood. Items 1-3 of attached list involve the K4 Condenser and/or fan as noted.

For item 4 in the list, the system had not stabilized when data was recorded. Item 5 relates to a procedural error. No re-test is required. See attached list of occurrences.

DISPOSITION AND RETEST REQUIREMENTS BY:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

DISPOSITION ACTIONS COMPLETE:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

TEST ENGINEER

DATE

TEST DIRECTOR

DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

See Original OTP for Signatures.
This Sheet Included for Reference Only.

RETEST COMPLETE:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

QA ENGINEER

DATE

TEST DIRECTOR

DATE

Usage Type

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Test Exception TE-006, Page 2

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Sect.	Page	Item #	Parameter	AC	Setpt.	Value	Disposition
B4	268 (-271)	1	PDI-AY1K48-1 PDI-AY2K48-1 PDI-AZ1K48-1 PDI-AZ2K48-1	8-12 in wc	NA	12.5 12.6 12.3 12.3	K4 condenser: AY102 in High-heat Mode. All condenser cooling towers wet (causes highest DP).
B9	295	1	PDI-AY1K48-1	8-12 in wc	NA	12.4	Fo K4 Condenser, one of 4 intervals exceed AC (trend - each interval shows higher DP than the one before). Cooling tower is wet, causing higher DP.
B12	332	1	PDI-AY1K48-1	8-12 in wc	NA	12.7-12.9	K4 condenser: AZ102 in High-heat Mode. Condenser cooling tower wet (causes highest DP).
B12	347	1	PDI-AZ2K48-1	8-12 in wc	NA	6.1	K4 condenser: AZ102 in High-heat Mode resulting in lower airflow and lower DP.
B7	269	2	PDI-AY2K48-1	8-12 in wc	NA	5.4-5.5	K4 condenser: AY102 in High-heat Mode resulting in lower airflow and lower DP.
B7	284	2	PDI-AY2K48-1	8-12 in wc	NA	5.5	K4 condenser: AY102 in High-heat Mode resulting in lower airflow and lower DP.
B9	297	2	PDI-AZ1K48-1	8-12 in wc	NA	3.7-4.7	K4 condenser: AZ101 in High-heat Mode resulting in lower airflow and lower DP.
B9	310	2	PDI-AZ1K48-1	8-12 in wc	NA	3.9-4.6	K4 condenser: AZ101 in High-heat Mode resulting in lower airflow and lower DP.
B12	335	2	PDI-AZ2K48-1	8-12 in wc	NA	6.1-6.3	K4 condenser: AZ101 in High-heat Mode resulting in lower airflow and lower DP.
B4	231, 232	3	PDI-AY1K45-1 PDI-AY2K45-1	15-18 in wc	NA	19.6 13.8	K4 fan: AY101 in High-heat Mode.
B4	246	3	PDI-AY1K45-1	Same	NA	19.6	Same
B7	268	3	PDI-AY1K45-1	15-18 in wc	NA	14.1-14.3	K4 fan: cooling tower is dry, resulting in higher airflow. Lower fan DP. AY102 in High-heat Mode.

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Test Exception TE-006, Page 3

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Sect.	Page	Item #	Parameter	AC	Setpt.	Value	Disposition
B7	269	3	PDI-AY2K45-1	15-18 in wc	NA	19.3-19.5	K4 fan; AY102 in High-heat Mode.
B7	284	3	PDI-AY2K45-1	15-18 in wc	NA	19.3-19.5	K4 fan; AY102 in High-heat Mode.
B9	295	3	PDI-AY1K45-1	15-18 in wc	NA	14.9	K4 fan; AZ101 in High-heat Mode.
B9	296	3	PDI-AY2K45-1	15-18 in wc	NA	13.8-14	K4 fan; AZ101 in High-heat Mode.
B9	297	3	PDI-AZ1K45-1	15-18 in wc	NA	20.6	K4 fan; AZ101 in High-heat Mode.
B9	310	3	PDI-AZ1K45-1	15-18 in wc	NA	20.7	K4 fan; AZ101 in High-heat Mode.
B12	333	3	PDI-AY2K45-1	15-18 in wc	NA	13.8-14	K4 fan; AZ102 in High-heat Mode.
B12	335	3	PDI-AZ2K45-1	15-18 in wc	NA	19.1	K4 fan; AZ102 in High-heat Mode.
A11	184	4	TDIC-AZK12-1B; TI-AZK12-3B	Setpt ± 2; calculated	25 F; NA	29 F 77 F	Heater DT and Train outlet temp; system had not stabilized when value recorded. Calculated AC for Train outlet temp. = TDIC + htr. inlet temp. ± 2 F.
A12	192	4	Same as page 184	Same	Same	Same	Same
A13	200	4	TI-AZK12-3B	calculated	Same	72 F	Same
B3	225	4	TDIC-AZK12-1B	Setpt ± 2	20 F	25 F	Heater DT was reset for special test, and system had not stabilized when data taken.
B7	279	4	TDIC-AZK12-1B	Setpt ± 2	25	28	System had not stabilized.
B7	288	5	A11	A11	NA	NA	Procedure error. Incorrect (Train A) data table presented; procedure steps called for Train B data.

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TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5. Various sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

T.E. NUMBER:

TE-007
Page 1 of 2

DESCRIPTION OF PROBLEM:

Data for Primary Vent Inlet manifold vacuum below setpoint acceptance limit in several test sections. See attached list of occurrences.

TEST ENGINEER:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE

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PIC

DATE

DISPOSITION (Completed by Test Engineer):

Acceptable. AC is inappropriate (too stringent) for the these tests as system performance for certain parameters was not fully developed and understood. In most of these instances, this parameter (which controls fan speed) is set greater than the fan can achieve under the required conditions, in order to force the fan to peak performance. In other cases, the table was in error. Manifold vacuum is negatively impacted by the effect of operating the exhaust fan in series with the K4 fans (which tend to pressurize the manifold). Insufficient experience had been obtained with these operating modes to predict this phenomena.

See attached list of occurrences.

DISPOSITION AND RETEST REQUIREMENTS BY:

See Original OTP for Signatures.
This Sheet Included for Reference Only.

DISPOSITION ACTIONS COMPLETE:

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TEST ENGINEER

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TEST DIRECTOR

DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

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RETEST COMPLETE:

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TEST DIRECTOR

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Section	Page	Parameter	AC	Setpt.	Value	Disposition
A11	184	PI-AZK1-1B	Setpt $\pm$ 0.5, in wc vacuum	30	20.7	Manifold vacuum below setpoint. OK; parameter set greater than fan can achieve, to force fan to peak.
A12	192	PI-AZK1-1B, PI-AZK1-1A	Same	30 25	20.7 20.8	Same; these 2 devices measure same parameter.
A13	200	PI-AZK1-1A	Same	30	20.8	Manifold vacuum below setpoint. OK; parameter set greater than fan can achieve, to force fan to peak.
B3	227	PI-AZK1-1B	Same	30	17.4-20.5	Same. However, this data sheet (Train B) is redundant (to Train A) and need not have been completed.
B4	242	PI-AZK1-1A	Same	21	20	Manifold vacuum below setpoint. OK; parameter set greater than fan can achieve, to force fan to peak.
B4	250	PI-AZK1-1A	Same	21	19.9	Same.
B6	262	PI-AZK1-1A, PI-AZK1-1B	Same	21	20.1 19.3	Same
B7	288	PI-AZK1-1A	Same	21	20.4	Same (marginal TE)
B9	295	FI-AY1K1-2	Setpt $\pm$ 20, scfm	200	173-179	Tank AY1 exhaust flow low when AZ1 in Hi-Heat. Condition is unexpected but acceptable. Setpoint is arbitrary.
B9	306	PI-AZK1-1B	Setpt $\pm$ 0.5 in wc vacuum	21	19.4-19.6	Manifold vacuum below setpoint. OK; parameter set greater than fan can achieve, to force fan to peak.
B9	314	PI-AZK1-1B	Same	21	19.3-19.5	Same
B11	326	PI-AZK1-1B, PI-AZK1-1A	Same	21	19 19.4	Same
B12	332	FI-AY1K1-2	Setpt $\pm$ 20, scfm	200	163-167	Tank AY1 exhaust flow low when AZ1 in Hi-Heat. Condition is unexpected but acceptable. Setpoint is arbitrary.
B12	343	PI-AZK1-1A	Setpt $\pm$ 0.5 in wc vacuum	21	19.7-19.9	Manifold vacuum below setpoint. OK; parameter set greater than fan can achieve, to force fan to peak.
B12	351	PI-AZK1-1A	Same	21	19.6	Same

TEST EXCEPTION REPORT

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TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5, Various sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

TE-008

DESCRIPTION OF PROBLEM:

Tank vacuum more negative than setpoint during High-Heat testing of tank-pressure-control process.

Section	Page	Tank, lowest vacuum achieved (in. wc)
B5	254	AY101, 1.3
B8	292	AY102, 1.2
B10	318	AZ101, 1.7
B13	355	AZ102, 2.3

TEST ENGINEER:

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IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE

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DISPOSITION (Completed by Test Engineer):

In High-Heat Mode at 500 scfm, inlet pressure control valve 100% open, but tank vacuum cannot be reduced below that limited by the inlet station pressure loss (DP) and current level of tank in-leakage. Acceptable, since there is no known need to meet the lower vacuum levels. Test objectives met. No re-test required.

DISPOSITION AND RETEST REQUIREMENTS BY:

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DISPOSITION ACTIONS COMPLETE:

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TEST ENGINEER

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TEST DIRECTOR

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QAE CONCURRENCE WITH DISPOSITION (if required):

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RETEST COMPLETE:

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TEST EXCEPTION REPORT

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TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5, Various sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

TE-009

DESCRIPTION OF PROBLEM:

Tank exhaust flow for TANKS AY101, AZ102 (FI-AY1K1-2, FI-AZ1K1-2) below setpoint during High-Heat tests, with K1-2 flow control valve 100% open. AC= setpoint ± 20 scfm.

Section	Page	Tank	Setpoint	Value
B9	298	AZ102	110	80-83
B11	321	AY101	200	180
B11	324	AZ102	110	79-85

TEST ENGINEER:

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DISPOSITION (Completed by Test Engineer):

Accept. Similar to TE-007. Setpoints are arbitrary.

DISPOSITION AND RETEST REQUIREMENTS BY:

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TEST ENGINEER

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TEST DIRECTOR

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QAE CONCURRENCE WITH DISPOSITION (if required):

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RETEST COMPLETE:

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TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:

OTP-W030-001, Revision B-5. Various sections as noted

TEST NAME:

W030 Operational Test
Procedure Integrated System Test

T.E. NUMBER:

TE-010

DESCRIPTION OF PROBLEM:

Tank exhaust flow for TANKS AY101, AY102 (FI-AY1K1-2, FI-AY1K1-2) below setpoint during High-Heat tests, with K1-2 flow control valve 100% open. AC= setpoint ± 20 scfm.

Section	Page	Tank	Setpoint	Value
A13	197	AY101, 102	400	335, 360
B9	295	AY101	200	173-179
B12	332	AY101	200	163-169

TEST ENGINEER:

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IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE

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ORG: _____

DATE: _____

PIC: _____

DATE: _____

DISPOSITION (Completed by Test Engineer):

Accept. Similar to TE-007 and -009. Setpoints are arbitrary.

DISPOSITION AND RETEST REQUIREMENTS BY:

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DISPOSITION ACTIONS COMPLETE:

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TEST ENGINEER _____

DATE _____

TEST DIRECTOR _____

DATE _____

QAE CONCURRENCE WITH DISPOSITION (if required):

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RETEST COMPLETE:

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TEST DIRECTOR _____

DATE _____

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ATTACHMENT 2

TEST DATA

Note: This attachment includes actual OTP copy with test instructions and annotated field data only; for administrative sections, prerequisites, setup steps, signatures, etc, see the Phase-1 test report, reference 4.

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

11.0 VENT TRAIN B - MAXIMUM FLOW RATE

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

11.1 ENSURE Exhaust Fan AZ-K1-5-1B and Filter Train B are in service.

11.2 ENSURE that the recirculation ventilation systems for tanks AY101, AY102, AZ101, and AZ102 are in the BYPASS or RECIRC mode of operation.

11.3 ENSURE the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1- are set at ~~-35.0~~ ~~-30.0~~ in wc. or as required to achieve stable conditions.

CAUTION

In the following steps, DO NOT exceed an indicated stack flow rate of ~~1000~~ ~~1050~~ scfm.

11.4 ADJUST the tank exhaust flow rates for tanks AY101 and AY102 to approximately ~~150~~ ~~scfm~~. approximately as follows:

- FIC-AY1K1-2 200 scfm FIC-AZ1K1-2 110 scfm
- FIC-AY2K1-2 210 scfm FIC-AZ2K1-2 110 scfm

11.5 INCREASE tank exhaust flow control setpoints for tanks AYZ101 and AYZ102 to approximately ~~350~~ ~~scfm~~ from each tank as required to achieve stack flow rate of ~~1050~~ ~~scfm~~ (PI-AZK1-3).

- FIC-AYZ1K1-2
- FIC-AYZ2K1-2

11.6 VERIFY stable fan operation (no surging) by observing stack flow rate FI-AZK1 for 15 minutes. Test Engineer:

11.7 RECORD data in TABLE 11-1. Test Engineer:

11.8 VERIFY that the data recorded in Table 11-1 is the data presented on the applicable MCS graphic screen. Test Engineer:

11.9 VERIFY that NO unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 11-1 is in the acceptable range. Test Engineer:

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 Vent Train B Maximum Flow Rate

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 15PriIn.v				
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	73	$\leq$ FIAY1K1-2	N/A	Pass
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-2.0	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (15PriIn.v)	340	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	329	setpoint $\pm$ 20 scfm	N/A	Pass
AY101 Exh. Air Valve Pos. ZI-AY1K1-2 (15PriIn.v)	100	$\geq$ 20% Open	N/A	Pass
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	95	$\leq$ FIAY2K1-2	N/A	Pass
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-1.9	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (15PriIn.v)	340	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	344	setpoint $\pm$ 20 scfm	N/A	Pass
AY102 Exh. Air Valve Pos. ZI-AY2K1-2 (15PriIn.v)	92	$\geq$ 20% Open	N/A	Pass
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	-150	$\leq$ FIAZ1K1-2	N/A	Pass
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-1.3	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (15PriIn.v)	110	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	109	setpoint $\pm$ 20 scfm	N/A	Pass
AZ101 Exh. Air Valve Pos. ZI-AZ1K1-2 (15PriIn.v)	19	$\geq$ 20% Open	N/A	Pass
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	0	$\leq$ FIAZ2K1-2	N/A	Pass
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-2.0	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (15PriIn.v)	110	N/A	N/A	N/A

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TABLE 11-1 Vent Train B Maximum Flow Rate

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PsiIn.v)	113	setpoint $\pm$ 20 scfm	N/A	Pass <i>g</i>
AZ102 Exh. Air Valve Pos. ZI-AZ2K1-2 (15PsiIn.v)	22	>20% Open	N/A	Pass <i>g</i>

ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 Vent Train B Maximum Flow Rate (Continued)

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 16PriCoo.v				
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	11.9 ^①	10-11 in wc	N/A	Pass <i>[initials]</i>
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	80	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	45	35-40/40-60°F	≥ 35°F OSD	Pass <i>[initials]</i>
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	37	36 ± 2 35-55°F	N/A OSD	Pass <i>[initials]</i>
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	4.5	< 10 in wc	≤ 15 in wc OSD	Pass <i>[initials]</i>
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3264	N/A	N/A	N/A

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 14Chillr.v				
Primary Vent Condenser Water Flow Rate FI-AZCWR-1 (14Chillr.v)	119	110-120 95-130 gpm	N/A	Pass <i>[initials]</i>

① SEE TE-001, SEE DATA PAGE 206, REV. 13-Y 9/20/98

ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 Vent Train B Maximum Flow Rate (Continued)

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 17PriExh.v				
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1B, (17PriExh.v)	25	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1B, (17PriExh.v)	29	① setpoint $\pm 2^{\circ}\text{F}$	$\geq 17^{\circ}\text{F}$ OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	1.5	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	0.7	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	77	① TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$	$\leq 195^{\circ}\text{F}$ OSD	Pass
Primary Vent Filter Train Inlet Pressure SETPOINT PI-AZK1-1B (17PriExh.v)	-30	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	-20.7	② setpoint ± 0.5 in wc	N/A	Pass
Primary Exhaust Fan AZ-K1-5-1B Motor Current II-AZK15-1B (17PriExh.v)	52	N/A	N/A	N/A
Primary Exhaust Fan AZ-K1-5-1B Fan Speed SI-AZK15-1B (17PriExh.v)	3632	N/A	N/A	N/A

MCS PARAMETERS	VENT TRAIN B	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS graphic Screen 18PriMon.v				
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	929	900-1050 4000 scfm	≥ 200 and ≤ 1050 800 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	87	N/A	N/A	N/A

① SEE TE-006, Item 4, See Page 279 Original TE Data.

② SEE TE-007, SEE Pages 242/250 Original TE Data.

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

12.0 PRIMARY FAN AND FILTER TRAIN SWITCHOVER (B to A)

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhauster to 800 scfm.

- 12.1 ENSURE Exhaust Fan AZ-K1-5-1B and Filter Train B are in service. ENSURE that the recirculation ventilation systems are in the BYPASS or RECIRC mode of operation.

* Test Engineer
Test Director: *[Signature]*
25 sep 98

- 12.2 ENSURE the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1- are set at -35.030.0 in wc or as required to achieve stable system operation.

* Test Engineer
Test Director: *[Signature]*
25 sep 98

- 12.3 ENSURE the tank exhaust flow rates for tanks AY101 and AY102 are set at approximately 150 scfm as follows.

- * FIC-AY1K1-2 350 scfm
- * FIC-AY2K1-2 350 scfm

- 12.4 ENSURE the tank exhaust flow control setpoints for tanks AZ101 and AZ102 are set at approximately 350 scfm from each tank as follows.

- * FIC-AZ1K1-2 110 scfm
- * FIC-AZ2K1-2 110 scfm

- 12.5 ENSURE heater temperature differential setpoints TDIC-AZK12-1A and TDIC-AZK12-1B match.

- 12.6 RECORD Initial Value data in TABLE 12-1.

Test Engineer: *[Signature]*

- 12.7 SELECT "Fan-1A" on MCS MACRO graphic screen 25mExhst.v.

* Note: should be signed by Test eng. see Page 180/185.
Considered a typo, missed on last page 9/25 sep 98

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

12.8 SELECT "Heater-1A" on MCS MACRO graphic screen 25mExhst.v.

12.9 RUN Exhaust MACRO.

12.10 CHECK the following conditions on MCS graphic 17PriExh.v.:

~ Fan-1A: ON
~ Fan-1B: STANDBY
~ Heater-1A: ON
~ Heater-1B: STANDBY

12.11 CHECK Chiller AND Pump-1A or Pump-1B ON at MCS graphic 14Chillr.v.

NOTE - In the following step, the system is stable when tank exhaust flow rates are within ± 20 scfm of the Initial Value, and primary tank pressures are within ± 0.2 in wc of the Initial Values. Allow a minimum of 15 minutes after changing any setpoint before recording data.

12.12 ALLOW the system to stabilize AND RECORD Final Value data in TABLE 12-1.

Test Engineer:

12.13 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 12-1 is in the acceptable range.

