

Susquehanna Steam Electric Station Extended Power Uprate Steam Dryer Update



Meeting Purpose

- Provide the current status of the Steam Dryer Project and review steam dryer design improvements.
- Discuss the schedule for Unit 1 start-up testing.
- Discuss the implementation of Unit 1 License Conditions:
 - 2.C.(36)(a)1
 - 2.C.(36)(a)3
 - 2.C.(36)(a)4
 - 2.C.(36)(a)5
 - 2.C.(36)(b)1
 - 2.C.(36)(b)2
 - 2.C.(36)(b)4
 - 2.C.(36)(b)7

Provide information on the Unit 1 Steam Dryer Installation Interference

Today's Discussion

- Steam Dryer Project Status
- Unit 1 Start-up Schedule
- Main Steam Line Strain Gages
- Proposed Start-Up Data Package Format
- Review of New Steam Dryer Design
- Hammer Test Status
- Unit 1 Steam Dryer Instrumentation
- Unit 1 Steam Dryer Installation Interference
- Post Start-Up Dryer Analysis

Steam Dryer Project Status

Unit 1 Steam Dryer Status

Completed Activities

- All assembly complete with exception of lower skirt ring tie bar modification and seismic brackets .
- Hammer test.
- Dryer mounted instruments installed.

Remaining Work

- Complete lower skirt ring tie bar modification.
- Dryer leveling.
- EDM reactor vessel lugs.
- Test fit dryer.
- Machine and install seismic brackets.
- Install steam dryer.
- Route instrument leads through vessel head instrument nozzle.

Unit 2 Steam Dryer Status

- Components under construction at GE Custom Fabrication
- Shop fabrication to be complete in late June of 2008.
- Ship to Susquehanna by mid July of 2008.

Unit 1 Start-Up Schedule

Unit 1 Start-up Schedule

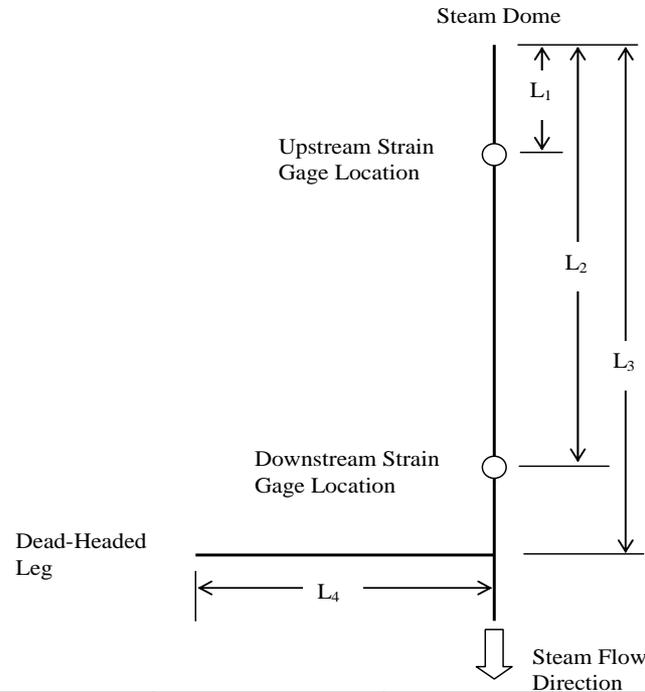
Activity	Date
Enter Mode 2	April 12
Breaker Closed	April 15
MSIV Closure Test (72.2% Power)	April 18
MSIV Closure Test (76.9% Power)	April 19
MELLLA Testing	April 20 thru April 27
3489 MW _{th} Plateau Review	April 28
Start Ramp to 3611 MW _{th} Plateau	April 29
3611 MW _{th} Plateau Review	May 1
Start Ramp to 3733 MW _{th}	May 6
Condensate Pump Trip	May 12
Plateau Review	May 13

Main Steam Line Strain Gages

Main Steam Line Instrumentation

- 32 strain gages installed.
- Two locations per steam line.
- 4 strain gages per location.
- Data usage:
 - Qualitative evaluation of acoustic spectrum.
 - Evaluation of proposed limit curves.
 - Collect data for ACM benchmarking.
 - Collect data for SUPF validation.