Test Engineer:

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v					
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	73	98	$\leq$ FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-2.0	-2.0	-0.35 to -3.0 in wc	-0.3 > x > -6 in wc OSD	Pass
AY101 Pressure Control Valve Position ZI-AY1K1-1 (15PriIn.v)	31	31	N/A	N/A	Pass
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (15PriIn.v)	340	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	329	338	setpoint $\pm$ 20 scfm	N/A	Pass

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filler Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	95	78	$\leq$ FIAY2K1-2	N/A	Pass ✓
AY102 Pressure Control <u>SETPOINT</u> PIC-AY2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-1.9	-1.9	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass ✓
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	0	0	N/A	N/A	Pass ✓
AY102 Exhaust Air Flow <u>SETPOINT</u> FIC-AY2K1-2 (15PriIn.v)	340	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	344	341	setpoint $\pm$ 20 scfm	N/A	Pass ✓

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	-150	-150	≤ FIAZ1K1-2	N/A	Pass
AZ101 Pressure Control <u>SETPOINT</u> PIC-AZ1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-1.3	-1.3	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15PriIn.v)	-25	-25	N/A	N/A	Pass
AZ101 Exhaust Air Flow <u>SETPOINT</u> FIC-AZ1K1-2 (15PriIn.v)	110	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	109	111	setpoint ± 20 scfm	N/A	Pass

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	0	0	≤ FIAZ2K1-2	N/A	Pass
AZ102 Pressure Control <u>SETPOINT</u> PIC-AZ2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-2.0	-2.0	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15PriIn.v)	24	25	N/A	N/A	Pass
AZ102 Exhaust Air Flow <u>SETPOINT</u> FIC-AZ2K1-2 (15PriIn.v)	110	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	110	114	setpoint ± 20 scfm	N/A	Pass

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)
TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v					
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	① 11.9	① 11.4	≤ 10 in wc	N/A	Pass
Primary Vent Condenser Outlet Air Temperature TI-AZK18-1B (16PriCoo.v)	45	45	35-40-60°F	N/A	Pass
Primary Vent HEHE Differential Pressure PDI-AZK19-1 (16PriCoo.v)	4.8	4.6	< 10 in wc	≤ 15 in wc OSD	Pass

① See TE-001, see Page 206, Mod B-1, Original TE-022 Oct 98

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	N/A	-25	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	N/A	-20.8 ^①	setpoint + 0.5 in wc (1)	N/A	Pass <i>g</i>
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1B (17PriExh.v)	-30	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	-20.7 ^①	N/A	setpoint + 0.5 in wc (1)	N/A	Pass <i>g</i>
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1A, (17PriExh.v)	N/A	25	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1A, (17PriExh.v)	N/A	25	setpoint ± 2°F (1)	≥ 17°F OSD	Pass <i>g</i>
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1B, (17PriExh.v)	25	N/A	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1B, (17PriExh.v)	29 ^②	N/A	setpoint ± 2°F (1)	≥ 17°F OSD	Pass <i>g</i>

① SEE T6-007, Item 4, Set Page 242/250, original T6 Data, 9/22/98

② SEE T6-006, Item 4, Set Page 279, original T6 Data, 9/22/98

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)
TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0	0.8	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	0.8	0	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.5	1.5	≤ 1.75 in wc (1)	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	1.5	0	≤ 1.75 in wc (1)	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0	0.8	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	0.7	0	< 5 in wc (1)	≤ 6 in wc OSD	Pass

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 Primary Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	74	74	TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$ (1)	$\leq 195^{\circ}\text{F}$ OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	77	74	TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$ (1)	$\leq 195^{\circ}\text{F}$ OSD	Pass

CS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 18PriMon.v					
Primary Stack Flow FI-AZK1-3 (18PriMon.v)	929	935	900-1050-1000 scfm	≥ 200 and ≤ 1050 800 scfm OSD	Pass

Note (1) Acceptable range is for the inservice vent train only.

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

13.0 VENT TRAIN A - MAXIMUM FLOW RATE

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

13.1 ENSURE Exhaust Fan AZ-K1-5-1A and Filter Train A are in service.

13.2 ENSURE that the recirculation ventilation systems for tanks AY101, AY102, AZ101, and AZ102 are in the BYPASS or RECIRC mode of operation.

13.3 ENSURE the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-F3 are set at ~~-35.0~~ -30.0 in wc.

CAUTION

In the following steps, do not exceed an indicated stack flow rate of ~~1000~~ 1050 scfm.

13.4 ENSURE the tank exhaust flow rates for tanks AY101 and AY102 to approximately ~~150 scfm~~ approximately as follows:

- FIC-AY1K1-2 200 scfm FIC-AZ1K1-2 110 scfm
- FIC-AY2K1-2 210 scfm FIC-AZ2K1-2 110 scfm

13.5 ENSURE the tank exhaust flow control setpoints for tanks AYZ101 and AYZ102 to approximately ~~350 scfm~~ from each tank as required to achieve stack flow rate of 1050 scfm (FI-AZK1-3).

- FIC-AYZ1K1-2
- FIC-AYZ2K1-2

13.6 VERIFY stable fan operation (no surging) by observing stack flow rate FI-AZK1 for 15 minutes.

Test Engineer:

13.7 RECORD data in TABLE 13-1.

Test Engineer:

13.8 VERIFY that the data recorded in Table 13-1 is the data presented on the applicable MCS graphic screen.

TEST *
PC Engineer:
95 540 98

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* Should be signed by Test Eng. See Page 190 For 3 TRAIN. Missed on last PCA - considered "typo".
6/25 sep 98

ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

13.9 ADJUST the tank flow control setpoints as follows ~~to 100 scfm~~ for each tank.

- FIC-AZ1K1-1 110 scfm
- FIC-AZ2K1-1 110 scfm
- FIC-AY1K1-1 200 scfm
- FIC-AY2K1-1 210 scfm

13.10 ADJUST the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B to -15.0 in wc.

13.11 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 13-1 is in the acceptable range.

Test Engineer:

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ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 13-1 Vent Train A Maximum Flow Rate

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 15PriIn.v				
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	106	$\leq$ FIAY1K1-2	N/A	Pass
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-2.0	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (15PriIn.v)	400	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	335 ①	setpoint $\pm$ 20 scfm	N/A	Pass
AY101 Exh. Air Valve Pos. ZI-AY1K1-2 (15PriIn.v)	100%	>20% Open	N/A	Pass
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	246	$\leq$ FIAY2K1-2	N/A	Pass
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-1.9	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (15PriIn.v)	400	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	360 ①	setpoint $\pm$ 20 scfm	N/A	Pass
AY102 Exh. Air Valve Pos. ZI-AY2K1-2 (15PriIn.v)	99%	>20% Open	N/A	Pass
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	-150	$\leq$ FIAZ1K1-2	N/A	Pass
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-1.2	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (15PriIn.v)	110	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	110	setpoint $\pm$ 20 scfm	N/A	Pass
AZ101 Exh. Air Valve Pos. ZI-AZ1K1-2 (15PriIn.v)	13%	>20% Open	N/A	Pass
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	0	$\leq$ FIAZ2K1-2	N/A	Pass
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-1.5	-0.53 to -3.0 in wc	-.3 > x > -6 in wc W030-RD-001	Pass
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (15PriIn.v)	110	N/A	N/A	N/A

① SEE TS-010

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TABLE 13-1 Vent Train A Maximum Flow Rate

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	111	setpoint $\pm$ 20 scfm	N/A	Pass
AZ102 Exh. Air Valve Pos. ZI-AZ2K1-2 (15PriIn.v)	21 %	>20% Open	N/A	Pass

ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 13-1 Vent Train A Maximum Flow Rate (Continued)

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 16PriCoo.v				
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	11.6	① $< 10 \pm 1$ in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	80	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	44	35-40/40-60°F	$\geq 35^\circ\text{F}$ OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	38	36 $\pm$ 2 35-55°F	N/A OSD	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	4.6	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3254	N/A	N/A	N/A

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 14Chillr.v				
Primary Vent Condenser Water Flow Rate FI-AZCWR-1 (14Chillr.v)	119	110-120 95-130 gpm	N/A	Pass

① SEE TE-001, SEE ORIGINAL TE PAGE 206, MOD 13-1 6/22/02

ATTACHMENT A - BYPASS MODE OPERATIONAL TESTING (Cont.)

TABLE 13-1 Vent Train A Maximum Flow Rate (Continued)

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS Graphic Screen 17PriExh.v				
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1A, (17PriExh.v)	25	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1A, (17PriExh.v)	24	setpoint $\pm 2^{\circ}\text{F}$	$\geq 17^{\circ}\text{F}$ OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.5	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.7	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Inlet Pressure SETPOINT PI-AZK1-1A (17PriExh.v)	-30	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-20.8 ①	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	72 ②	TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$	$\leq 195^{\circ}\text{F}$ OSD	Pass
Primary Exhaust Fan AZ-K1-5-1A Motor Current II-AZK15-1A (17PriExh.v)	48	N/A	N/A	N/A
Primary Exhaust Fan AZ-K1-5-1A Fan Speed SI-AZK15-1A (17PriExh.v)	3031	N/A	N/A	N/A

MCS PARAMETERS	VENT TRAIN A	ACCEPTANCE CRITERIA	LIMIT	PASS/FAIL
MCS graphic Screen 18PriMon.v				
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	923	900-1050 4000 scfm	≥ 200 and ≤ 1050 800 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	87	N/A	N/A	N/A

① SEE TE-007, See Page 242/250, ORIGINAL TO DATA
 ② SEE TE-006, Item 4, See Page 219, Original TO DATA. 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

NOTE: This section is added to the procedure in order to characterize system performance over a range of condenser water temperatures, especially to evaluate effect on condenser air differential pressure.

3.9 **ENSURE** Exhaust Fan AZ-K1-5-1A and Filter Train A (or Exhaust Fan AZ-K1-5-1B and Filter Train B) are in service.

3.10 **ENSURE** the recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

3.11 **ENSURE** Cooling Towers are in operation in accordance with TO-060-358, in WET MODE, with control dampers OPEN and fans ON.

Test Engineer:

3.12 **ENSURE** that Primary Vent Condenser Water Inlet Temperature is in the normal range of 38-42 °F, TI-AZCWS-1 (16PriCoo.v).

Test Engineer:

3.13 **ENSURE** the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set at -30.0 in wc. on MCS graphic screen 17PriExh.v or as required to achieve a stable system operation.

Test Director:

CAUTIONS

1. In the following steps, do not exceed an indicated stack flow rate of 1050 scfm, or stack temperature of 100 degrees F.
2. After stopping chiller operation, carefully monitor for moisture in the HEPA/HEGA Filter sight glasses. If moisture is detected, suspend the test of this section.

3.14 **ENSURE** the tank exhaust flow control setpoints are as follows so as to achieve a maximum stack flow rate, not to exceed 1050 scfm (FI-AZK1-3). NOTE- An ala condition is expected for the Primary Vent Condenser Air differential pressure PDI-AZK1B-1; it is to be acknowledged with no response:

- FIC-AY1K1-2 350 scfm FIC-AZ1K1-2 150 scfm
- FIC-AY2K1-2 350 scfm FIC-AZ2K1-2 150 scfm

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

3.15 ENSURE Primary Vent Train Heater Setpoints, TDIC-AZK12-1A and TDIC-AZK12-1B, are set at 20 °F on MCS graphic screen 17Pr1exh.v.

Test Engineer:

3.16 RECORD initial data in TABLE 3-2.

Test Engineer:

3.17 ESTABLISH a trend screen and TREND-PLOT the parameters below during this test the plot will have a span of 4 hours. For backup, MCS Engineer GENERATE a special data file for these same parameters.

Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16Pr1Coo.v)
 Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16Pr1Coo.v)
 Primary Vent HEME Differential Pressure PDI-AZK19-1 (16Pr1Coo.v)
 Primary Vent Train Differential Pressure, 1st HEPA, PDI-AZK14-1A (17Pr1exh.v)

3.18 On graphic screen 14Ch111r.v, STOP AZ-CW-R-1 chiller operation.

NOTE: Similarly RE-START chiller as directed by the Test Director or when one of the following conditions exist:

- Stack air, 100 °F, TI-AZK1-3 (18Pr1Mon.v).
- Pri. Vent Condenser Water Inlet, 75 °F, TI-AZCWS-1 (16Pr1Coo.v).
- Moisture detected in HEPA/HEGA filter sight glass.

Test Engineer:

3.19 MONITOR Condenser Water Inlet Temperature TI-AZCWS-1 (16Pr1Coo.v) AND RECORD all changed values in Table 3-2 at the temperatures shown (except the maximum including surveillance of HEPA/HEGA filter sight glasses.

3.20 ALLOW CMS system to warm up until the conditions of the above note are observed. If those conditions do not occur, ALLOW system to run for a minimum of 12 hours.

3.21 After the designated time period or when any of the conditions of the prior step occur, RESTART chiller by the following actions:
 1) Manually start chiller from MCS graphic screen 14Ch111r.v;
 2) Reset any chiller faults locally per procedure 10-060-350.

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

3.22 Immediately **RECORD** maximum Changed-Value data in TABLE 3-2.

Test Engineer:

3.23 **ALLOW** CWS system to cool until Condenser Water Inlet Temperature is restored to its initial value, TI-AZCWS-1 (16PriCoo.v). **RECORD FINAL** data in TABLE 3-2.

3.24 After recording required data, **ADJUST** the tank exhaust flow-control setpoints as directed by the Test Director **AND VERIFY** that no unexpected alarms or conditions occurred associated with this section of testing.

Test Engineer:

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 3-2 PV Condenser Evaluation

MCS PARAMETERS	INITIAL	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	FINAL	ACCEPTANCE CRITERIA	LIMIT
Primary Vent Condenser Water Inlet Temperature TI-AZCHS-1 (16PriCoo.V)	38-42 °F	45 °F	50 °F	55 °F	60 °F	MAXIMUM	38-42 °F	35-75 °F	<75 °F
MCS Graphic Screen 14Chn11r.v									
Primary Vent Condenser Water Flow Rate FI-AZCHS-1 (14Chn11r.v)	119	119	120	121	121.0	121.0		95-130 gpm	N/A
MCS Graphic Screen 16PriCoo.V									
Primary Vent Condenser Differential Pressure PD1-AZCHS-1 (16PriCoo.V)	12.6	11.4	11.2	10.9	10.4	7.7		≤ 11 in. WC	N/A
Primary Vent Condenser Air Inlet Temperature TI-AZCHS-1A (16PriCoo.V)	80	79	79	79	78.0	76.0		N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZCHS-1B (16PriCoo.V)	44	48	53	57	61.0	68.0		40-80 °F	≤ 35 °F OSD
Primary Vent Condenser Water Inlet Temperature TI-AZCHS-1 (16PriCoo.V)	38	45	50	55	60.0	68.0		35-75 °F	N/A
Primary Vent Condenser Water Outlet Temperature TI-AZCHS-1 (16PriCoo.V)	40	46	51	55	60.0	68.0		N/A	N/A
Primary Vent HEME Differential Pressure PD1-AZCHS-1 (16PriCoo.V)	4.7	4.8	4.8	4.9	5.0	5.3		≤ 10 in. WC	≤ 15 in. WC OSD

① See 7E-0007 7E-001, 500 original 7E, Page 400 Mod 13-4 220774

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MCS Graphic Screen 16PriCoo.V						
Initial change change change change change						
Primary Vent Condenser Differential Pressure P01-AZK18-1 (16PriCoo.V)	12.6	11.4	11.1	10.8	10.3	9.7
Primary Vent Condensate Flow Rate F1-AZPC-1 (16PriCoo.V)	.1	.1	.1	.1	0.1	0.1
Primary Vent Condensate Total Flow F10-AZPL-1 (16PriCoo.V)	329.1	329.3	329.6	330.0	330.5	332.0

① See TE-001, See original TE, Rev 206, Mod-B-1/12208798

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 3-2 PV Condenser Evaluation (Continued)

MCS PARAMETERS	INITIAL	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	FINAL	ACCEPTANCE CRITERIA	LIMIT
MCS Graphic Screen 18Pr1Mon.v									
Primary Vent Exhaust Stack Air Flow Rate FL-AZK1-3 (18Pr1Mon.v)	942	963	966	958	958.0	1009.0	1020	≤ 1050 scfm	≥ 200 and ≤ 800 scfm OSD
Primary Vent Exhaust Stack Air Temperature TT-AZK1-3 (18Pr1Mon.v)	85	83	87	91	94.0	100.0	55.0	≤ 100 °F	N/A
TRAIN-A Fan Room									
HEPA/HEGA Filter sight glass (wet or dry)	dry	dry	dry	dry	dry	dry	dry	DRY	N/A
TRAIN-B Fan Room									
HEPA/HEGA Filter sight glass (wet or dry)	dry	dry	dry	dry	dry	dry	dry		

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 3-2 PV Condenser Evaluation (Continued)

MCS PARAMETERS	INITIAL	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	FINAL	ACCEPTANCE CRITERIA	LIMIT
MCS Graphic Screen 17PrExh.v (For Fan/Filter Train A only)										
Primary Vent Manifold Pressure SETPOINT P1C-AZK1-1A (17PrExh.v)	-30.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure P1-AZK1-1A (17PrExh.v)	① -20.9	① -20.6	① -20.3	① -20.0	① -19.6	① -17.9	① -17.9	N/A	setpoint ± 0.5 in WC (1)	N/A
Primary Vent Heater Air Inlet Temperature T1-AZK12-1A (17PrExh.v)	49	50	53	57	62.0	67.0	53.0	N/A	60-80°F (1)	N/A
Primary Vent Heater Differential Temperature SETPOINT IDIC-AZK12-1A (17PrExh.v)	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature IDIC-AZK12-1A (17PrExh.v)	25	18	19	19	19.0 ² 20.8 ² 19.8 ²	19.0	19.0	19.0	setpoint ± 2.5°F (1)	≥ 17°F OSD
Primary Vent Filter Train Differential Pressure, 1st HEPA PDI-AZK14-1A (17PrExh.v)	.8	-8	-8	-8	0.8	0.9	0.8	0.8	≤ 5 in WC (1)	≤ 6 in WC OSD
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK10-1A (17PrExh.v)	1.5	1.6	1.6	1.6	1.6	1.8	1.8	1.8	≤ 1.75 in WC (1)	≤ 3 in WC OSD
Primary Vent Filter Train Differential Pressure, 2nd HEPA PDI-AZK14-2A (17PrExh.v)	.7	-8	-8	-8	0.8	0.9	0.8	0.8	≤ 5 in WC (1)	≤ 6 in WC OSD
Primary Vent Filter Train Outlet Temperature T1-AZK12-3A (17PrExh.v)	74	68	73	76	80	86.0	72.0	72.0	IDIC setpoint ± htr inlet ± 2°F (1)	≤ 195°F OSD

① See - 7C-007, see Piping 342/250 original Te-Data.
 ② See - 7C-006, Item 1, see Page 279, original Te-Data, 8/22/98

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TABLE 3-2 PV Condenser Evaluation (Continued)

MCS PARAMETERS	INITIAL	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	FINAL	ACCEPTANCE CRITERIA	LIMIT
Primary Exhaust Fan AZ-K1-5-1A Fan Speed ST-AZK15-1A (17pmExt.N)	3632	3628	3630	3636	3633.0	3629.0	3556.0	N/A	N/A

(1) Acceptable range is for the inservice train only.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 3-2 PV Condenser Evaluation (Continued)

MCS PARAMETERS	INITIAL	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	CHANGE	FINAL	ACCEPTANCE CRITERIA	LIMIT
MCS Graphic Screen 17PriExh.v (For Fan/Filter Train B only)										
Primary Vent Manifold Pressure SETPOINT PID-AZK1-1B (17PriExh.v)	-30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	② -20.5	① -20.2	③ -19.8	② -19.5	② -19.1	② -17.4	② -17.4	② -17.4	setpoint ± 0.5 in WC (1)	N/A
Primary Vent Heater Air Inlet Temperature TI-AZK12-1B (17PriExh.v)	66	66	66	65	66	67.0	67.0	67.0	40-80°F (1)	N/A
Primary Vent Heater Differential Temperature SETPOINT TIDC-AZK12-1B (17PriExh.v)	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TIDC-AZK12-1B (17PriExh.v)	4 ①	4	4	4	3.0	3.0	3.0	3.0	setpoint ± 2.5 (1)	≥ 17.4 OSD
Primary Vent Filter Train Differential Pressure, 1st HEPA PDI-AZK14-1B (17PriExh.v)	0 ①	0	0	0	0.0	0.0	0.0	0.0	≤ 5 in WC (1)	≤ 6 in WC OSD
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK10-1B (17PriExh.v)	0 ①	0	0	0	0.0	0.0	0.0	0.0	≤ 1.75 in WC (1)	≤ 3 in WC OSD
Primary Vent Filter Train Differential Pressure, 2nd HEPA PDI-AZK16-2B (17PriExh.v)	0 ①	0	0	0	0.0	0.0	0.0	0.0	≤ 5 in WC (1)	≤ 6 in WC OSD
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	70 ①	70	70	69	70.0	69.0	70.0	70.0	TBFC setpoint $\pm$ hr Inlet ± 2.5 (1)	≤ 195.3 OSD

① STANDBY

② See TC-007, SEE R542/250 original TB Def. of 2/20/99

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(1) Acceptable range is for the inservice train only.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

4.0 AY101 HIGH HEAT - STEADY STATE OPERATION

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhauster to 800 scfm.

- 4.1 ENSURE Exhaust Fan AZ-K1-5-1A and Filter Train A are in service
- 4.2 ENSURE the recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.
- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
 - AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
 - AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
 - AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION
- 4.3 ENSURE Cooling Towers ~~operating in DRY MODE~~ are prepared for operation in accordance with TO-060-358, with control dampers OPEN. ENSURE AY101 Cooling Tower operating in DRY MODE.
- 4.4 PLACE Cooling Towers in WET MODE operation, with fans ON, in accordance with TO-060-358, EXCEPT for tank AY101, AND RETURN to this procedure
- Test Engineer:
- 4.5 ENSURE tank pressure control setpoints are set at -2.0 in. wc on MCS graphic screen 15PriIn.v.
- PIC-AZ1K1-1
 - PIC-AZ2K1-1
 - PIC-AY1K1-1
 - PIC-AY2K1-1

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

4.6 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ101 at ~~110~~100 $\pm$ 20 scfm (FIC-AZ1K1-2)
- AZ102 at ~~110~~100 $\pm$ 20 scfm (FIC-AZ2K1-2)
- AY101 at ~~200~~100 $\pm$ 20 scfm (FIC-AY1K1-2)
- AY102 at ~~210~~100 $\pm$ 20 scfm (FIC-AY2K1-2)

4.7 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data with AY101 in RECIRC mode in TABLE 4-1.

Test Engineer:

~~4.8 ADJUST AY101 tank exhaust flow control setpoint to 500 $\pm$ 20 scfm (FIC-AY1K1-2)~~

4.9 ESTABLISH AY101 HIGH HEAT mode according to TO-060-351.

Test Engineer:

4.10 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f AY101 in HIGH HEAT mode in TABLE 4-1.

Test Engineer:

4.11 RECORD data in TABLE 4-1 every hour for 4 consecutive hours.

4.12 PLACE AY101 Cooling Tower in WET MODE operation in accordance with TO-060-358 AND RETURN to this procedure.

Test Engineer:

4.13 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data with AY101 in HIGH-HEAT mode in TABLE 4-2.

4.14 RECORD data in TABLE 4-2 every 15 minutes ~~hour~~ for 4 consecutive ~~hours~~ intervals.

Test Engineer:

4.15 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLES 4-1 and 4-2 satisfies the acceptance criteria.

Test Engineer:

NOTE - All Cooling Towers will remain in WET MODE operation throughout the balance of this procedure except as directed.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.v									
AY101 Recirc Vent Condenser Air Inlet Temperature TI-AY1K48-1A (10RecAY1.v)	86.0	83°	85°	84°	84°	82°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Outlet Air Temperature TI-AY1K48-1B (10RecAY1.v)	76.0	67°	67°	69°	68°	67°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Inlet Temperature TI-AY1EWS-1 (10RecAY1.v)	72.0	66°	66°	68°	66°	67°	N/A *	N/A	N/A
AY101 Recirc Vent Condenser Water Outlet Temperature TI-AY1EWR-1 (10RecAY1.v)	72.0	65°	68°	67°	68°	68°	N/A *	N/A	N/A
AY101 Recirc Vent Condenser Differential Pressure PDI-AY1K48-1 (10RecAY1.v)	11.2	8.2	8.1	8.2	8.1	8.1	8-12 in wc	N/A	Pass
AY101 Recirc Vent Fan Differential Pressure PDI-AY1K45-1 (10RecAY1.v)	15.1	19.6	19.6	19.5	19.5	19.5	15-18 in wc	N/A	Pass
AY101 Recirc Vent Fan Motor Current TI-AY1K45-1 (10RecAY1.v)	5.3	4.3	4.5	4.5	4.5	4.5	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	225.0	484	483	482	486	484	N/A *	N/A	N/A
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (10RecAY1.v)	200.0	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (10RecAY1.v)	191.0	500	492	501	492	502	setpoint ± 20 scfm	N/A	Pass

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* Report-writer comment: Some data
reflects impossible or inconsistent
conditions and is suspect.

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① SEE TE-006, Item (3), SEE 11/02/2008/2009 For original To Date, 8/22/98.

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 11RecAY2.v									
AY102 Recirc Vent Condenser Air Inlet Temperature TI-AY2K48-1A (11RecAY2.v)	80.0	81°	81°	79°	78°	79°	N/A	N/A	N/A
AY102 Recirc Vent Condenser Outlet Air Temperature TI-AY2K48-1B (11RecAY2.v)	76.0	77°	78°	80°	82°	80°	N/A	N/A	N/A
AY102 Recirc Vent Condenser Water Inlet Temperature TI-AY2EWS-1 (11RecAY2.v)	79.0	79°	81°	81°	79°	82°	*	N/A	N/A
AY102 Recirc Vent Condenser Water Outlet Temperature TI-AY2EWR-1 (11RecAY2.v)	79.0	79°	81°	81°	80°	80°	*	N/A	N/A
AY102 Recirc Vent Condenser Differential Pressure PDI-AY2K48-1 (11RecAY2.v)	10.2	10.1	10.1	10.1	10.1	10.1	8-12 in wc	N/A	Pass
AY102 Recirc Vent Fan Differential Pressure PDI-AY2K45-1 (11RecAY2.v)	13.4	13.8	13.8	13.8	13.7	13.8	15-18 in wc	N/A	Pass
AY102 Recirc Vent Fan Motor Current II-AY2K45-1 (11RecAY2.v)	5.5	5.5	5.4	5.2	5.3	5.2	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	225.0	484	483	482	486	484	*	N/A	N/A
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (11RecAY2.v)	220.0	220	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (11RecAY2.v)	216.0	211	215	215	210	210	setpoint ± 20 scfm	N/A	Pass

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① SEE TE-006, Item ③ SEE Pgs 248/249/251, 6/22 OCT 98
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* Report-writer comment: Some data
reflects impossible or inconsistent
conditions and is suspect..

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 12RecAZ1.v									
AZ101 Recirc Vent Condenser Air Inlet Temperature TI-AZ1K48-1A (12RecAZ1.v)	122.0	122°	121°	122°	122°	122°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Outlet Air Temperature TI-AZ1K48-1B (12RecAZ1.v)	87.0	89°	90°	88°	88°	89°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Inlet Temperature TI-AZ1EWS-1 (12RecAZ1.v)	86.0	87°	87°	85°	85°	88°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Outlet Temperature TI-AZ1EWR-1 (12RecAZ1.v)	88.0	89°	90°	87°	87°	89°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Differential Pressure PDI-AZ1K48-1 (12RecAZ1.v)	11.9	11.9	11.9	11.8	11.9	11.8	8-12 in wc	N/A	PASS
AZ101 Recirc Vent Fan Differential Pressure PDI-AZ1K45-1 (12RecAZ1.v)	12.0	16.9	16.9	16.9	16.9	16.8	15-18 in wc	N/A	PASS
AZ101 Recirc Vent Fan Motor Current II-AZ1K45-1 (12RecAZ1.v)	4.7	4.9	4.7	4.9	4.9	4.8	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	225.0	484	483	482	486	484	* N/A	N/A	N/A
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (12RecAZ1.v)	110.0	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (12RecAZ1.v)	108.0	108	116	113	109	111	setpoint ± 20 scfm	N/A	PASS

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 13RecAZ2.v									
AZ102 Recirc Vent Condenser Air Inlet Temperature TI-AZ2K48-1A (13RecAZ2.v)	111.0	112°	111°	112°	112°	112°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Outlet Air Temperature TI-AZ2K48-1B (13RecAZ2.v)	90.0	88°	88°	85°	90°	88°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Inlet Temperature TI-AZ2EUS-1 (13RecAZ2.v)	88.0	85°	85°	84°	88°	88°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Outlet Temperature TI-AZ2EUR-1 (13RecAZ2.v)	91.0	89°	89°	85°	89°	89°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Differential Pressure PDI-AZ2K48-1 (13RecAZ2.v)	11.8	11.9	11.9	12.0	11.8	11.9	8-12 in wc	N/A	Pass
AZ102 Recirc Vent Fan Differential Pressure PDI-AZ2K45-1 (13RecAZ2.v)	15.7	15.7	15.8	15.8	15.7	15.7	15-18 in wc	N/A	Pass
AZ102 Recirc Vent Fan Motor Current TI-AZ2K45-1 (13RecAZ2.v)	4.5	4.5	4.6	4.7	4.5	4.5	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	225.0	484	483	482	486	484	*	N/A	N/A
AZ102 Exhaust Air Flow SETPOINT FI-AZ2K1-2 (13RecAZ2.v)	110.0	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (13RecAZ2.v)	106.0	112	108	120	120	111	setpoint ± 20 scfm	N/A	Pass

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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.V									
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.V)	2	413	396	393	384	390	5 FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.V)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.V)	-1.3	-2.0	-2.0	-2.0	-2.0	-2.0	0.5 to 5.0 In MC W030-RD-001	5.3 to 6 In MC W030-RD-001	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.V)	1.0	53%	55%	55%	55%	55%	N/A	N/A	N/A
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.V)	77.0	45%	44%	44%	45%	45%	> 20% Open	N/A	Pass
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.V)	0	1	1	1	1	1	5 FIAY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.V)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.V)	-0.8	-0.8	-0.9	-0.8	-0.8	-0.8	0.5 to 5.0 In MC W030-RD-001	5.3 to 6 In MC W030-RD-001	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.V)	0	1	1	1	1	1	N/A	N/A	N/A
AY102 Exh. Flow Control Valve Position ZI-AY2K1-2 (15PriIn.V)	56.0	214	215	208	215	215	> 20% Open	N/A	Pass

0 Unavailable because inlet station is off line for maintenance

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(a) Took scfm readings by mistakes - Flow Position was 99% all four sets. Ymt

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PrIn.v (Continued)									
AZ101 Inlet Air Flow PI-AZ1K1-1 (15PrIn.v)	N	0	0	0	0	0	≤ FIAZ1K1-2	N/A	Pass
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PrIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PrIn.v)	-1.0	-1.1	-1.1	-1.1	-1.1	-1.1	±0.5 to ±3.0 in MC	3.0 to 6.0 in MC W030-RO-001	Pass
AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15PrIn.v)	0	0	-2%	-2%	-2%	-2%	N/A	N/A	N/A
AZ101 Exh. Flow Control Valve Position ZI-AZ1K1-2 (15PrIn.v)	24.0	26%	26%	26%	26%	26%	>20% Open	N/A	Pass
AZ102 Inlet Air Flow PI-AZ2K1-1 (15PrIn.v)	0	0	0	0	1	1	≤ FIAZ2K1-2	N/A	Pass
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15PrIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PrIn.v)	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	±0.5 to ±3.0 in MC	3.0 to 6.0 in MC W030-RO-001	Pass
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15PrIn.v)	22.0	20%	22%	22%	20%	22%	N/A	N/A	N/A
AZ102 Exh. Flow Control Valve Position ZI-AZ2K1-2 (15PrIn.v)	43.0	61%	61%	61%	61%	61%	>20% Open	N/A	Pass

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ATTACHMENT B RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANC E CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v									
AY101 Recirc Condenser Cooling System Flow FI-AY1EWR-1 (06EvPAY1.v)	212.0	216	215	217	216	217	180-200- 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v									
AY102 Recirc Condenser Cooling System Flow FI-AY2EWR-1 (07EvPAY2.v)	218.0	217	218	218	218	219	180-200- 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v									
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EWR-1 (08EvPAZ1.v)	333.0	333	335	334	335	333	300-335- 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v									
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EWR-1 (09EvPAZ2.v)	222.0	224	226	225	225	225	180-200- 190-230 gpm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v									
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	8.8	12.0	12.1	12.1	12.1	12.1	40 ± 11 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	83.0	81°	81°	81°	81°	81°	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	46.0	46°	46°	46°	45°	45°	35-40°F 40-60°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCMS-1 (16PriCoo.v)	38.0	38°	38°	38°	38°	38°	36 ± 2°F set 35-55°F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40.0	41°	40°	40°	39°	40°	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	3.2	5.0	5.0	5.0	5.0	5.0	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	.1	.1	.1	.1	.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3060.0	3067	3072	3078	3083	3090	N/A	N/A	N/A

① SEE TE-001, see Page 206 Mod B-4, original TC Data, 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 14Chillr.v									
Primary Vent Condenser Water Flow Rate FI-AZCWR-1 (14Chillr.v)	118.0	119	119	119	118	119	110-120 95-130 gpm	N/A	Pass
MCS Graphic Screen 17PriExh.v									
Primary Exhaust Fan AZ-K1-5-1A Motor Current LI-AZK15-1A (17PriExh.v)	41.0	57%	51%	46%	49%	49%	N/A	N/A	N/A
Primary Exhaust Fan AZ-K1-5-1A Fan Speed SI-AZK15-1A (17PriExh.v)	2915.0	3628	3630	3630	3631	3629	N/A	N/A	N/A
MCS Graphic Screen 18PriMon.v									
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	655.0	997	998	995	1000	996	760-1050 scfm	≥ 200 and ≤ 1050 scfm BSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	84.0	87°	87°	87°	87°	87°	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.1	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.2	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

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ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v									
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-14.0	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-14.2	-20.0 ^①	-20.1 ^①	-20.1 ^①	-20.0 ^①	-20.1 ^①	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	53.0	49°	48°	48°	48°	48°	35-40°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25.0	25°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	26°	24°	24°	24°	24°	24°	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.5	0.8	.8	.8	.8	.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	0.9	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.5	0.8	.8	.8	.8	.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	78.0	73°	72°	72°	72°	72°	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

① SEE TE-007

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TABLE 4-1--AY101 HIGH HEAT Steady-State (continued)

MCS PARAMETERS								
MCS-GRAPHIC-SCREEN-18Pr1Mon-V	INITIAL	AY101	RECIRC	INITIAL	AY101	HIGH-HEAT	1ST	2ND
	INTERVAL	INTERVAL	INTERVAL	INTERVAL	INTERVAL	INTERVAL	INTERVAL	INTERVAL
Primary-Vent-Exhaust-Stack-Air-Flow-Rate- FI-AZK1-3 (18Pr1Mon-V)								
Primary-Vent-Exhaust-Stack-Air-Temperature- FI-AZK1-3 (18Pr1Mon-V)								
Primary-Vent-Exhaust-Stack-Monitor-Beta-Sample-Flow-Rate- FI-AZK1-1 (18Pr1Mon-V)								
Primary-Vent-Exhaust-Stack-Monitor-Record-Sample-Flow-Rate- FI-AZK1-2 (18Pr1Mon-V)								

Notes: (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 X (stack scfm/1206) -

ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (continued)

LOCAL PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Inlet Temperature TIC-AY101K102-1	0	①	①	①	①	①	N/A	N/A	N/A ✓
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	0	0.1	0.9	0.9	.9	.9	No alarm	N/A	Pass ✓
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	0	0.5	0.5	0.5	.5	.5	No alarm	N/A	Pass ✓
AY102 Air Inlet Station Inlet Temperature TIC-AY102K102-1	0	①	①	①	①	①	N/A	N/A	Pass ✓
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	0	0.02	0.01	0.01	.01	.01	No alarm	N/A	Pass ✓
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	0	0.3	0.3	0.3	.3	.3	No alarm	N/A	Pass ✓

① Downstream of and around room return

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-1 AY101 HIGH HEAT Steady State (continued)

LOCAL PARAMETERS	INITIAL AY101 RECIRC	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AZ101 Air Inlet Station Inlet Temperature TIC-AZ101K102-1	0	1	1	1	1	1	N/A	N/A	N/A
AZ101 Air Inlet Station Pre-filter Differential Pressure PDI-AZ101K103-1	0	0	0	0	0	0	No alarm	N/A	Pass
AZ101 Air Inlet Station HEPA Differential Pressure PDI-AZ101K104-1	0	0	0	0	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station Inlet Temperature TIC-AZ102K102-1	0	1	1	1	1	1	N/A	N/A	N/A
AZ102 Air Inlet Station Pre-filter Differential Pressure PDI-AZ102K103-1	0	0	0	0	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station HEPA Differential Pressure PDI-AZ102K104-1	0	0	0	0	0	0	No alarm	N/A	Pass

0 Downed and removed from service

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ATTACHMENT D - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.v								
AY101 Recirc Vent Condenser Air Inlet Temperature TI-AY1K48-1A (10RecAY1.v)	84°	83°	85°	85°	83°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Outlet Air Temperature TI-AY1K48-1B (10RecAY1.v)	67°	65°	65°	66°	66°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Inlet Temperature TI-AY1EWS-1 (10RecAY1.v)	63°	65°	66°	64°	62°	* N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Outlet Temperature TI-AY1EWR-1 (10RecAY1.v)	65°	63°	65°	64°	63°	* N/A	N/A	N/A
AY101 Recirc Vent Condenser Differential Pressure PDI-AY1K48-1 (10RecAY1.v)	8.2	8.2	8.2	8.2	8.1	8-12 in wc	N/A	Pass
AY101 Recirc Vent Fan Differential Pressure PDI-AY1K45-1 (10RecAY1.v)	19.6	19.6	19.6	19.6	19.6	15-18 in wc	N/A	Pass
AY101 Recirc Vent Fan Motor Current II-AY1K45-1 (10RecAY1.v)	4.4	4.4	4.3	4.6	4.4	N/A	N/A	N/A
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (10RecAY1.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (10RecAY1.v)	501	498	501	500	490	setpoint ± 20 scfm	N/A	Pass

① SEE TE-006, Item 3

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TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v								
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	393	385	398	393	399	≤ FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-2.0	-2.0	-2.0	-2.0	-2.0	-0.35 to -3.0 in WC	-3 > x > -6 in WC W030-RD-001	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	55%	55%	55%	55%	55%	N/A	N/A	Pass
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	45%	45%	45%	45%	45%	20% open	N/A	N/A

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TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v								
AY101 Recirc Condenser Cooling System Flow FI-AY1EWR-1 (06EvPAY1.v)	214	214	215	215	216	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v								
AY102 Recirc Condenser Cooling System Flow FI-AY2EWR-1 (07EvPAY2.v)	218	218	218	220	219	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v								
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EWR-1 (08EvPAZ1.v)	334	333	333	333	335	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EWR-1 (09EvPAZ2.v)	224	225	222	225	227	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 14Chillr.v								
Primary Vent Condenser Chiller Cooling Flow Rate FI-AZCWR-1 (14Chillr.v)	119	119	118	119	118	110-120 95-130 gpm		Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v								
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	12.1	12.1	12.1	12.1	12.0	< 10 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	81°	81°	81°	81°	81°	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	45°	45°	45°	45°	45°	35-40-60°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	39°	38°	38°	39°	38°	36-42°F -66- 35-55°F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	41°	39°	40°	41°	40°	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	5.0	5.0	4.9	4.9	5.0	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FI0-AZPC-1 (16PriCoo.v)	3092	3094	3095	3097	3098	N/A	N/A	N/A

① SEE TE-001, See Page 206 Mod 8-9, original TE-DTE, 12-20-198

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ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v								
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-20.1	① -19.9	-19.9	-20.0	② -20.0	setpoint ± 0.5 in wc	N/A	PASS
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	48°	48°	48°	48°	48°	35-40°F 40-65°F	N/A	PASS
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	24°	24°	24°	24°	24°	setpoint ± 2°F	≥ 17°F OSD	PASS
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	PASS
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	72°	72°	72°	72°	72°	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	PASS

(1) See TE-007

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 4-2 AY101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.v								
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	992	999	1002	997	999	760-9491050 scfm	≥ 200 and ≤ 8001050 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	87°	87°	87°	87°	86°	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 x (stack scfm/1206).