Main Steam Line Strain Gauge Locations



Length	MSL A (ft)	MSL B (ft)	MSL C (ft)	MSL D (ft)
Distance from steam dome to upstream SG location (L ₁)	22.8	22.8	22.8	22.8
Distance from steam dome to downstream SG location (L ₂)	52.7	49.6	48.3	52.6
Distance from steam dome to dead-headed leg location (L ₃)	56.7	NA	NA	56.7
Length of dead-headed leg (L ₄)	24.1	NA	NA	24.2

Proposed Start-Up Data Package Format

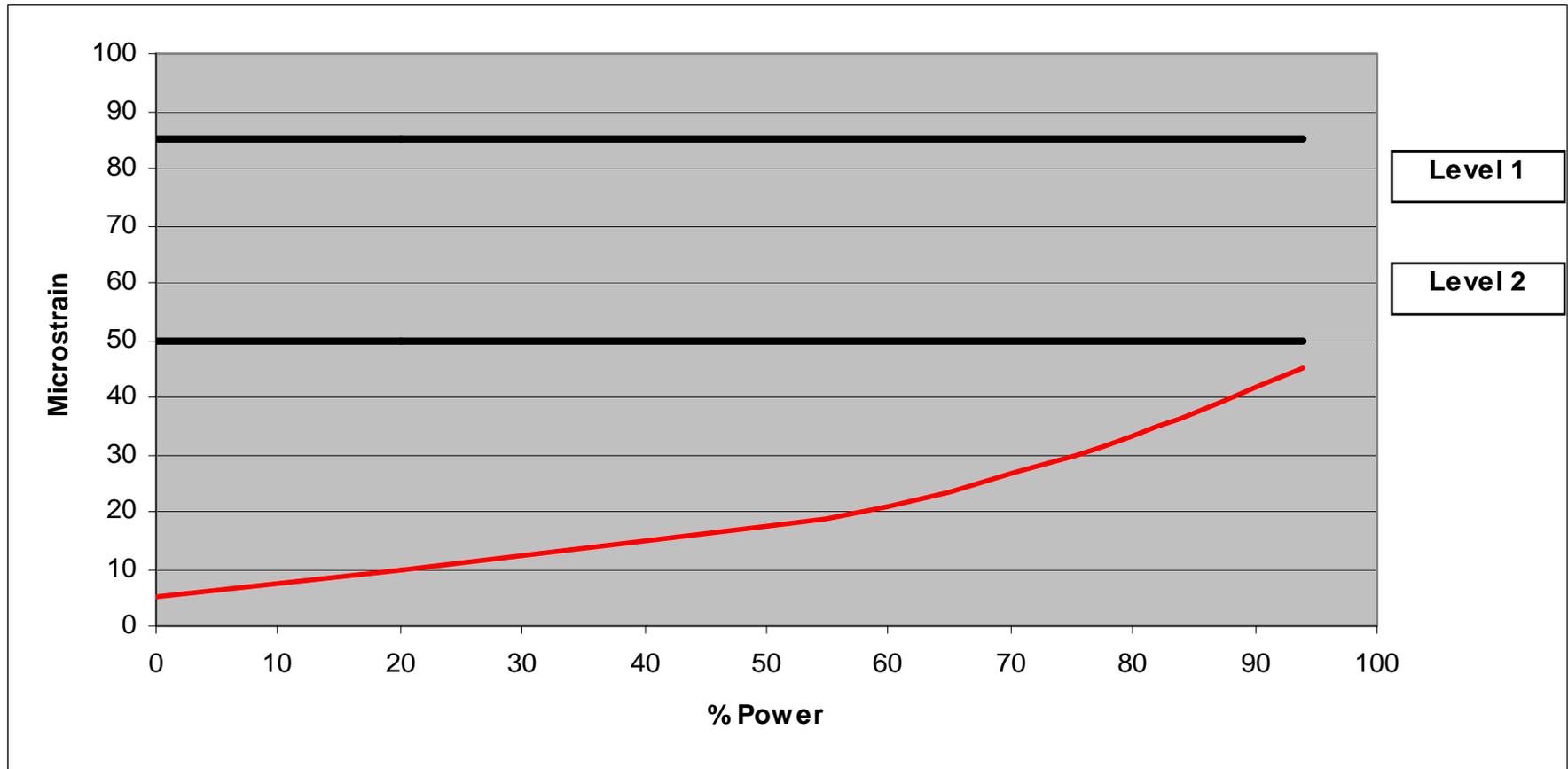
License Conditions 2.C.(36)(a)1, 2.C.(36)(a)3 and 2.C.(36)(a)5