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

5.0 AY101 HIGH HEAT - TANK PRESSURE CONTROL

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhaustor to 800 scfm.

5.1 ENSURE the recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

5.2 ENSURE AY101 HIGH HEAT mode is established according to TO-060-351.

5.3 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AY101 at 500 ± 20 scfm (FIC-AY1K1-2)
- AY102 at 210 ± 20 scfm (FIC-AY2K1-2)
- AZ101 at 110 ± 20 scfm (FIC-AZ1K1-2)
- AZ102 at 110 ± 20 scfm (FIC-AZ2K1-2)

5.4 ENSURE the tank pressure control setpoints for tanks AY102, AZ101, and AZ102 are set to -2.0 in. wc on MCS graphic screen 15PriIn.v.

- PIC-AY2K1-1
- PIC-AZ1K1-1
- PIC-AZ2K1-1

5.5 ADJUST the tank pressure setpoint controller for tank AY101, PIC-AY1K1, to -0.5 in. wc.

NOTE - In the following steps, the system is stable when tank pressures are within ± 0.2 in wc of the setpoint and pressure control valve position is approximately steady state.

5.6 ALLOW the system to stabilize AND RECORD the Initial Value data in TABLE 5-1.

Test Engineer:

5.7 ADJUST the tank pressure setpoint controller for tank AY101, PIC-AY1K1, in 0.5 in. wc increments, from -0.5 in. wc to -3.0 in. wc.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

5.8 ALLOW system to stabilize AND RECORD the Changed Value data in TABLE 5-1 at each increment.

Test Engineer:

5.9 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 5-1 satisfies the acceptance criteria.

Test Engineer:

5.10 ADJUST the pressure setpoint controller for tank AY101, PIC-AY1K1, to -2.0 in. wc.

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ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 5-1 AY101 HIGH HEAT -- Pressure Control

MCS Graphic Screen 15PriIn.v									
AY101 Pressure Control <u>SETPOINT</u> PIC-AY1K1-1 (15PriIn.v)	Initial (-0.5)	-1.0 in wc	-1.5 in wc	-2.0 in wc	-2.5 in wc	-3.0 in wc	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-1.3	-1.3 ^①	-1.5	-2.0	-2.6	-2.9	setpoint $\pm$ 0.2 in wc	-3.3 > X > -6 in wc W030-RD-001	Pass
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	503	501	462	401	317	142	$\leq$ FIAZ2K1-2	N/A	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	101%	102%	75%	59%	46%	32%	N/A	N/A	Pass
AY101 Exhaust Air Flow <u>SETPOINT</u> FIC-AY1K1-2 (15PriIn.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	503	493	493	494	500	508	setpoint $\pm$ 20 scfm	N/A	Pass
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	42%	43%	43%	45%	46%	47%	$\geq$ 20% Open		Pass

① See TE-008

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)**6.0 AY101 HIGH HEAT - FAN AND FILTER TRAIN SWITCHOVER (A to B)****CAUTION**

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhauster to 800 scfm.

- 6.1 ENSURE Exhaust Fan AZ-K1-5-1A and Filter Train A are in service.
- 6.2 ENSURE the recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.
- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
 - AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
 - AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION
- 6.3 ENSURE AY101 HIGH HEAT mode is established according to TO-060-351.
- 6.4 ENSURE primary vent manifold setpoints PIC-AZK1-1A AND PIC-AZK1-1B match.
- 6.5 ENSURE heater temperature differential setpoints TDIC-AZK12-1A and TDIC-AZK12-1B match.
- 6.6 RECORD Initial Value data in TABLE 6-1.
- Test Engineer:
- 6.7 SELECT "Fan-1B" on MCS MACRO graphic screen 25mExhst.v.
- 6.8 SELECT "Heater-1B" on MCS MACRO graphic screen 25mExhst.v.
- 6.9 RUN Exhaust MACRO.
- 6.10 CHECK the following conditions on MCS graphic 17PriExh.v.:
- Fan-1A: STANDBY
 - Fan-1B: ON
 - Heater-1A: STANDBY
 - Heater-1B: ON
- 6.11 CHECK Chiller AND Pump-1A or Pump-1B ON at MCS graphic 14Chillr.v.

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

NOTE - In the following step, the system is stable when tank exhaust flow rates are within ± 20 scfm of the Initial Value and primary tank pressures are within ± 0.2 in wc of the Initial Values.

✓ 6.12 ALLOW the system to stabilize AND RECORD Final Value data in TABLE 6-1.

Test Engineer:

6.13 ESTABLISH AY101 RECIRC mode according to TO-060-351.

6.14 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 6-1 is in the acceptable range.

Test Engineer:

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v					
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	276	321	≤ FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-2.1	-2.0	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	53%	49%	N/A	N/A	Pass
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (15PriIn.v)	500	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	493	499	setpoint ± 20 scfm	N/A	Pass
AY101 Exhaust Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	44%	44%	>20% Open	N/A	Pass

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ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v					
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	-150	-150	≤ FIAY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-0.9	-0.9	-0.35 to -3.0 in wc	-0.3 > x > -6 in wc OSD	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	-25	-25	N/A	N/A	Pass
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (15PriIn.v)	220	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	212	213	setpoint ± 20 scfm	N/A	Pass
AY102 Exhaust Flow Control Valve Position ZI-AY2K1-2 (15PriIn.v)	99%	99%	>20% Open	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING
TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B) (Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	-1	-1	≤ FI-AZ1K1-2	N/A	Pass
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-1.1	-1.1	-0.35 to -3.0 in WC	-0.3 > x > -6 in WC OSD	Pass
AZ101 Pressure Control Valve Position ZI-AZ1K1-1 (15PriIn.v)	0	0	N/A	N/A	Pass
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (15PriIn.v)	110	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	113	112	setpoint ± 20 scfm	N/A	Pass
AZ101 Exhaust Flow Control Valve Position ZI-AZ1K1-2 (15PriIn.v)	26%	25%	≥20% Open	N/A	Pass

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Fan and Filter Train Switchover (Train A to Train B)(Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)			≤ FIAZ2K1-2	N/A	Pass
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-1.9	-2.0	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AZ102 Pressure Control Valve Position ZI-AZ2K1-1 (15PriIn.v)	19%	22%	N/A	N/A	Pass
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (15PriIn.v)	110	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	108	107	setpoint ± 20 scfm	N/A	Pass
AZ102 Exhaust Flow Control Valve Position ZI-AZ2K1-2 (15PriIn.v)	56%	54%	>20% open	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)(Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v					
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	12.1 ^①	11.7 ^①	< 10 in wc	N/A	Pass
Primary Vent Condenser Outlet Air Temperature TI-AZK18-1B (16PriCoo.v)	45	45	35-40-60°F	N/A	Pass
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	5.0	5.0	< 10 in wc	≤ 15 in wc OSD	Pass

① see TE-001, See Page 206, Mod B-4, original Data 4/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

TABLE 6-1 AV101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)(Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-21.0	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-20.1	N/A	setpoint + 0.5 in wc (1)	N/A	Pass
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1B (17PriExh.v)	N/A	-21.0	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	N/A	-19.3	setpoint + 0.5 in wc (1)	N/A	Pass
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1A, (17PriExh.v)	25	N/A			Pass
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1A, (17PriExh.v)	24	N/A	setpoint ± 2°F (1)	≥ 17°F OSD	Pass
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1B, (17PriExh.v)	N/A	25			Pass
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1B, (17PriExh.v)	N/A	27	setpoint ± 2°F (1)	≥ 17°F OSD	Pass

① see 78-007 see 78-008 original Date 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING
TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)(Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8	N/A	< 5 in wc (1)	≤ 6 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	N/A	0.9	< 5 in wc (1)	≤ 6 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.7	N/A	0.2 - 0.7 in wc (1) * ①	≤ 3 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	N/A	1.7	≤ 1.75 in wc (1)	≤ 3 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.8	N/A	< 5 in wc (1)	≤ 6 in wc OSD	PASS
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	N/A	0.8	< 5 in wc (1)	≤ 6 in wc OSD	PASS

① Incorrect Acceptance Criteria
Note: Exception 6/24/98
Should be ≤ 1.75 in wc

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TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)(Continued)

MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	72	72	IDIC setpoint + htr inlet $\pm$ 2°F (1)	$\leq$ 195°F OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	70	77	IDIC setpoint + htr inlet $\pm$ 2°F (1)	$\leq$ 195°F OSD	Pass
MCS PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 18PriMon.v					
Primary Stack Flow FI-AZK1-3 (18PriMon.v)	998	982	760-940 scfm	$\geq$ 200 and $\leq$ 800 scfm OSD	Pass

Note (1) Acceptable range is for the inservice vent train only.

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TABLE 6-1 AY101 HIGH HEAT - Fan and Filter Train Switchover (Train A to Train B)(Continued)

LOCAL PARAMETERS	INITIAL (Train A)	FINAL (Train B)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	0.07	0.07	No alarm	N/A	Pass
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	0.5	0.5	No alarm	N/A	Pass
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	0	0	No alarm	N/A	Pass
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	0	0	No alarm	N/A	Pass
AZ101 Air Inlet Station Pre-filter Differential Pressure PDI-AZ101K103-1	0	0	No alarm	N/A	Pass
AZ101 Air Inlet Station HEPA Differential Pressure PDI-AZ101K104-1	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station Pre-filter Differential Pressure PDI-AZ102K103-1	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station HEPA Differential Pressure PDI-AZ102K104-1	0	0	No alarm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING**7.0 AY102 HIGH HEAT - STEADY STATE OPERATION****CAUTION**

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhaustor to 800 scfm.

7.1 ENSURE Exhaust Fan AZ-K1-5-1B and Filter Train B are in service.

7.2 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- ~ AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- ~ AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- ~ AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- ~ AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

7.3 ENSURE tank pressure control setpoints are set at -2.0 in. wc on MCS graphic screen 15PriIn.v.

- ~ PIC-AZ1K1-1
- ~ PIC-AZ2K1-1
- ~ PIC-AY1K1-1
- ~ PIC-AY2K1-1

7.4 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ101 at ~~110100~~ ± 20 scfm (FIC-AZ1K1-2)
- AZ102 at ~~110100~~ ± 20 scfm (FIC-AZ2K1-2)
- AY101 at ~~200100~~ ± 20 scfm (FIC-AY1K1-2)
- AY102 at ~~210100~~ ± 20 scfm (FIC-AY2K1-2)

7.5 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AY102 RECIRC mode in TABLE 7-1.

Test Engineer:

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7.6 ~~ADJUST AY102 tank exhaust flow control setpoint to 500 $\pm$ 20 scfm (FIC AY2K1-2)~~

7.7 ESTABLISH AY102 HIGH HEAT mode according to TO-060-352.

Test Engineer:

7.8 PLACE AY102 Cooling Tower in DRY MODE operation in accordance with TO-060-358

Test Engineer:

7.9 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AY102 HIGH HEAT mode in TABLE 7-1.

Test Engineer:

→ 7.10 RECORD data in TABLE 7-1 every hour for 4 consecutive hours.

Test Engineer:

7.11 PLACE AY102 Cooling Tower in WET MODE operation in accordance with TO-060-358
AND RETURN to this procedure.

Test Engineer:

7.12 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data
with AY102 in HIGH-HEAT mode in TABLE 7-2.

7.13 RECORD data in TABLE 7-2 every 15 minutes hour for 4 consecutive hours
intervals.

Test Engineer:

7.14 VERIFY that no unexpected alarms or conditions occurred associated with this
section of testing and that the data in TABLES 7-1 and 7-2 satisfies the
acceptance criteria.

Test Engineer:

NOTE- All Cooling Towers will remain in WET MODE operation throughout the balance of the
procedure except as directed.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.V									
AY101 Recirc Vent Condenser Air Inlet Temperature TI-AY1K48-1A (10RecAY1.V)	83°	84°	85°	85°	85°	88°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Outlet Air Temperature TI-AY1K48-1B (10RecAY1.V)	69°	82°	83°	79°	79°	81°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Inlet Temperature TI-AY1EWS-1 (10RecAY1.V)	68°	82	83°	78°	80°	77°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Outlet Temperature TI-AY1EWS-1 (10RecAY1.V)	63°	83	84°	83°	82°	81°	N/A	N/A	N/A
AY101 Recirc Vent Condenser Differential Pressure PDI-AY1K48-1 (10RecAY1.V)	12.5	10.4	10.3	10.4	10.5	10.5	8-12 in wc	N/A	Pass
AY101 Recirc Vent Fan Differential Pressure PDI-AY1K45-1 (10RecAY1.V)	16.5	14.1	14.1	14.2	14.3	14.3	15-18 in wc	N/A	Pass
AY101 Recirc Vent Fan Motor Current II-AY1K45-1 (10RecAY1.V)	5.5	5.5	5.5	5.3	5.4	5.5	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Genl. Bldg.	483	481	480	479	480	477	N/A	N/A	N/A
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (10RecAY1.V)	200	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow	199	194	202	203	203	207	setpoint + 20 scfm	N/A	Pass

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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 11RecAY2.v									
AY102 Recirc Vent Condenser Air Inlet Temperature TI-AY2K48-1A (11RecAY2.v)	80°	81	79°	79°	80°	82°	N/A	N/A	N/A
AY102 Recirc Vent Condenser Outlet Air Temperature TI-AY2K48-1B (11RecAY2.v)	64°	83	82°	81°	82°	86°	N/A	N/A	N/A
AY102 Recirc Vent Condenser Water Inlet Temperature TI-AY2EWS-1 (11RecAY2.v)	61°	78	83°	85°	85°	84	* N/A	N/A	N/A
AY102 Recirc Vent Condenser Water Outlet Temperature TI-AY2EWR-1 (11RecAY2.v)	65°	81	83°	83°	82°	85	* N/A	N/A	N/A
AY102 Recirc Vent Condenser Differential Pressure PDI-AY2K48-1 (11RecAY2.v)	① 12.6"	② 5.5"	① 5.5"	① 5.5"	③ 5.4"	③ 5.4"	8-12 in wc	N/A	Pass
AY102 Recirc Vent Fan Differential Pressure PDI-AY2K45-1 (11RecAY2.v)	16.2"	② 19.5	② 19.4"	② 19.4"	② 19.4"	② 19.3	15-18 in wc	N/A	Pass
AY102 Recirc Vent Fan Motor Current II-AY2K45-1 (11RecAY2.v)	4.2	4.0	4.2	4.0	4.2	4.2	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	483	481	480	479	480	477	N/A	N/A	N/A
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (11RecAY2.v)	210	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (11RecAY2.v)	212	499	500	502	497	503	setpoint ± 20 scfm	N/A	Pass

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① SEE TC 006, Item ① ③ SEE TC 006, Item ②
 ② SEE TC 006, Item ③

* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 12RecAZ1.v									
AZ101 Recirc Vent Condenser Air Inlet Temperature TI-AZ1K48-1A (12RecAZ1.v)	123°	123	122°	123°	122°	122°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Outlet Air Temperature TI-AZ1K48-1B (12RecAZ1.v)	76°	89	88°	88°	88°	88°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Inlet Temperature TI-AZ1ENS-1 (12RecAZ1.v)	72°	88	86°	86°	87°	87°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Outlet Temperature TI-AZ1ENR-1 (12RecAZ1.v)	75°	89	87°	87°	87°	88°	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Differential Pressure PD1-AZ1K48-1 (12RecAZ1.v)	12.3	11.8	11.8	11.9	11.8	11.9	8-12 in wc	N/A	Pass
AZ101 Recirc Vent Fan Differential Pressure PD1-AZ1K45-1 (12RecAZ1.v)	17.4	16.8	16.9	16.9	16.9	16.9	15-18 in wc	N/A	Pass
AZ101 Recirc Vent Fan Motor Current II-AZ1K45-1 (12RecAZ1.v)	4.9	5.0	4.8	4.9	5.0	4.9	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105 Gen. Bldg.	483	481	480	479	480	477	N/A	N/A	N/A
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (12RecAZ1.v)	110	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow	109	114	110	113	111	118	setpoint ± 20 scfm	N/A	Pass

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① See TR-006, Item D

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 13RecAZ2.v									
AZ102 Recirc Vent Condenser Air Inlet Temperature TI-AZ2K48-1A (13RecAZ2.v)	111°	112°	111°	111°	112°	112°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Outlet Air Temperature TI-AZ2K48-1B (13RecAZ2.v)	75°	89	89°	90°	87°	88°	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Inlet Temperature TI-AZ2EWS-1 (13RecAZ2.v)	72°	88	87°	88°	87°	86	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Outlet Temperature TI-AZ2EWR-1 (13RecAZ2.v)	73°	91	88°	89°	92°	89	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Differential Pressure PDI-AZ2K48-1 (13RecAZ2.v)	③ 12.3	11.8	11.8	11.8	11.9	11.8	8-12 in wc	N/A	Pass
AZ102 Recirc Vent Fan Differential Pressure PDI-AZ2K45-1 (13RecAZ2.v)	16.2	15.6	15.6	15.7	15.7	15.7	15-18 in wc	N/A	Pass
AZ102 Recirc Vent Fan Motor Current II-AZ2K45-1 (13RecAZ2.v)	4.6	4.6	4.7	4.8	4.8	4.7	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	483	481	480	479	480	477	N/A	N/A	N/A
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (13RecAZ2.v)	110	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (13RecAZ2.v)	107	116	①	81 102-48 ①	①	109 ②	setpoint ± 20 scfm	N/A	Pass

① MASTRON REMOVED @ 1835 ② MASTRON RE-INSTALLED @ 2148

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③ ④ see TE-006, Item ①

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v									
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	-1	-1	-1	-1	-1	-1	FI-AY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-1.4 -1.3 YMH 9-22-98	-1.7	-1.7	-1.7	-1.8	-1.8	0.5 to 3.0 in wc	3 to 6 in wc W030-RD-001	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	1%	1%	1%	1%	1%	1%	N/A	N/A	N/A
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	51%	100%	100%	100%	100%	88%	> 20% Open	N/A	Pass
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	0	115 ^①	115 ^①	115 ^①	115 ^①	115 ^①	FI-AY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	-2.0	-2.0 ^①	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-1.2	-2.0 ^①	-2.1	-2.1	-2.1	-2.1	0.5 to 3.0 in wc	3 to 6 in wc W030-RD-001	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	0%	36% ^①	36 ^①	36 ^①	36 ^①	36 ^①	N/A	N/A	N/A
AY102 Exh. Flow Control Valve Position ZI-AY2K1-2 (15PriIn.v)	41%	35%	35%	35%	35%	35%	> 20% Open	N/A	Pass

① READING from earlier in day due to de-energizing inlet station, could not actually read flow during test, however no conditons have changed. flow is still within spec 8/22/98

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TABLE 7-1 AY102 HIGH HEAT Steady State (continued)

MCS PARAMETERS								
INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15Psi In.V (continued)								
AY101 Inter Air Flow FI-AZ1K1-1 (15Psi In.V)	Ø	Ø	-1	-1	-1	5 FIAZ1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AZ1K1-1 (15Psi In.V)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AZ1K1-1 (15Psi In.V)	-1.2	-1.3	-1.4	-1.4	-1.4	±0.5 to ±1.0 in HG ±0.3 x ±0.6 in HG H030-RD-001	N/A	Pass
AY101 Pressure Control Valve Z1-AZ1K1-1 (15Psi In.V)	-2%	-2%	-1%	-1%	-1%	N/A	N/A	N/A
AY101 Exh. Flow Control Valve Position Z1-AZ1K1-2 (15Psi In.V)	23%	23%	22%	22%	22%	>20% Open	N/A	Pass
AY102 Inter Air Flow FI-AZ2K1-1 (15Psi In.V)	Ø	63	0	0	0	5 FIAZ2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AZ2K1-1 (15Psi In.V)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AZ2K1-1 (15Psi In.V)	-2.1	-2.0	-2.0	-2.0	-2.0	±0.5 to ±1.0 in HG ±0.3 x ±0.6 in HG H030-RD-001	N/A	Pass
AY102 Pressure Control Valve Z1-AZ2K1-1 (15Psi In.V)	21% 21% 21% ^{max}	21%	22%	24%	22%	N/A	N/A	N/A
AY102 Exh. Flow Control Valve Position Z1-AZ2K1-2 (15Psi In.V)	29%	27%	27%	27%	23%	>20% Open	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v									
AY101 Recirc Condenser Cooling System Flow FI-AY1EWR-1 (06EvPAY1.v)	213	225	222	223	223	221	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v									
AY102 Recirc Condenser Cooling System Flow FI-AY2EWR-1 (07EvPAY2.v)	209	219	218	219	218	218	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v									
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EWR-1 (08EvPAZ1.v)	323	332	334	333	335	335	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v									
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EWR-1 (09EvPAZ2.v)	215	222	225	225	225	225	180-200 190-230 gpm	N/A	Pass

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TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v									
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	10.5"	① 12.1	① 12.0	① 12.0	① 12.0	① 11.9	4-40 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	81°	84°	84°	84°	85	85	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	44°	47°	46°	46°	47	47	35-40 60°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	38°	38°	38°	38°	38	38	36-2°F -set- 35-55°F	OSD	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40°	41°	41°	40°	41	40	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	3.1"	4.9	4.8	4.8	4.8	4.8	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	2942	2946	2955	2962	2970	2975	N/A	N/A	N/A

① SEE TE-001, See Ref Page 206, Mod B-4, Original TG-DATA

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TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 14Chillr.v									
Primary Vent Condenser Water Flow Rate FI-AZCWR-1 (14Chillr.v)	119	118	119	119	119	119	110-120 95-130 gpm	N/A	Pass

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TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v									
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1B (17PriExh.v)	-16.4 YMH-9-22-98 -21.0	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	-16.4	-20.4	-20.3	-20.3	-20.2	-20.3	setpoint + 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1B (17PriExh.v)	51°	50°	50°	50°	50	50	35-40°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1B (17PriExh.v)	25° YMH-9-22-98	25°	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1B (17PriExh.v)	28° YMH-9-22-98	23°	24°	25°	24	24	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	0.6 YMH-9-22-98	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	1.0 YMH-9-22-98	1.6	1.6	1.6	1.5	1.6	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	0.5 YMH-9-22-98	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	79° YMH-9-22-98	73°	74°	74°	74°	74°	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

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TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
Primary Exhaust Fan AZ-K1-5-1B Fan Speed SI-AZK15-1B (17P-1EXH-V)	3161 488	3627	3629	3628	3629	3626	N/A	N/A	N/A

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.v									
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	688	963	955	947	952	947	760-940/1050 scfm	≥ 200 and ≤ 800/1050 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	84°	85°	86°	85°	86	86	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.2	1.7	1.7	1.7	1.7	1.7	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.2	1.8	1.7	1.7	1.7	1.7	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 x (stack scfm/1206).

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Inlet Temperature TIC-AY101K102-1	N/A ①						N/A	N/A	→
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	∅	∅ ②	0	0	0	∅	No alarm	N/A	Pass N/A ②
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	∅	∅ ②	0	0	0	0	No alarm	N/A	Pass N/A ②
AY102 Air Inlet Station Inlet Temperature TIC-AY102K102-1	N/A ①						N/A	N/A	→
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	∅	∅ ②	0.02	0.02	0.02	0.02	No alarm	N/A	Pass N/A ②
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	∅	∅ ②	0.3	0.3	0.3	0.3	No alarm	N/A	Pass N/A ②

① Temp. Ind. De-energized
VNH 9-22-98

② Readings taken earlier in the day

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-1 AY102 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AY102 RECIRC	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AZ101 Air Inlet Station Inlet Temperature TIC-AZ101K102-1	N/A						N/A	N/A	Pass
AZ101 Air Inlet Station Pre-filter Differential Pressure P01-AZ101K103-1	φ	φ	φ	φ	φ	φ	No alarm	N/A	Pass
AZ101 Air Inlet Station HEPA Differential Pressure P01-AZ101K104-1	φ	φ	φ	φ	φ	φ	No alarm	N/A	Pass
AZ102 Air Inlet Station Inlet Temperature TIC-AZ102K102-1	N/A						N/A	N/A	Pass
AZ102 Air Inlet Station Pre-filter Differential Pressure P01-AZ102K103-1	φ	φ	φ	φ	φ	φ	No alarm	N/A	Pass
AZ102 Air Inlet Station HEPA Differential Pressure P01-AZ102K104-1	φ	φ	φ	φ	φ	φ	No alarm	N/A	Pass

① Temp. Ind. "Turned off"
② Reading taken earlier in the day

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-2 AY102 HIGH HEAT Steady State (All Cooling Towers in WET MODE)

MCS PARAMETERS	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.v								
AY102 Recirc Vent Condenser Air Inlet Temperature TI-AY2K48-1A (10RecAY1.v) II	79 ⁸¹ 88 ⁹⁻²²⁻⁹⁸	79	80	81	80	N/A	N/A	N/A
AY102 Recirc Vent Condenser Outlet Air Temperature TI-AY2K48-1B (10RecAY1.v) II	86	81	77	80	80	*	N/A	N/A
AY102 Recirc Vent Condenser Water Inlet Temperature TI-AY2EWS-1 (10RecAY1.v) II	84	82	85	81 75 ^{Umm 9-22-98}	83	*	N/A	N/A
AY102 Recirc Vent Condenser Water Outlet Temperature TI-AY2EWR-1 (10RecAY1.v) II	84 ⁸¹ 79 ⁹⁻²²⁻⁹⁸	87	83	83	81	*	N/A	N/A
AY102 Recirc Vent Condenser Differential Pressure PDI-AY2K48-1 (10RecAY1.v) II	5.5 ⁸¹ 10.5 ⁹⁻²²⁻⁹⁸	5.5 ^①	5.5 ^①	5.4 ^①	5.4 ^①	8-12 in wc	N/A	Pass
AY102 Recirc Vent Fan Differential Pressure PDI-AY2K45-1 (10RecAY1.v) II	19.3 ⁸¹ 19.3 ⁹⁻²²⁻⁹⁸	19.4 ^②	19.5 ^②	19.5 ^②	19.5 ^②	15-18 in wc	N/A	Pass
AY102 Recirc Vent Fan Motor Current II-AY2K45-1 (10RecAY1.v) II	4.2 5.4 ⁸¹ 5.4 ⁹⁻²²⁻⁹⁸	4.1	4.3	4.3	4.1	N/A	N/A	N/A
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (10RecAY1.v) II	500 200 ⁸¹ 200 ⁹⁻²²⁻⁹⁸	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (10RecAY1.v) II	502	508	501	500	498	setpoint ± 20 scfm	N/A	Pass

① see TEE-006, Item 2
② see TEE-006, Item 3

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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect..

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-2 AY102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v								
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	-150	-150	-150	-150	-150	≤ FIAY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	①	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-2.2	-2.2	-2.2	-2.1	-2.1	-0.35 to -3.0 in wc	-0.3 > x > -6 in wc W030-RD-001	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	-25%	-25%	-25%	-25	-25	N/A	N/A	Pass
AY102 Exh. Flow Control Valve Position ZI-AY2K1-2 (15PriIn.v)	35%	35%	34%	34	34	>20% Open	N/A	Pass

① PIC IN MANUAL - INLET STATION DEENERGIZED

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-2 AY102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANC E CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v								
AZ101 Recirc Condenser Cooling System Flow FI-AZ1ENR-1 (06EvPAY1.v)	222	224	222	223	222	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v								
AY102 Recirc Condenser Cooling System Flow FI-AY2ENR-1 (07EvPAY2.v)	218	219	217	219	217	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v								
AZ101 Recirc Condenser Cooling System Flow FI-AZ1ENR-1 (08EvPAZ1.v)	332	335	334	333	332	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2ENR-1 (09EvPAZ2.v)	224	223	226	227	225	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 14Chillr.v								
Primary Vent Condenser Water Flow Rate FI-AZCUR-1 (14Chillr.v)	119	119	118	118	118	95-130 gpm		Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont..)

TABLE 7-2 AY102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v								
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	11.9	12.0	12.1	12.1	12.0	< 40 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	84	85	85	85	85	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	46	46	46	46	46	35-40 50°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	38	37	37	39	37	36-42°F 50-55°F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40	40	40	41	39	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	4.8	4.8	4.8	4.8	4.8	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	.1	.1	.1	.1	.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	2978	2980	2982	2983	2984	N/A	N/A	N/A

(1) SEE TE-001, 5000 original Data from 70 Page 206, 2000 3-1, 2/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-2 AY102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AY102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v								
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-21.0 ^①	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-20.5 ^①	-20.5 ^①	-20.4 ^③	-20.4 ^③	-20.4 ^③	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	50° ^①	50° ^①	50° ^①	50° ^①	50° ^①	35-40°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25° ^①	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	24° ^①	24° ^①	24° ^①	24° ^①	24° ^①	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8 ^①	0.8 ^①	0.8 ^①	0.8 ^①	0.8 ^①	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.5 ^①	1.5 ^①	1.5 ^①	1.5 ^①	1.6 ^①	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.8 ^①	0.7 ^①	0.8 ^①	0.8 ^①	0.8 ^①	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	74° ^①	74° ^①	74° ^①	74° ^①	74° ^①	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

① RUNNING ON B-TRAIN

② SEE TE-006, Items

③ Late NOTE: SEE TE-007

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 7-2 AV102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AV102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.v								
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	939	943	945	950	952	760-9401050 scfm	≥ 200 and ≤ 8001050 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	86	86	86	85	86	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.7	1.7	1.7	1.8	1.7	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.8	1.8	1.8	1.7	1.7	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 x (stack scfm/1206).

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)**8.0 AY102 HIGH HEAT - TANK PRESSURE CONTROL****CAUTION**

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

8.1 ENSURE the recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

8.2 ENSURE AY102 HIGH HEAT mode is established according to TO-060-352.

8.3 ENSURE the tank pressure control setpoints for tanks AY101, AZ101, and AZ102 are set to -2.0 in. wc on MCS graphic screen 15PriIn.v.

- PIC-AY1K1-1
- PIC-AZ1K1-1
- PIC-AZ2K1-1

8.4 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AY102 at 500 $\pm$ 20 scfm (FIC-AY2K1-2)
- AY101 at ~~200~~100 $\pm$ 20 scfm (FIC-AY1K1-2)
- AZ101 at ~~110~~100 $\pm$ 20 scfm (FIC-AZ1K1-2)
- AZ102 at ~~110~~100 $\pm$ 20 scfm (FIC-AZ2K1-2)

8.5 ADJUST the tank pressure setpoint controller for tank AY102, PIC-AY2K1, to -0.5 in. wc.

NOTE - In the following steps, the system is stable when tank pressures are within $\pm$ 0.2 in wc of the setpoint and pressure control valve position in approximately steady state.

8.6 ALLOW the system to stabilize AND RECORD the Initial Value data in TABLE 8-1.

Test Engineer:

8.7 ADJUST the tank pressure setpoint controller for tank AY102, PIC-AY2K1, in 0. in. wc increments, from -0.5 in. wc to -3.0 in. wc.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

8.8 ALLOW system to stabilize AND RECORD the Changed Value data in TABLE 8-1 at each increment.

Test Engineer:

8.9 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 8-1 satisfies the acceptance criteria.

Test Engineer:

8.10 ESTABLISH AY102 RECIRC mode according to TO-060-352.

8.11 ADJUST the pressure setpoint controller for tank AY102, PIC-AY2K1, to -2.0 in. wc.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

TABLE 8-1 AY102 HIGH HEAT - Pressure Control

TABLE 8-1 AY102 HIGH HEAT - Pressure Control										
MCS Graphic Screen 15PriIn.v										
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	Initial (-0.5)	-1.0 in wc	-1.5 in wc	-2.0 in wc	-2.5 in wc	-3.0 in wc	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL	
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-1.2	-1.2	-1.5	-1.9	-2.5	-3.0	setpoint + 0.2 in wc	-0.3 > x > -6 in wc W030-RD-001	Pass	
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	0	0	0	0	0	0	≤ FIAZ2K1-2	N/A	Pass	
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	100%	100%	51%	28%	34%	1%	N/A	N/A	Pass	
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (15PriIn.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	506	504	500	495	505	501	setpoint ± 20 scfm	N/A	Pass	
AY102 Exhaust Air Flow Control Valve Position ZI-AY2K1-2 (15PriIn.v)	31%	31%	31%	32%	34%	34%	≥ 20% Open	N/A	Pass	

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① INSTRUMENT MALFUNCTION
② See TE-008, see Page 254 for original TC Data, 8/22 or 7/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING**9.0 AZ101 HIGH HEAT - STEADY STATE OPERATION****CAUTION**

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

9.1 ENSURE Exhaust Fan AZ-K1-5-1B and Filter Train B are in service.

9.2 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- ~ AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- ~ AY102 - TO-060-352, AY101 TANK RECIRC MODULE OPERATION
- ~ AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- ~ AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

9.3 ENSURE tank pressure control setpoints are set at -2.0 in. wc on MCS graphic screen 15PriIn.v.

- ~ PIC-AZ1K1-1
- ~ PIC-AZ2K1-1
- ~ PIC-AY1K1-1
- ~ PIC-AY2K1-1

9.4 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ101 at ~~110100~~ ± 20 scfm (FIC-AZ1K1-2)
- AZ102 at ~~110100~~ ± 20 scfm (FIC-AZ2K1-2)
- AY101 at ~~200100~~ ± 20 scfm (FIC-AY1K1-2)
- AY102 at ~~210100~~ ± 20 scfm (FIC-AY2K1-2)

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

9.5 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AZ101 RECIRC mode in TABLE 9-1.

Test Engineer:

~~9.6 ADJUST AZ101 tank exhaust flow control setpoint to 500 ±20 scfm (FIC AZ1K1-2)~~

✓9.7 ESTABLISH AZ101 HIGH HEAT mode according to TO-060-353.

Test Engineer:

✓9.8 PLACE AZ101 Cooling Tower in DRY MODE operation in accordance with TO-060-358

Test Engineer:

✓9.9 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AZ101 HIGH HEAT mode in TABLE 9-1.

Test Engineer:

✓9.10 RECORD data in TABLE 9-1 every hour for 4 consecutive hours.

Test Engineer:

9.11 PLACE AZ101 Cooling Tower in WET MODE operation in accordance with TO-060-358
AND RETURN to this procedure.

Test Engineer:

9.12 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data
with AZ101 in HIGH HEAT mode in TABLE 9-2.

✓9.13 RECORD data in TABLE 9-2 every 15 minutes hour for 4 consecutive hours
intervals.

Test Engineer:

9.14 VERIFY that no unexpected alarms or conditions occurred associated with this
section of testing and that the data in TABLES 9-1 and 9-2 satisfies the
acceptance criteria.

Test Engineer:

NOTE - All Cooling Towers will remain in WET MODE operation throughout the
balance of this procedure except as directed.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.v									
AY101 Recirc Vent Condenser Air Inlet Temperature TI-AY1K48-1A (10RecAY1.v)	85	84	84	84	85	90	N/A	N/A	N/A
AY101 Recirc Vent Condenser Outlet Air Temperature TI-AY1K48-1B (10RecAY1.v)	64	61	63	65	57	62	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Inlet Temperature TI-AY1EWS-1 (10RecAY1.v)	63	59	59	60	57	59	* N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Outlet Temperature TI-AY1EWR-1 (10RecAY1.v)	61	57	59	61	57	58	* N/A	N/A	N/A
AY101 Recirc Vent Condenser Differential Pressure PDI-AY1K48-1 (10RecAY1.v)	11.0	11.4	11.6	11.8	11.9	12.4 ^①	8-12 in wc	N/A	Pass
AY101 Recirc Vent Fan Differential Pressure PDI-AY1K45-1 (10RecAY1.v)	14.9 ^②	15.4	15.5	15.8	15.9	16.3	15-18 in wc	N/A	Pass
AY101 Recirc Vent Fan Motor Current II-AY1K45-1 (10RecAY1.v)	5.4	5.3	5.2	5.4	5.4	5.1	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	483	489	486	485	487	N/A	N/A	N/A
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (10RecAY1.v)	200	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (10RecAY1.v)	192	179 ^③	177 ^③	173 ^③	179 ^③	181	setpoint ± 20 scfm	N/A	Pass

① SEE - TE-006, Item ② 562 Page 269 for original TE Data.