Maximum strain and acceleration amplitudes, as a percent of the acceptable limits

Sensor ID	% of Level 1 Criteria	% of Level 2 Criteria
A4		
S1		
S2		
S3		
S4		
S5		
S6		
S7		
S8		
S9		

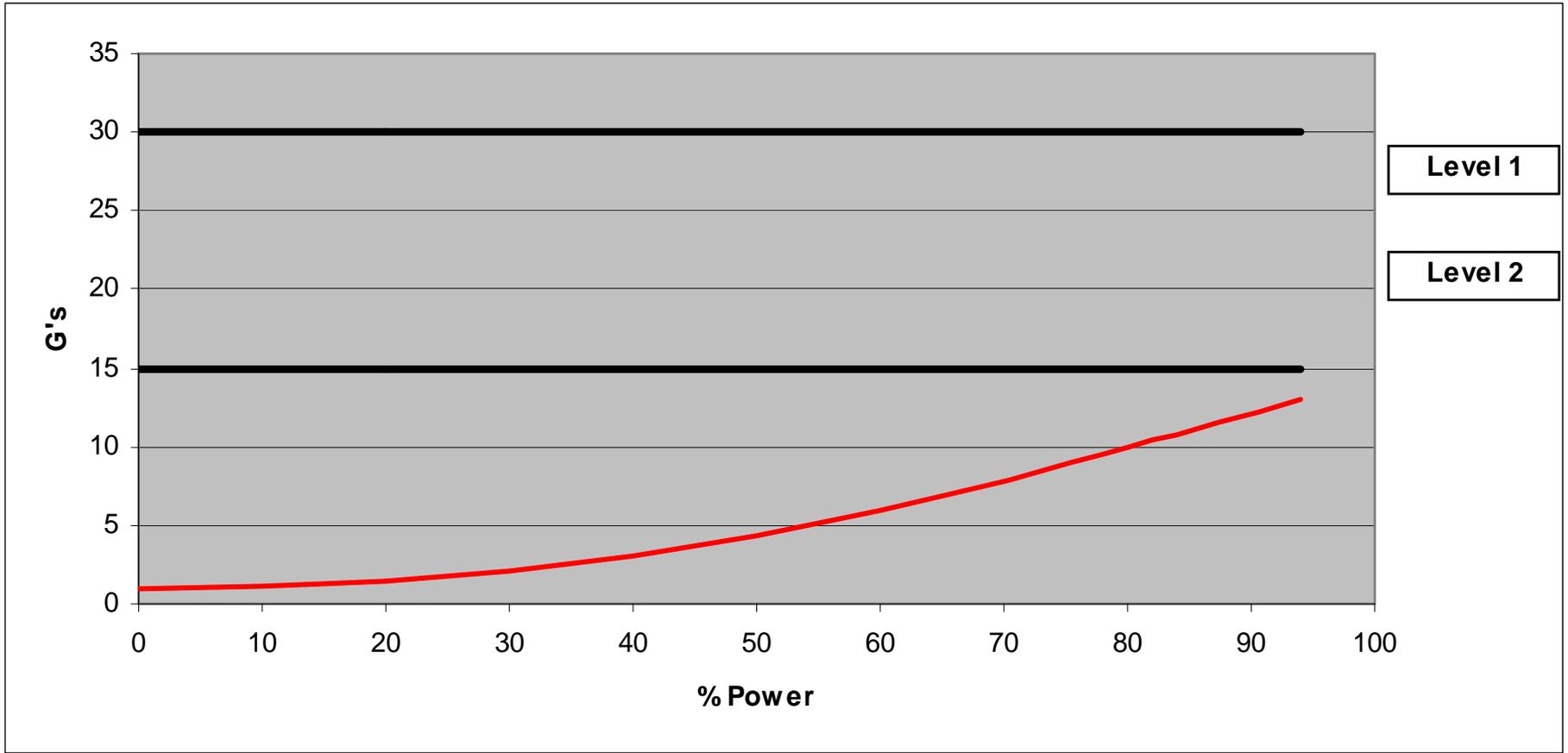
Typical Power Ascension Trend Plots for Strain Gages (S1 to S9)