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* see next page.

② SEE TE-006, Item ①, see Page 268 for original TE Data.
③ SEE PG-010, 007 SEE Page 195 or 242/250 for original TE Data.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 11RecAY2.V									
AY102 Recirc Vent Condenser Air Inlet Temperature TI-A12K48-1A (11RecAY2.V)	79	80	78	78	73	80	N/A	N/A	N/A
AY102 Recirc Vent Condenser Outlet Air Temperature TI-A12K48-1B (11RecAY2.V)	76	77	76	76	75	75	N/A	N/A	N/A
AY102 Recirc Vent Condenser Water Inlet Temperature TI-A12EUS-1 (11RecAY2.V)	73	75	74	77	76	72	*	N/A	N/A
AY102 Recirc Vent Condenser Water Outlet Temperature TI-A12EUR-1 (11RecAY2.V)	76	82	75	76	69	75	*	N/A	N/A
AY102 Recirc Vent Condenser Differential Pressure PDI-A12K48-1 (11RecAY2.V)	10.1	10.1	10.2	10.3	10.3	10.3	8-12 in wc	N/A	Pass
AY102 Recirc Vent Fan Differential Pressure PDI-A12K45-1 (11RecAY2.V)	13.9	13.8	13.9	13.9	14.0	14.0	15-18 in wc	N/A	Pass
AY102 Recirc Vent Fan Motor Current II-A12K45-1 (11RecAY2.V)	5.4	5.3	5.4	5.3	5.4	5.4	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	483	489	486	486	487	N/A	N/A	N/A
AY102 Exhaust Air Flow SETPOINT FIC-A12K1-2 (11RecAY2.V)	220	210	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-A12K1-2 (11RecAY2.V)	216	210	212	214	214	212	setpoint ± 20 scfm	N/A	Pass

See 7E006, Item ③, see Page 268/269 for original TC data of 222.074

* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 12RecAZ1.v									
AZ101 Recirc Vent Condenser Air Inlet Temperature TI-AZ1K48-1A (12RecAZ1.v)	122	121	122	122	123	123	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Outlet Air Temperature TI-AZ1K48-1B (12RecAZ1.v)	87	88	90	89	89	90	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Inlet Temperature TI-AZ1EWS-1 (12RecAZ1.v)	85	85	90	89	88	88	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Outlet Temperature TI-AZ1EWR-1 (12RecAZ1.v)	86	86	91	91	89	88	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Differential Pressure PDI-AZ1K48-1 (12RecAZ1.v)	11.8"	4.7 ^①	4.6 ^①	4.6 ^①	3.7 ^①	4.6 ^①	8-12 in wc	N/A	Pass
AZ101 Recirc Vent Fan Differential Pressure PDI-AZ1K45-1 (12RecAZ1.v)	16.9	20.6 ^②	20.5 ^②	20.6 ^②	20.6 ^②	20.6 ^②	15-18 in wc	N/A	Pass
AZ101 Recirc Vent Fan Motor Current II-AZ1K45-1 (12RecAZ1.v)	4.9	3.8	3.8	3.8	3.9	3.9	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	483	489	486	488	487	N/A	N/A	N/A
AZ101 Exhaust Air Flow SETPOINT FI-AZ1K1-2 (12RecAZ1.v)	110	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (12RecAZ1.v)	108	508	497	497	504	503	setpoint ± 20 scfm	N/A	Pass

① SEE TE-006, Item 2 * ② SEE TE-006, Item 3 *

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 13RecAZ2.v									
AZ102 Recirc Vent Condenser Air Inlet Temperature TI-AZ2K48-1A (13RecAZ2.v)	112	111	111	112	112	112	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Outlet Air Temperature TI-AZ2K48-1B (13RecAZ2.v)	91	90	91	92	89	91	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Inlet Temperature TI-AZ2EWS-1 (13RecAZ2.v)	90	88	90	90	88	90	*	N/A	N/A
AZ102 Recirc Vent Condenser Water Outlet Temperature TI-AZ2EWR-1 (13RecAZ2.v)	91	87	92	94	90	91	*	N/A	N/A
AZ102 Recirc Vent Condenser Differential Pressure PDI-AZ2K48-1 (13RecAZ2.v)	11.7 +5.6 R 9-23-98	11.7	11.7	11.7	11.7	11.7	8-12 in wc	N/A	Pass
AZ102 Recirc Vent Fan Differential Pressure PDI-AZ2K45-1 (13RecAZ2.v)	15.6	15.6	15.6	15.6	15.7	15.7	15-18 in wc	N/A	Pass
AZ102 Recirc Vent Fan Motor Current II-AZ2K45-1 (13RecAZ2.v)	4.5	4.5	4.5	4.6	4.7	4.7	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	483	489	486	487	487	N/A	N/A	N/A
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (13RecAZ2.v)	110	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (13RecAZ2.v)	106	82 ①	83 ①	81 ①	83 ①	80 ②	setpoint ± 20 scfm	N/A	Pass

① TE-008, 500/2499 ② see TE-009

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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v									
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	-1	-2	-1	-2	-1	-2	≤ FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-1.0	0.8	-0.8	-0.8	-0.8	0.8	-0.5 to +3.0 in Hg	-3 to +6 in Hg W030-RD-001	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	1%	1%	1	1	1%	1%	N/A	N/A	N/A
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	41%	100%	100	100	100%	100	> 20% Open	N/A	Pass
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	①	①	①	①	①	①	≤ FIAY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.5 to +3.0 in Hg	-3 to +6 in Hg W030-RD-001	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	-25% ^①	①-150	①-150	①-150	-25%	-25%	N/A	N/A	N/A
AY102 Exh. Flow Control Valve Position ZI-AY2K1-2 (15PriIn.v)	37%	86%	86%	86%	86%	86%	> 20% Open	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (continued)

MCS PARAMETERS								MCS Graphic Screen 15P11h.v (continued)	
INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL	
AZ101 Inlet Air Flow FI-AZ1K1-1 (15P11h.v)	0	284	287	286	286	5. FI-AZ1K1-2	N/A	Pass	AZ101 Inlet Air Flow FI-AZ1K1-1 (15P11h.v)
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15P11h.v)	-2.0	-2.0	-2.0	-2.0	-2.0	N/A	N/A	N/A	AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15P11h.v)
AZ101 Tank Pressure PI-AZ1K1-1 (15P11h.v)	-0.9	-2.0	-2.0	-2.0	-2.0	0.5 to -3.0 in HG	-3 > -1 > -6 in HG	Pass	AZ101 Tank Pressure PI-AZ1K1-1 (15P11h.v)
AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15P11h.v)	-1	60%	60%	60%	60%	N/A	N/A	N/A	AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15P11h.v)
AZ101 EXH. Flow Control Valve Position ZI-AZ1K1-2 (15P11h.v)	19%	32%	32%	32%	32%	>20% Open	N/A	Pass	AZ101 EXH. Flow Control Valve Position ZI-AZ1K1-2 (15P11h.v)
AZ102 Inlet Air Flow FI-AZ2K1-1 (15P11h.v)	0	0	0	0	0	5. FI-AZ2K1-2	N/A	Pass	AZ102 Inlet Air Flow FI-AZ2K1-1 (15P11h.v)
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15P11h.v)	-2.0	-2.0	-2.0	-2.0	-2.0	N/A	N/A	N/A	AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15P11h.v)
AZ102 Tank Pressure PI-AZ2K1-1 (15P11h.v)	-2.1	-1.5	-1.5	-1.5	-1.5	-0.5 to -3.0 in HG	-3 > -1 > -6 in HG	Pass	AZ102 Tank Pressure PI-AZ2K1-1 (15P11h.v)
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15P11h.v)	22%	0	0	0	0	N/A	N/A	N/A	AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15P11h.v)
AZ102 EXH. Flow Control Valve Position ZI-AZ2K1-2 (15P11h.v)	25%	101%	101%	101%	101%	>20% Open	N/A	Pass	AZ102 EXH. Flow Control Valve Position ZI-AZ2K1-2 (15P11h.v)

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.V									
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EHR-1 (06EvPAY1.V)	215	214	212	212	214	218	180-200 190-210 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.V									
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EHR-1 (07EvPAY2.V)	218	217	215	216	216	218	180-200 190-210 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.V									
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EHR-1 (08EvPAZ1.V)	335	334	334	337	331	332	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.V									
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EHR-1 (09EvPAZ2.V)	222	225	225	222	224	225	180-200 190-210 gpm	N/A	Pass

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TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v									
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	6.3"	12.4	12.4	12.4	12.4	12.4	< 40 in WC	N/A	PASS
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	81	84	84	84	84	85	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	46	46	47	46	46	46	35-40 ± 0.2 F	≥ 35 F OSD	PASS
Primary Vent Condenser Water Inlet Temperature TI-AZC18-1 (16PriCoo.v)	38	38	38	37	37	39	36 ± 2 F -5 F	OSD	PASS
Primary Vent Condenser Water Outlet Temperature TI-AZC18-1 (16PriCoo.v)	40	40	41	39	40	41	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	3.3	5.0	5.0	5.0	4.9	5.0	< 10 in WC	≤ 15 in WC OSD	PASS
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FI-AZPC-1 (16PriCoo.v)	3116	3121	3126	3132	3139	3144	N/A	N/A	N/A

SEE TE-001 SEE Page 206, Mod 8-4, Original To Det. 6220190

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TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 14Chillr.v									
Primary Vent Condenser Water Flow Rate FI-AZCWR-1 (14Chillr.v)	118	118	118	119	119	118	110-120 95-130 gpm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v									
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1B (17PriExh.v)	-12.8	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	-12.7	-19.6	-19.4	-19.6	-19.5	19.6 19.4 9-24-98	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1B (17PriExh.v)	51	50	50	49	49	49	40°F ± 2°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1B (17PriExh.v)	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1B (17PriExh.v)	24	24	24	25	24	24	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	0.6	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	0.9	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	0.5	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	75	73	73	74	74	73	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

① SEE TG-007 566 Pages 242/250, Original To Date 9/22/98

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TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.V									
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.V)	681	999	993	1002	989 987 986	996	760-9401050 scfm	≥ 200 and ≤ 8001050 scfm OSD	PASS
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.V)	80	85	85	85	85	85	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.V)	1.3	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.V)	1.2	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = $2 \times (\text{stack scfm}/1206)$.

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TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Inlet Temperature TIC-AY101K102-1	68.4	68.8	67.8	64.1	64.5	62.5	N/A	N/A	Pass
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	0	0	0	0	0	0	No alarm	N/A	Pass
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	0	0	0	0	0	0	No alarm	N/A	Pass
AY102 Air Inlet Station Inlet Temperature TIC-AY102K102-1	0	0	0	0	0	0	N/A	N/A	N/A
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	0	0	0	0	0	0	No alarm	N/A	Pass
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	0	0	0	0	0	0	No alarm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-1 AZ101 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AZ101 RECIRC	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AZ101 Air Inlet Station Inlet Temperature TIC-AZ101K102-1	71.6	67.7	65.0	66.5	67.2	66.0	N/A	N/A	Pass
AZ101 Air Inlet Station Pre-filter Differential Pressure PDI-AZ101K103-1	0	.07	.06	.06	.07	.07	No alarm	N/A	Pass
AZ101 Air Inlet Station HEPA Differential Pressure PDI-AZ101K104-1	0	.5	.5	.6	.5	.5	No alarm	N/A	Pass
AZ102 Air Inlet Station Inlet Temperature TIC-AZ102K102-1	70.3	70.1	66.6	66.6	66.7	63.5	N/A	N/A	Pass
AZ102 Air Inlet Station Pre-filter Differential Pressure PDI-AZ102K103-1	0	0	0	0	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station HEPA Differential Pressure PDI-AZ102K104-1	0	0	0	0	0	0	No alarm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAV1.V								
AZ101 Recirc Vent Condenser Air Inlet Temperature TI-AZ1K48-1A (40RecAV1.V)	122.01 83 4-24-98	122 82 4-24-98	122	122	122	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Outlet Air Temperature TI-AZ1K48-1B (40RecAV1.V)	88.81 61 4-24-98	88 60 4-24-98	89	89	86	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Inlet Temperature TI-AZ1EWS-1 (40RecAV1.V)	87	87 56 4-24-98	88	89	85	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Outlet Temperature TI-AZ1EWR-1 (40RecAV1.V)	88	88 51 4-24-98	89	90	87	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Differential Pressure PDI-AZ1K48-1 (40RecAV1.V)	4.6 13.8 4-24-98	4.6	3.9	4.6	4.6	8-12 in wc	N/A	N/A
AZ101 Recirc Vent Fan Differential Pressure PDI-AZ1K45-1 (40RecAV1.V)	20.6 17.1 4-24-98	20.7	20.6	20.6	20.7	15-18 in wc	N/A	N/A
AZ101 Recirc Vent Fan Motor Current TI-AZ1K45-1 (40RecAV1.V)	4.0 5.0 4-24-98	3.7	3.8	3.9	3.9	N/A	N/A	N/A
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (40RecAV1.V)	500 24 4-24-98	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (40RecAV1.V)	504 24 4-24-98	490	487	508	502	setpoint $\pm$ 20 scfm	N/A	N/A

① SEE TE 006, Item 23 SEE FIGS 268/269 for original
② SEE TE 006, Item 33 SEE FIGS 268/269 for original

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)
TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v								
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	287	287	284	281	282	≤ FIAZ1K1-2	N/A	Pass
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-2.0	-2.0	-2.0	-2.0	-2.0	-0.35 to -3.0 in WC	-3 > x > -6 in WC W030-RD-001	Pass
AZ101 Pressure Control Valve Position ZI-AZ1K1-1 (15PriIn.v)	60	60%	60%	60%	60%	N/A	N/A	Pass
AZ101 Exh. Flow Control Valve Position ZI-AZ1K1-2 (15PriIn.v)	32	32%	32%	32%	32%	≥ 20% Open	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v								
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EWR-1 (06EvPAY1.v)	212	213	215	214	212	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v								
AZ102 AZ101 Recirc Condenser Cooling System Flow FI-AY2EWR-1 (07EvPAY2.v)	216	217	216	215	216	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v								
AZ101 Recirc Condenser Cooling System Flow FI-AZ1EWR-1 (08EvPAZ1.v)	334	332	334	335	331	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EWR-1 (09EvPAZ2.v)	225	225	224	224	225	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 14Chillr.v								
Primary Vent Condenser Chiller Cooling Flow Rate FI-AZCWR-1 (14Chillr.v)	119	118	119	119	119	110-120 95-130 gpm		Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v								
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	12.4 ^①	12.4 ^①	12.5 ^①	12.4 ^①	12.5 ^①	< 10 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	84	85	84	85	84	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	46	47	46	46	46	35-40 °F	≥ 35 °F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	38	38	39	37	37	36 ± 2 °F set 35-55 °F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40	41	41	39	39	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	5.0	5.0	5.0	5.0	4.9	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3148	3150	3151	3153	3155	N/A	N/A	N/A

① see TE-001, see Page 206, Mod B-4, Original to Date 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v								
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-4A (17PriExh.v)	21.0 -19.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-19.3	-19.4	-19.5	-19.5	-19.4	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	49 65	49	49	49	49	35-40°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	23	24	24	24	24	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8	0.9	0.8	0.8	0.9	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.8	0.8	0.8	0.8	0.9	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	73	74	73	73	74	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

① see TB 007 see Pages 242/250 For original TB Data. 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 9-2 AZ101 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ101 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.V								
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.V)	991	996	997	993	999	760-9401050 scfm	≥ 200 and ≤ 9001050 scfm OSD	PASS
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.V)	85	85	85	85	85	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.V)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.V)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

Notes:
(1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = $2 \times (\text{stack scfm}/1206)$.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

10.0 AZ101 HIGH HEAT - TANK PRESSURE CONTROL

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

10.1 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

10.2 ENSURE AZ101 HIGH HEAT mode is established according to TO-060-353.

10.3 ENSURE the tank pressure control setpoints for tanks AY101, AY102, and AZ102 are set to -2.0 in. wc on MCS graphic screen 15PriIn.v.

- PIC-AY1K1-1
- PIC-AY2K1-1
- PIC-AZ2K1-1

10.4 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ101 at 500 ± 20 scfm (FIC-AZ1K1-2)
- AZ102 at 110 ± 20 scfm (FIC-AZ2K1-2)
- AY101 at 200 ± 20 scfm (FIC-AY1K1-2)
- AY102 at 210 ± 20 scfm (FIC-AY2K1-2)

10.5 ADJUST the tank pressure setpoint controller for tank AZ101, PIC-AZ1K1, to -0.5 in. wc.

NOTE - In the following steps, the system is stable when tank pressures are within ± 0.2 in wc of the setpoint and pressure control valve position is approximately steady state.

10.6 ALLOW the system to stabilize AND RECORD the Initial Value data in TABLE 10-1

Test Engineer:

10.7 ADJUST the tank pressure setpoint controller for tank AZ101, PIC-AZ1K1, in 0.5 in. wc increments, from -0.5 in. wc to -3.0 in. wc.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

10.8 ALLOW system to stabilize AND RECORD the Changed Value data in TABLE 10-1 at each increment.

Test Engineer:

✓10.9 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 10-1 satisfies the acceptance criteria.

Test Engineer:

10.10 ADJUST the pressure setpoint controller for tank AZ101, PIC-AZ1K1, to -2.0 in. wc.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 10-1 AZ101 HIGH HEAT - Pressure Control

MCS Graphic Screen 15PriIn.v									
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PriIn.v)	Initial (-0.5)	-1.0 in wc	-1.5 in wc	-2.0 in wc	-2.5 in wc	-3.0 in wc	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-1.7	-1.7	-1.7	-2.0	-2.6	-3.0	setpoint $\pm$ 0.2 in wc	-3 > x > -6 in wc W030-RD-001	Pass
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	352	350	353	288	266	220	$\leq$ FIAZ2K1-2	N/A	Pass
AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15PriIn.v)	98%	98%	98%	61%	52%	42%	N/A	N/A	Pass
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (15PriIn.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	507	506	503	507	508	499	setpoint $\pm$ 20 scfm	N/A	Pass
AZ101 Exh. Flow Control Valve Position ZI-AZ1K1-2 (15PriIn.v)	32%	32%	32%	32%	34%	35%	$\geq$ 20% Open	N/A	Pass

① SEE TG-008, SEE Page 254 for original TG DATA of 220c798

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

11.0 AZ101 HIGH HEAT - FAN AND FILTER TRAIN SWITCHOVER (B to A)

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

11.1 ENSURE Exhaust Fan AZ-K1-5-1B and Filter Train B are in service.

11.2 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

11.3 ENSURE AZ101 HIGH HEAT mode is established according to TO-060-353.

11.4 ENSURE primary vent manifold setpoints PIC-AZK1-1A AND PIC-AZK1-1B match.

11.5 ENSURE heater temperature differential setpoints TDIC-AZK12-1A and TDIC-AZK12-1B match.

11.6 RECORD Initial Value data in TABLE 11-1.

Test Engineer:

11.7 SELECT "Fan-1A" on MCS MACRO graphic screen 25mExhst.v.

11.8 SELECT "Heater-1A" on MCS MACRO graphic screen 25mExhst.v.

11.9 RUN Exhaust MACRO.

11.10 CHECK the following conditions on MCS graphic 17PriExh.v.:

- Fan-1A: ON
- Fan-1B: STANDBY
- Heater-1A: ON
- Heater-1B: STANDBY

11.11 CHECK Chiller AND Pump-1A or Pump-1B ON at MCS graphic 14Chillr.v.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

NOTE - In the following step, the system is stable when tank exhaust flow rates are within ± 20 scfm of the Initial Value and primary tank pressures are within ± 0.2 in wc of the Initial Values. Allow a minimum of 15 minutes after changing any setpoints before recording any data.

11.12 ALLOW the system to stabilize AND RECORD Final Value data in TABLE 11-1.

Test Engineer:

11.13 ESTABLISH AZ101 RECIRC mode according to T0-060-353.

11.14 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 11-1 is in the acceptable range.

Test Engineer:

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v					
AY101 Inlet Air Flow FI-AY1K1-1 (15PriIn.v)	-1	-1	$\leq$ FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PIC-AY1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-AY1K1-1 (15PriIn.v)	-0.8	-0.8	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AY101 Pressure Control Valve Valve Position ZI-AY1K1-1 (15PriIn.v)	1%	1	N/A	N/A	Pass
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (15PriIn.v)	200	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (15PriIn.v)	181 (1)	180 (1)	setpoint $\pm$ 20 scfm	N/A	Pass
AY101 Exh. Flow Control Valve Position ZI-AY1K1-2 (15PriIn.v)	100	100	$\geq$ 20% Open	N/A	Pass

(1) Marginal - SEE TE-009, SEE PAGE 298, ORIGINAL TE DATA ATTACHED

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TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A)(Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AY102 Inlet Air Flow FI-AY2K1-1 (15PriIn.v)	-150	-150	≤ FIAY2K1-2	N/A	Pass
AY102 Pressure Control SETPOINT PIC-AY2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-AY2K1-1 (15PriIn.v)	-0.7	-0.7	-0.35 to -3.0 in WC	-0.3 > x > -6 in WC OSD	Pass
AY102 Pressure Control Valve Valve Position ZI-AY2K1-1 (15PriIn.v)	-25%	-25%	N/A	N/A	Pass
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (15PriIn.v)	210	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (15PriIn.v)	209	206	setpoint ± 20 scfm	N/A	Pass
AY102 Exhaust Air Flow ZI-AY2K1-2 (15PriIn.v)	80%	80%	≥ 20% open	N/A	Pass

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TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PriIn.v)	288	289	≤ FIAZ1K1-2	N/A	Pass
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PriIn.v)	-2.0	-2.0	-0.35 to -3.0 in wc	-3 > x > -6 in wc OSD	Pass
AZ101 Pressure Control Valve Valve Position ZI-AZ1K1-1 (15PriIn.v)	61%	61%	N/A	N/A	Pass
AZ101 Exhaust Air Flow SETPOINT FIC-AZ1K1-2 (15PriIn.v)	560	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	495	512	setpoint ± 20 scfm	N/A	Pass
AZ101 Exhaust Air Flow FI-AZ1K1-2 (15PriIn.v)	33%	33%	≥ 20% Open	N/A	Pass

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TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v (Continued)					
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	0	0	≤ FIAZ2K1-2	N/A	Pass 6
AZ102 Pressure Control <u>SETPOINT</u> PIC-AZ2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-1.5	-1.5	-0.35 to -3.0 in wc	-.3 > x > -6 in wc OSD	Pass 6
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15PriIn.v)	0	0	N/A	N/A	Pass 6
AZ102 Exhaust Air Flow <u>SETPOINT</u> FIC-AZ2K1-2 (15PriIn.v)	110	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	79	85	setpoint ± 20 scfm	N/A	Pass 6
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	101	101	≥20% Open	N/A	Pass 6

① SEE TE-009, SEE Qry 298 original W. Data 4/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v					
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	12.0 ①	12.1 ①	< 10 in wc	N/A	Pass 6/
Primary Vent Condenser Outlet Air Temperature TI-AZK18-1B (16PriCoo.v)	47	46	35-40-60°F	N/A	Pass 6/
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	5.0	4.9	< 10 in wc	≤ 15 in wc OSD	Pass 6/

① SEE TG-001, See Page 206, B-4, for original TG Data.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	N/A	- 21.0	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	N/A	- 19.4 ^①	setpoint $\pm$ 0.5 in wc (1)	N/A	Pass <i>[Signature]</i>
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1B (17PriExh.v)	- 21.0 ^①	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1B (17PriExh.v)	- 19.0	N/A	setpoint $\pm$ 0.5 in wc (1)	N/A	Pass <i>[Signature]</i>
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1A, (17PriExh.v)	N/A	25	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1A, (17PriExh.v)	N/A	27	setpoint $\pm$ 2°F (1)	$\geq$ 17°F OSD	Pass <i>[Signature]</i>
Primary Vent Filter Train Heater Differential Temperature SETPOINT TDIC-AZK12-1B, (17PriExh.v)	25	N/A	N/A	N/A	N/A
Primary Vent Filter Train Heater Differential Temperature TDI-AZK12-1B, (17PriExh.v)	24	N/A	setpoint $\pm$ 2°F (1)	$\geq$ 17°F OSD	Pass <i>[Signature]</i>

① see TG-007 see Page ~~246~~ 246/250 for original TG Data 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	N/A	0.9	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1B (17PriExh.v)	0.9	N/A	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	N/A	1.7	≤ 1.75 in wc (1)	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1B (17PriExh.v)	1.7	N/A	≤ 1.75 in wc (1)	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	N/A	0.8	< 5 in wc (1)	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2B (17PriExh.v)	0.8	N/A	< 5 in wc (1)	≤ 6 in wc OSD	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)**TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A) (Continued)**

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v					
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	74	77	TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$ (1)	$\leq 195^{\circ}\text{F}$ OSD	PASS
Primary Vent Filter Train Outlet Temperature TI-AZK12-3B (17PriExh.v)	73	73	TDIC setpoint + htr inlet $\pm 2^{\circ}\text{F}$ (1)	$\leq 195^{\circ}\text{F}$ OSD	PASS

MCS PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 18PriMon.v					
Primary Stack Flow FI-AZK1-3 (18PriMon.v)	999	992	760-9401050 scfm	≥ 200 and ≤ 8001050 scfm OSD	PASS

Note (1) Acceptable range is for the inservice vent train only.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)**TABLE 11-1 AZ101 HIGH HEAT - Fan and Filter Train Switchover (Train B to Train A)(Continued)**

LOCAL PARAMETERS	INITIAL (Train B)	FINAL (Train A)	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	0	0	No alarm	N/A	Pass
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	0	0	No alarm	N/A	Pass
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	0	0	No alarm	N/A	Pass
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	0	0	No alarm	N/A	Pass
AZ101 Air Inlet Station Pre-filter Differential Pressure PDI-AZ101K103-1	0.07	0.06	No alarm	N/A	Pass
AZ101 Air Inlet Station HEPA Differential Pressure PDI-AZ101K104-1	0.5	0.4	No alarm	N/A	Pass
AZ102 Air Inlet Station Pre-filter Differential Pressure PDI-AZ102K103-1	0	0	No alarm	N/A	Pass
AZ102 Air Inlet Station HEPA Differential Pressure PDI-AZ102K104-1	0	0	No alarm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

12.0 AZ102 HIGH HEAT - STEADY STATE OPERATION

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhauster to 800 scfm.

12.1 ENSURE Exhaust Fan AZ-K1-5-1~~AB~~ and Filter Train ~~AB~~ are in service.

12.2 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AY102 - TO-060-352, AY101 TANK RECIRC MODULE OPERATION
- AZ101 - TO-060-353, AZ101 TANK RECIRC MODULE OPERATION
- AZ102 - TO-060-354, AZ102 TANK RECIRC MODULE OPERATION

~~12.3 ADJUST AZ102 tank exhaust flow control setpoint to 500 $\pm$ 20 scfm (FIC-AZ2K1-2)~~

12.4 ENSURE tank pressure control setpoints are set at -2.0 in. wc on MCS graphic screen 15PriIn.v.

- PIC-AZ1K1-1
- PIC-AZ2K1-1
- PIC-AY1K1-1
- PIC-AY2K1-1

12.5 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ101 at ~~110100~~ $\pm$ 20 scfm (FIC-AZ1K1-2)
- AZ102 at ~~110100~~ $\pm$ 20 scfm (FIC-AZ2K1-2)
- AY101 at ~~200100~~ $\pm$ 20 scfm (FIC-AY1K1-2)
- AY102 at ~~210100~~ $\pm$ 20 scfm (FIC-AY2K1-2)

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING

12.6 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AZ102 RECIRC mode in TABLE 12-1.

Test Engineer:

12.7 ESTABLISH AZ102 HIGH HEAT mode according to TO-060-354.

Test Engineer:

12.8 PLACE AZ102 Cooling Tower in DRY MODE operation in accordance with TO-060-358

Test Engineer:

12.9 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial data f
AZ102 HIGH HEAT mode in TABLE 12-1.

Test Engineer:

12.10 RECORD data in TABLE 12-1 every hour for 4 consecutive hours.

Test Engineer:

12.11 PLACE AZ102 Cooling Tower in WET MODE operation in accordance with TO-06
358, AND RETURN to this procedure.

Test Engineer:

12.12 ALLOW system parameters to stabilize for 15 minutes AND RECORD Initial
data with AZ102 in HIGH HEAT mode in TABLE 12-2.

12.13 RECORD data in TABLE 12-2 every 15 minutes hour for 4 consecutive hours
intervals.

Test Engineer:

12.14 VERIFY that no unexpected alarms or conditions occurred associated with
this section of testing and that the data in TABLES 12-1 and 12-2
satisfies the acceptance criteria.

Test Engineer:

NOTE - All Cooling Towers will remain in WET MODE operation throughout the
balance of this procedure except as directed.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.V									
AY101 Recirc Vent Condenser Air Inlet Temperature TI-AY1K48-1A (10RecAY1.V)	84	83	83	83	83	83	N/A	N/A	N/A
AY101 Recirc Vent Condenser Outlet Air Temperature TI-AY1K48-1B (10RecAY1.V)	64	63	63	63	64	65	N/A	N/A	N/A
AY101 Recirc Vent Condenser Water Inlet Temperature TI-AY1EWS-1 (10RecAY1.V)	59	60	57	62	63	65	*	N/A	N/A
AY101 Recirc Vent Condenser Water Outlet Temperature TI-AY1EWS-1 (10RecAY1.V)	56	61	62	64	62	64	*	N/A	N/A
AY101 Recirc Vent Condenser Differential Pressure PDI-AY1K48-1 (10RecAY1.V)	12.9	12.8	12.9	12.8	12.7	12.7	8-12 in wc	N/A	Pass
AY101 Recirc Vent Fan Differential Pressure PDI-AY1K45-1 (10RecAY1.V)	17.0	17.0	17.0	17.0	16.9	16.8	15-18 in wc	N/A	Pass
AY101 Recirc Vent Fan Motor Current II-AY1K45-1 (10RecAY1.V)	5	5.0	5.2	5.1	5.1	5.0	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	488	488	483	483	484	N/A	N/A	N/A
AY101 Exhaust Air Flow SETPOINT FIC-AY1K1-2 (10RecAY1.V)	200	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Exhaust Air Flow FI-AY1K1-2 (10RecAY1.V)	193	165	163	167	169	167	setpoint ± 20 scfm	N/A	Pass

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* See next page.
 1) SEE - 78-006, Item 2, 502-Page 269, original for DATA, 200.748
 2) SEE - 78-010, 1007, SEE Pages 195 or 242/250 for Original DATA, 200.748

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 11RecAY2.v									
AY102 Recirc Vent Condenser Air Inlet Temperature TI-AY2K48-1A (11RecAY2.v)	80	80	80	82	82	81	N/A	N/A	N/A
AY102 Recirc Vent Condenser Outlet Air Temperature TI-AY2K48-1B (11RecAY2.v)	79	78	78	77	78	77	N/A	N/A	N/A
AY102 Recirc Vent Condenser Water Inlet Temperature TI-AY2EWS-1 (11RecAY2.v)	74	76	77	78	78	80	*	N/A	N/A
AY102 Recirc Vent Condenser Water Outlet Temperature TI-AY2EWR-1 (11RecAY2.v)	73	76	77	79	79	78	*	N/A	N/A
AY102 Recirc Vent Condenser Differential Pressure PDI-AY2K48-1 (11RecAY2.v)	10.3	10.3	10.3	10.1	10.2	10.2	8-12 in wc	N/A	Pass
AY102 Recirc Vent Fan Differential Pressure PDI-AY2K45-1 (11RecAY2.v)	14.0 ^①	13.9 ^①	13.9 ^①	13.9 ^①	13.8 ^①	13.8 ^①	15-18 in wc	N/A	Pass
AY102 Recirc Vent Fan Motor Current II-AY2K45-1 (11RecAY2.v)	5.5	5.5	5.3	5.4	5.4	5.5	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	488	488	483	483	484	N/A	N/A	N/A
AY102 Exhaust Air Flow SETPOINT FIC-AY2K1-2 (11RecAY2.v)	220	220	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Exhaust Air Flow FI-AY2K1-2 (11RecAY2.v)	212	193	195	196	198	197	setpoint ± 20 scfm	N/A	Pass

① SEE TE-006, Item 3, SEE Page 268/289 for original TE Data, 9/22/98

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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 12RecAZ1.v									
AZ101 Recirc Vent Condenser Air Inlet Temperature TI-AZ1K48-1A (12RecAZ1.v)	123	122	122	123	123	122	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Outlet Air Temperature TI-AZ1K48-1B (12RecAZ1.v)	87	90	90	88	89	87	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Inlet Temperature TI-AZ1EWS-1 (12RecAZ1.v)	85	89	89	85	88	85	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Water Outlet Temperature TI-AZ1EWR-1 (12RecAZ1.v)	86	90	90	86	89	87	N/A	N/A	N/A
AZ101 Recirc Vent Condenser Differential Pressure PDI-AZ1K48-1 (12RecAZ1.v)	11.9	11.8	11.8	11.9	11.8	11.9	8-12 in wc	N/A	Pass
AZ101 Recirc Vent Fan Differential Pressure PDI-AZ1K45-1 (12RecAZ1.v)	16.9	16.8	16.7	16.8	16.7	16.8	15-18 in wc	N/A	Pass
AZ101 Recirc Vent Fan Motor Current II-AZ1K45-1 (12RecAZ1.v)	5.0	4.8	4.8	5.0	5.0	4.9	N/A	N/A	N/A
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	488	488	483	483	484	N/A	N/A	N/A
AZ101 Exhaust Air Flow SETPOINT FI-AZ1K1-2 (12RecAZ1.v)	110	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Exhaust Air Flow	106	106	108	106	108	108	setpoint ± 20 scfm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 13RecAZ2.v									
AZ102 Recirc Vent Condenser Air Inlet Temperature TI-AZ2K48-1A (13RecAZ2.v)	111	111	111	111	112	111	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Outlet Air Temperature TI-AZ2K48-1B (13RecAZ2.v)	88	88	90	90	90	89	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Inlet Temperature TI-AZ2EHS-1 (13RecAZ2.v)	85	86	88	89	89	89	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Outlet Temperature TI-AZ2EHR-1 (13RecAZ2.v)	89	88	89	89	90	91	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Differential Pressure PDI-AZ2K48-1 (13RecAZ2.v)	11.9	6.3	6.1	6.2	6.1	6.1	8-12 in wc	N/A	Pass
AZ102 Recirc Vent Fan Differential Pressure PDI-AZ2K45-1 (13RecAZ2.v)	15.8	19.1	19.1	19.1	19.0	19.0	15-18 in wc	N/A	Pass
AZ102 Recirc Vent Fan Motor Current II-AZ2K45-1 (13RecAZ2.v)	4.5	3.8	3.9	3.8	3.8	3.9	N/A	N/A	Pass
Incoming Line Voltage at Metering Station, Room 105, Gen. Bldg.	490	488	488	483	483	484	N/A	N/A	N/A
AZ102 Exhaust Air Flow SETPOINT FI-AZ2K1-2 (13RecAZ2.v)	110	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (13RecAZ2.v)	96	495	501	500	505	498	setpoint ± 20 scfm	N/A	Pass

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(1) SEE TE-006, Item 2 - SEE Pages 268/269 for original. To Date. 6/22/00-T88
(2) SEE TE-006, Item 3

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen I5PrIn.v									
AY101 Inlet Air Flow FI-A1K1-1 (15PrIn.v)	-2	-1	-1	-1	-1	-1	5 FIAY1K1-2	N/A	Pass
AY101 Pressure Control SETPOINT PI-A1K1-1 (15PrIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY101 Tank Pressure PI-A1K1-1 (15PrIn.v)	-1.0	-1.7	-7	-7	-7	-7	±0.5 to ±3.0 in WC	±3 to ±6 in WC H030-RD-001	Pass
AY101 Pressure Control Valve Valve Position ZI-A1K1-1 (15PrIn.v)	1	1	1	1	1	1	N/A	N/A	N/A
AY101 Exh. Flow Control Valve Position ZI-A1K1-2 (15PrIn.v)	89	100	100	100	100	100	≤ 20% Open	N/A	Pass
AY102 Inlet Air Flow FI-A1K1-1 (15PrIn.v)	1	2.15	1.3	81	154	-1	5 FIAY2K1-2	N/A	See Note Below
AY102 Pressure Control SETPOINT PI-A1K1-1 (15PrIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AY102 Tank Pressure PI-A1K1-1 (15PrIn.v)	-0.9	-1.8	-8	-8	-8	-8	±0.5 to ±3.0 in WC	±3 to ±6 in WC H030-RD-001	Pass
AY102 Pressure Control Valve Valve Position ZI-A1K1-1 (15PrIn.v)	1	0	0	0	0	0	N/A	N/A	N/A
AY102 Exh. Flow Control Valve Position ZI-A1K1-2 (15PrIn.v)	45	99	99	99	99	99	≥ 20% Open	N/A	Pass

VALVE CLOSED, EQUIPMENT PROBLEM

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
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MCS Graphic Screen 15PrtIn.v (Continued)									
AZ101 Inlet Air Flow FI-AZ1K1-1 (15PrtIn.v)	-150	-150	-150	-150	-150	-150	± FI/AZ1K1-2	N/A	75% Pass
AZ101 Pressure Control SETPOINT PIC-AZ1K1-1 (15PrtIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ101 Tank Pressure PI-AZ1K1-1 (15PrtIn.v)	-1.0	-0.9	-0.9	-0.9	-0.9	-0.9	±0.5 to ±3.0 in HG	±0.3 to ±0.6 in HG	75% Pass
AZ101 Pressure Control Valve ZV-AZ1K1-1 (15PrtIn.v)	-25%	-25%	-25%	-25%	-25%	-25%	N/A	N/A	N/A
AZ101 Exh. Flow Control Valve Position ZV-AZ1K1-2 (15PrtIn.v)	26	67	67	67	67	67	>20% Open	N/A	75% Pass
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PrtIn.v)	0	413	409	406	404	404	± FI/AZ2K1-2	N/A	75% Pass
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15PrtIn.v)	-2.0	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PrtIn.v)	-1.9	-2.3	-2.3	-2.3	-2.3	-2.3	±0.5 to ±3.0 in HG	±0.3 to ±0.6 in HG	75% Pass
AZ102 Pressure Control Valve ZV-AZ2K1-1 (15PrtIn.v)	2	98	97	97	97	97	N/A	N/A	N/A
AZ102 Exh. Flow Control Valve Position ZV-AZ2K1-2 (15PrtIn.v)	101	39	39	39	39	39	>20% Open	N/A	75% Pass

① Look & Tag out for Field Work

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.v									
AY101:Recirc Condenser Cooling System Flow FI-AZ1EVR-1 (06EvPAY1.v)	214	213	214	215	217	217	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.v									
AY102:Recirc Condenser Cooling System Flow FI-AZ2EVR-1 (07EvPAY2.v)	217	215	217	218	219	218	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.v									
AZ101:Recirc Condenser Cooling System Flow FI-AZ1EVR-1 (08EvPAZ1.v)	335	333	333	334	334	333	300-335 300-340 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.v									
AZ102:Recirc Condenser Cooling System Flow FI-AZ2EVR-1 (09EvPAZ2.v)	224	225	224	226	226	224	180-200 190-230 gpm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v									
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	9.5	12.6 ^①	12.4 ^①	12.5 ^①	12.5 ^①	12.5 ^①	< 40 ± 1 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	81	85	86	86	87	87	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	45	46	47	47	47	47	35-40 ± 0.5°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	40	39	38	38	38	38	36 ± 2°F -det 35-55°F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	41	41	41	41	41	41	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	3.0	5.0	5.0	5.0	5.0	5.0	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3186	3189	3195	3200	3208	3213	N/A	N/A	N/A

① See TG-001, See Page 206, Mod B-4 for original TG-001 Data. 6/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 14Chillr.V									
Primary Vent Condenser Water Flow Rate FI-AZCHUR-1 (14Chillr.V)	119	119	118	119	119	120	110-120 95-120 gpm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)
TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v									
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-14.0	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-14.0	-19.9	-19.7	-19.8	-19.8	-19.7	setpoint $\pm$ 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	52	49	50	50	50	50	35-40°F 40-65°F	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	24	24	24	24	24	24	setpoint $\pm$ 2°F	$\geq 174^\circ\text{F}$ OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.5	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HECA PDI-AZK110-1A (17PriExh.v)	0.8	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.5	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	7.6	73	74	74	74	74	TDIC: setpoint + htr inlet $\pm$ 2°F	$\leq 195^\circ\text{F}$ OSD	Pass

① SEE 76-007 SEE RGR 2-12/98 for original Test Data

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

MCS PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.v									
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	614	998	998	994	998	994	760-9401050 scfm	≥ 200 and ≤ 8001050 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	83	86	88	88	88	88	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.1	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.1	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 x (stack scfm/1206).