With Level-1 and Level-2 Acceptance limits

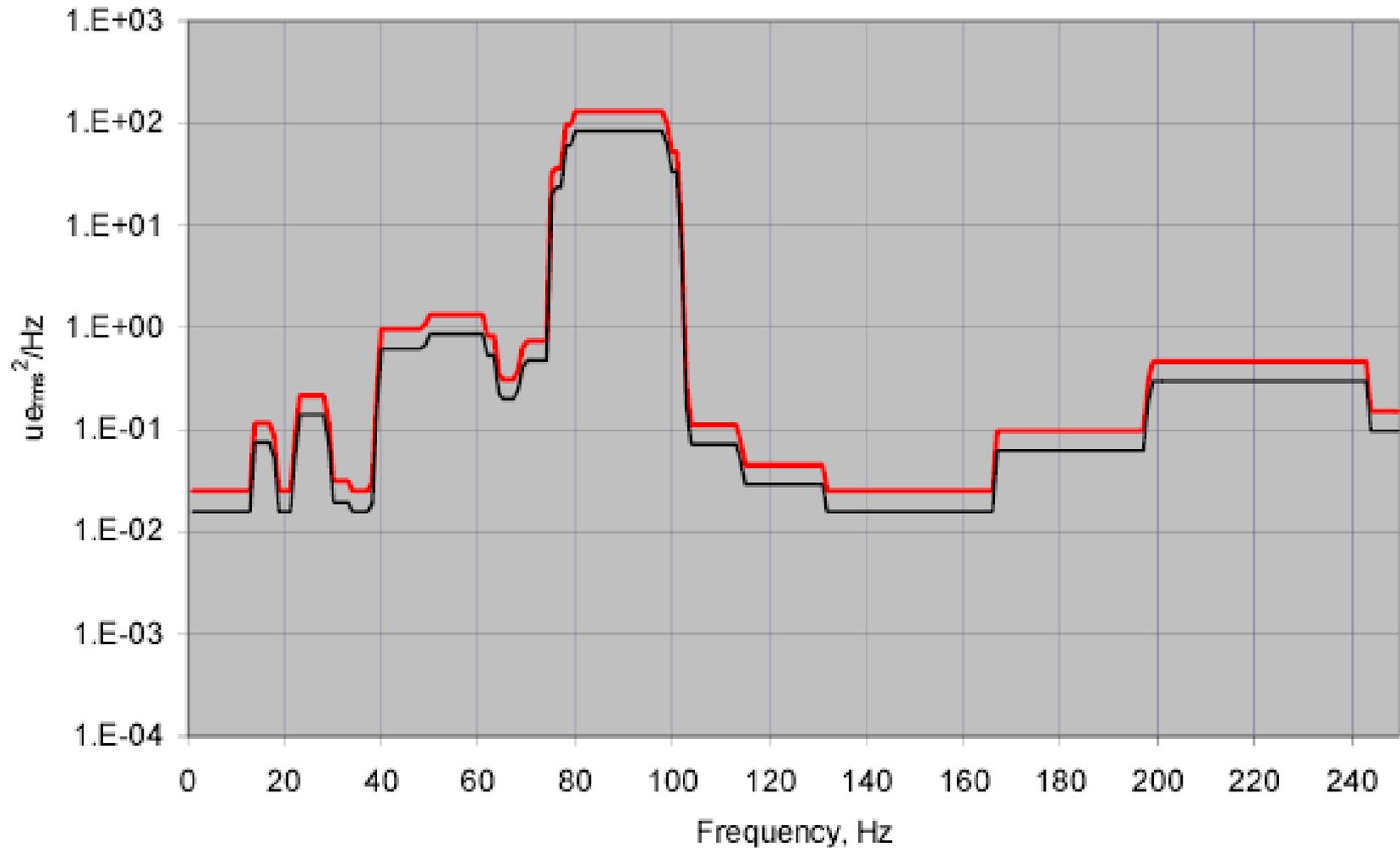


Typical Power Ascension Trend Plots for Accelerometer A4

With Level-1 and Level-2 Acceptance limits



Typical Frequency Spectrum Monitoring Curves for Strain Gages (S1 to S9), Accelerometer (A4)