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AY101 Air Inlet Station Inlet Temperature TIC-AY101K102-1	①	①	①	①	①	①	N/A	N/A	NA ①
AY101 Air Inlet Station Pre-filter Differential Pressure PDI-AY101K103-1	0	0					No alarm	N/A	NA ①
AY101 Air Inlet Station HEPA Differential Pressure PDI-AY101K104-1	0	0					No alarm	N/A	NA ①
AY102 Air Inlet Station Inlet Temperature TIC-AY102K102-1	①	①	①	①	①	①	N/A	N/A	NA ①
AY102 Air Inlet Station Pre-filter Differential Pressure PDI-AY102K103-1	0	0					No alarm	N/A	NA ①
AY102 Air Inlet Station HEPA Differential Pressure PDI-AY102K104-1	0	0					No alarm	N/A	NA ①

① Heater derated & determined

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TABLE 12-1 AZ102 HIGH HEAT Steady State (Continued)

LOCAL PARAMETERS	INITIAL AZ102 RECIRC	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
AZ101 Air Inlet Station Inlet Temperature TIC-AZ101K102-1	0	0	0	0	0	0	N/A	N/A	NA 6
AZ101 Air Inlet Station Pre-filter Differential Pressure PDI-AZ101K103-1	0	0	0	0	0	0	No alarm	N/A	NA 6
AZ101 Air Inlet Station HEPA Differential Pressure PDI-AZ101K104-1	0	0	0	0	0	0	No alarm	N/A	NA 6
AZ102 Air Inlet Station Inlet Temperature TIC-AZ102K102-1	0	0	0	0	0	0	N/A	N/A	NA 6
AZ102 Air Inlet Station Pre-filter Differential Pressure PDI-AZ102K103-1	0	0.2	0	0	0	0	No alarm	N/A	NA 6
AZ102 Air Inlet Station HEPA Differential Pressure PDI-AZ102K104-1	0	0.7	0	0	0	0	No alarm	N/A	NA 6

① heater deenergized & determined

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 10RecAY1.v	1410	1425	1440	1455	1510			
AZ102 Recirc Vent Condenser Air Inlet Temperature TI-AZ2K48-1A (10RecAY1.v)	84	83	84	85	85	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Outlet Air Temperature TI-AZ2K48-1B (10RecAY1.v)	65	66	67	66	64	N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Inlet Temperature TI-AZ2EWS-1 (10RecAY1.v)	65	64	64	63	63	* N/A	N/A	N/A
AZ102 Recirc Vent Condenser Water Outlet Temperature TI-AZ2EWR-1 (10RecAY1.v)	64	66	65	65	65	* N/A	N/A	N/A
AZ102 Recirc Vent Condenser Differential Pressure PDI-AZ2K48-1 (10RecAY1.v)	12.6 ^①	12.6 ^①	12.7 ^①	12.6 ^①	12.7 ^①	8-12 in wc *	N/A	Pass
AZ102 Recirc Vent Fan Differential Pressure PDI-AZ2K45-1 (10RecAY1.v)	16.8	16.8	16.8	16.8	16.8	15-18 in wc *	N/A	Pass
AZ102 Recirc Vent Fan Motor Current II-AZ2K45-1 (10RecAY1.v)	5.0	4.9	5.0	5.1	4.9	N/A	N/A	N/A
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (10RecAY1.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Exhaust Air Flow FI-AZ2K1-2 (10RecAY1.v)	500	497	493	497	493	setpoint $\pm$ 20 scfm	N/A	Pass

① SEE TE-006, Item 2 sub Page 268 for original TE Data
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* Report-writer comment: Some data reflects impossible or inconsistent conditions and is suspect.

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 15PriIn.v								
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	410	405	406	411	412	≤ FIAZ2K1-2	N/A	Pass
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15PriIn.v)	-2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	-2.4	-2.4	-2.4	-2.4	-2.4	-0.35 to -3.0 in WC	-3 > X > -6 in WC W030-RD-001	Pass
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15PriIn.v)	97	97	97	97	97	N/A	N/A	Pass
AZ102 Flow Control Valve Valve Position ZI-AZ2K1-2 (15PriIn.v)	39	39	39	39	39	>20% open	N/A	Pass

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TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 06EvPAY1.V								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EUR-1 (06EvPAY1.V)	214	216	216	216	215	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 07EvPAY2.V								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EUR-1 (07EvPAY2.V)	219	220	218	219	218	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 08EvPAZ1.V								
AZ102 Recirc Condenser Cooling System Flow FI-AZ1EUR-1 (08EvPAZ1.V)	332	334	334	334	334	300-335 300-360 gpm	N/A	Pass
MCS Graphic Screen 09EvPAZ2.V								
AZ102 Recirc Condenser Cooling System Flow FI-AZ2EUR-1 (09EvPAZ2.V)	226	225	227	224	224	180-200 190-230 gpm	N/A	Pass
MCS Graphic Screen 14Chiller.V								
Primary Vent Condenser Chiller Cooling Flow Rate FI-AZCUR-1 (14Chiller.V)	119	119	119	119	119	110-120 95-130 gpm	N/A	Pass

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 16PriCoo.v								
Primary Vent Condenser Differential Pressure PDI-AZK18-1 (16PriCoo.v)	12.5 ^①	12.5 ^①	12.5 ^①	12.5 ^①	12.5 ^①	≤ 10 in wc	N/A	Pass
Primary Vent Condenser Air Inlet Temperature TI-AZK18-1A (16PriCoo.v)	87	87	87	87	87	N/A	N/A	N/A
Primary Vent Condenser Air Outlet Temperature TI-AZK18-1B (16PriCoo.v)	47	46	47	46	47	35-40-60°F	≥ 35°F OSD	Pass
Primary Vent Condenser Water Inlet Temperature TI-AZCWS-1 (16PriCoo.v)	37	38	38	39	37	36 ± 2°F -60°F 35-55°F	N/A	Pass
Primary Vent Condenser Water Outlet Temperature TI-AZCWR-1 (16PriCoo.v)	40	40	40	41	39	N/A	N/A	N/A
Primary Vent HEME Differential Pressure PDI-AZK19-1 (16PriCoo.v)	4.9	5.0	4.9	5.0	5.0	< 10 in wc	≤ 15 in wc OSD	Pass
Primary Vent Condensate Flow Rate FI-AZPC-1 (16PriCoo.v)	0.1	0.1	0.1	0.1	0.1	N/A	N/A	N/A
Primary Vent Condensate Total Flow FIQ-AZPC-1 (16PriCoo.v)	3217	3218	3219	3221	3223	N/A	N/A	N/A

① SEE TB-001, SEE Page 106, Mod B-4, for original TO Data 9/22/98

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS Graphic Screen 17PriExh.v								
Primary Vent Manifold Pressure SETPOINT PIC-AZK1-1A (17PriExh.v)	-21.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Filter Train Inlet Pressure PI-AZK1-1A (17PriExh.v)	-19.6	-19.7	-19.7	-19.7	-19.6	setpoint ± 0.5 in wc	N/A	Pass
Primary Vent Heater Air Inlet Temperature TI-AZK12-1A (17PriExh.v)	49	49	50	49	49	35-40°F (0-5°F)	N/A	Pass
Primary Vent Heater Differential Temperature SETPOINT TDIC-AZK12-1A (17PriExh.v)	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Primary Vent Heater Differential Temperature TDI-AZK12-1A (17PriExh.v)	24	24	24	24	24	setpoint ± 2°F	≥ 17°F OSD	Pass
Primary Vent Filter Train Differential Pressure, 1 st HEPA PDI-AZK14-1A (17PriExh.v)	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, HEPA PDI-AZK110-1A (17PriExh.v)	1.7	1.7	1.7	1.7	1.7	≤ 1.75 in wc	≤ 3 in wc OSD	Pass
Primary Vent Filter Train Differential Pressure, 2 nd HEPA PDI-AZK14-2A (17PriExh.v)	0.8	0.8	0.8	0.8	0.8	< 5 in wc	≤ 6 in wc OSD	Pass
Primary Vent Filter Train Outlet Temperature TI-AZK12-3A (17PriExh.v)	73	73	74	73	74	TDIC setpoint + htr inlet ± 2°F	≤ 195°F OSD	Pass

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ATTACHMENT B -- RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

TABLE 12-2 AZ102 HIGH HEAT Steady State (All Cooling Towers in WET MODE, Continued)

MCS PARAMETERS	INITIAL AZ102 HIGH HEAT	1ST INTERVAL	2ND INTERVAL	3RD INTERVAL	4TH INTERVAL	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL
MCS graphic Screen 18PriMon.v								
Primary Vent Exhaust Stack Air Flow Rate FI-AZK1-3 (18PriMon.v)	991	997	998	999	994	760-9401050 scfm	≥ 200 and ≤ 8001050 scfm OSD	Pass
Primary Vent Exhaust Stack Air Temperature TI-AZK1-3 (18PriMon.v)	88	88	88	88	88	N/A	N/A	N/A
Primary Vent Exhaust Stack Monitor Beta Sample Flow Rate FI-AZK1-1 (18PriMon.v)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A
Primary Vent Exhaust Stack Monitor Record Sample Flow Rate FI-AZK1-2 (18PriMon.v)	1.8	1.8	1.8	1.8	1.8	(1)	N/A	N/A

Notes:

- (1) For sample flow rate, ideal value must be calculated, based on actual stack flow (FI-AZK1-3) as follows: Ideal sample flow = 2 x (stack scfm/1206).

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ATTACHMENT B - RECIRC AND HIGH HEAT MODE OPERATIONAL TESTING (Cont.)

13.0 AZ102 HIGH HEAT - TANK PRESSURE CONTROL

CAUTION

This section cannot be performed prior to lifting of the limitations cited in the Project W-030 NOC limiting the maximum flow rate of the exhausters to 800 scfm.

13.1 ENSURE the following recirculation ventilation systems are in the RECIRC mode of operation according to the listed procedure.

- AY101 - TO-060-351, AY101 TANK RECIRC MODULE OPERATION
- AY102 - TO-060-352, AY102 TANK RECIRC MODULE OPERATION
- AZ101 - TO-060-353, AZ102 TANK RECIRC MODULE OPERATION

13.2 ENSURE AZ102 HIGH HEAT mode is established according to TO-060-354.

13.3 ENSURE the tank pressure control setpoints for tanks AY101, AY102, and AZ101 are set to -2.0 in. wc on MCS graphic screen 15PriIn.v.

- PIC-AY1K1-1
- PIC-AY2K1-1
- PIC-AZ1K1-1

13.4 ENSURE the tank exhaust flow control setpoints and the primary vent manifold pressure setpoints PIC-AZK1-1A and PIC-AZK1-1B are set as required to achieve the flow rates listed below.

- AZ102 at 500 ± 20 scfm (FIC-AZ2K1-2)
- AZ101 at 10100 ± 20 scfm (FIC-AZ1K1-2)
- AY102 at 210100 ± 20 scfm (FIC-AY2K1-2)
- AY101 at 200100 ± 20 scfm (FIC-AY1K1-2)

13.5 ADJUST the tank pressure setpoint controller for tank AZ102, PIC-AZ2K1, to -0.5 in. wc.

NOTE - In the following steps, the system is stable when tank pressures are within ± 0.2 in wc of the setpoint and pressure control valve position is approximately steady state. Allow a minimum of 15 minutes after changing any setpoints before recording any data.

13.6 ALLOW the system to stabilize AND RECORD the Initial Value data in TABLE 13-1

Test Engineer:

13.7 ADJUST the tank pressure setpoint controller for tank AZ102, PIC-AZ2K1, in 0.5 in. wc increments, from -0.5 in. wc to -3.0 in. wc.

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13.8 ALLOW system to stabilize AND RECORD the Changed Value data in TABLE 13-1 at each increment.

Test Engineer:

13.9 VERIFY that no unexpected alarms or conditions occurred associated with this section of testing and that the data in TABLE 13-1 satisfies the acceptance criteria.

Test Engineer:

13.10 ADJUST the pressure setpoint controller for tank AZ102, PIC-AZ2K1, to -2.0 in. wc.

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TABLE 13-1 AZ102 HIGH HEAT - Pressure Control

MCS Graphic Screen 15PriIn.v 1315 1330										
AZ102 Pressure Control SETPOINT PIC-AZ2K1-1 (15PriIn.v)	Initial (-0.5)	-1.0 in wc	-1.5 in wc	-2.0 in wc	-2.5 in wc	-3.0 in wc	ACCEPTANCE CRITERIA	LIMIT	PASS/ FAIL	
AZ102 Tank Pressure PI-AZ2K1-1 (15PriIn.v)	① -2.3	① -2.4	① -2.4	① -2.4	-2.5	-3.0	setpoint ± 0.2 in wc	-3 > x > -6 in wc W030-RD-001	Pass	
AZ102 Inlet Air Flow FI-AZ2K1-1 (15PriIn.v)	407	409	408	408	380	282	≤ FIAZ2K1-2	N/A	Pass	
AZ102 Pressure Control Valve Valve Position ZI-AZ2K1-1 (15PriIn.v)	97	78	97	97	68	59	N/A	N/A	Pass	
AZ102 Exhaust Air Flow SETPOINT FIC-AZ2K1-2 (15PriIn.v)	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
AZ102 Exhaust Air Flow FI-AZ2K1-2 (15PriIn.v)	509	502	502	506	502	505	setpoint ± 20 scfm	N/A	Pass	
AZ102 Exh. Flow Control Valve Position ZI-AZ2K1-2 (15PriIn.v)	39%	39	39	39	39	40	±20% Open	N/A	Pass	

① see TE-008, see Page 254 for original Test Data. 9/22/98

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ATTACHMENT C - TEST LOGS AND RECORDS

SIGNATURE/INITIAL VERIFICATION SHEET

All persons involved in procedure performance, data recording, and verification or evaluation of test steps shall provide their name, signature, and initials below.

NAME (PRINT)

SIGNATURE

INITIALS

Kevin J. Gandy

[Signature]

KJG

Brian Ivey

[Signature]

BI

Mark Jennings

[Signature]

[Initials]

Gary Hopkins

[Signature]

GH

C. Kearney

[Signature]

CK

JK Ravencraft

[Signature]

JKR

Craig Michael C. McLeod

[Signature]

CMC

ALAN A. ARDAMICA

[Signature]

AAA

Rich Gutierrez

[Signature]

RG

W-030 OPERATIONAL TEST REPORT (PHASE 2)

ATTACHMENT 3

FIGURES

FIGURE 2	K4 Fan Curve
FIGURE 4-1	PV Condenser Air Pressure Differential PDI Transient
FIGURE 4-2	PV Stack Airflow Transient
FIGURE 4-3	PV Condenser Cooling Water Temperature Transient
FIGURE 4-4	PV Condenser Air Temperature Transient

MODEL 1/2-20 HP

IMPELLER DIA. = 18.6125 INCHES

R.P.M. = 3500

INLET DENSITY = .0648 LB./CU.FT.

FAN ENGINEERING CO., INC.
3430 W. CARRIAGE DRIVE
SANTA ANA, CA 92704
(714) 957-5900
FAX (714) 957-5911

FIGURE 2
K4 Fan Curve

FIGURE 4-1
PV Condenser Air Pressure Differential PDI Transient

FIGURE 4-2
PV Stack Airflow Transient

FIGURE 4-3
PV Condenser Cooling Water Temperature Transient

FIGURE 4-4
PV Condenser Air Temperature Transient

DISTRIBUTION SHEET

To Distribution	From Disposal Projects	Page 1 of 1
		Date
Project Title/Work Order		EDT No. 626711
OTR (Phase 2) - TANK FARM VENTILATION UPGRADE W-030		ECN No. ---

Name	MSIN	Text With All Attach	Text Only	Attach. / Appendi x Only	EDT/ECN Only
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US Department of Energy
Richland Operations Office

M. L. Ramsay	S7-54			X
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Fluor Daniel Northwest Company

N/A

Lockheed Martin Hanford Company

G. P. Hopkins	S5-03	X		
M. S. Harrington	R2-88			X
W. M. Harty	S5-13	X		
J. Lohrasbi	S5-05			X
G. R. Tardiff	S5-05	X		
J. J. Verterber	S5-15			X
W. D. Winkelman	R3-12			X
S. U. Zaman	S5-12			X

Numatec Hanford Company

S. R. Briggs	S2-48			X
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Others

M. M. Jennings	R2-88	X		
DOE/RL Reading Room	H2-53	X		
W-030 Project Files	R1-29	X		