Steam Dryer Data Log Sheets

Date/Time	2/6/2008 7:00
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	Computer ID	Value	Units
Thermal Power (Instantaneous)	u01.nba01	3484.78	MWth
Thermal Power (15 min Ave.)	u01.nba101	3484.43	MWth
Electrical Power	u01.tra178	1199.08	Mwe
Total Core Flow	u01.tra026	100.07	M lbm/hr
Recirc Loop Flow A	u01.tra028	50.21	M lbm/hr
Recirc Loop Flow B	u01.tra029	49.49	M lbm/hr
Core Plate D/P	u01.tra027	14.71	PSI
Steam Flow Line A	u01.tra153	3.66	M lbm/hr
Steam Flow Line B	u01.tra154	3.50	M lbm/hr
Steam Flow Line C	u01.tra155	3.83	M lbm/hr
Steam Flow Line D	u01.tra156	3.67	M lbm/hr
Total Steam Flow	u01.tra097	14.52	M lbm/hr

Feedwater Flow	u01.tra098	14.51	M lbm/hr
Feedwater Temperature Line A	u01.tra102	391.48	°F
Feedwater Temperature Line B	u01.tra103	388.52	°F
Feedwater Temperature Line C	u01.tra104	391.10	°F
Rx Dome Pressure Narrow Range	u01.tra208	1037.96	PSIG
Rx Dome Pressure Wide Range	u01.tra209	1039.19	PSIG
Steam Dome Temperature	u01.nfa05	551.11	°F
Recirculation Pump A Speed	vm.1p401a/1a_rrp_tac	1421.00	RPM
Recirculation Pump B Speed	vm.1p401b/1b_rrp_tac	1424.00	RPM
Recirculation Pump A Power	u01.nrj51	3.63	MWe
Recirculation Pump B Power	u01.nrj52	3.64	MWe
CRD Cooling Header Flow	u01.nef03	64.46	GPM
CRD System Flow	u01.nef01	63.54	GPM
CRD System Temperature	u01.ndt05	125.42	°F
Bottom Head Drain Temp	u01.tra206	530.75	°F

Reactor Water Level Narrow Range	u01.tra142	33.64	Inches H2O
Reactor Water Level Narrow Range	u01.nfl02	33.98	Inches H2O
Reactor Water Level Narrow Range	u01.nfl03	33.74	Inches H2O
Reactor Water Level Wide Range	u01.tra143	33.72	Inches H2O
Recirculation Pump A Vane Passing Freq.	n/a	118.42	Hz
Recirculation Pump B Vane Passing Freq.	n/a	118.67	Hz
Recirculation Pump A Motor Frequency	n/a	47.85	Hz
Recirculation Pump A Motor Frequency	n/a	47.95	Hz

Review of New Steam Dryer Design

Replacement Steam Dryer Analysis

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Fabrication Improvements

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Hood Joint Tee

Hood End Panel

Drain Trough Side Plates

Hood Support and Bank Divider Plate Assembly

New Dryer Trans Brace

Bank Cap and Tie Bar

Dryer Constructed in Halves

Support Ring Splice Bar and Drain Channel Tee

Final Fabrication on Refueling Floor

Completed Steam Dryer

Hammer Test Results

Hammer Test Status

Preliminary Test Summary

Tank and Test Frame

Tripod Support

Photograph of Dryer, 90° Side

Unit 1 Steam Dryer Instrumentation

Steam Dryer Instrumentation

Steam Dryer Sensor Summary

Elevation Ninety Degree View

Elevation Zero Degree View

Elevation 270 Degree View

Dryer Top View

Cover Plate Instrumentation

Hood Pressure Sensors and Strain Gages

Instrument Mast

Instrument Mast

Unit 1 Steam Dryer Installation Interference

Issue

Interference Pictures

0-deg Guide Rod

180-deg Guide Rod

Probable Interference Contributing Factors

Lower Support Ring Deflection

Modification

Modification

New Splice Bar

Original Splice Bar

New Splice Bar Installation

Additional Engineering Actions

Post Start-Up Dryer Analysis

**License Conditions 2.C.(36)(a)4, 2.C.(36)(a)5, 2.C.(36)(b)1,
2.C.(36)(b)2, 2.C.(36)(b)4, and 2.C.(36)(b)7**

Dryer Acceptance Limits

Dryer Acceptance Limits, cont'd

Start-Up Analysis Scenarios

Loss of Instruments: Instruments Placement Selected to Provide Redundancy

Loss of Instruments: Instruments Placement Selected to Provide Redundancy

Loss of Instruments

Frequency Response Monitoring Curves

Dryer Acceptance Limits are Challenged or Frequency Response Significantly Different

Post Start-up Steam Dryer Margin Analysis