GE Energy
Nuclear

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GE-ENG-DRY-086

May 17, 2005 ***GE Proprietary Information***

To: John Nosko (Exelon)

Authors: Michael J. Dick (GE)

Subject: Exelon Integrated Steam Dryer – April 25 to April 27, 2005 - NRC Presentation with GE Proprietary & Non-Proprietary Information

Dear John:

As part of the Exelon Integrated Steam Dryer Project, GE is providing Enclosure 1, a Proprietary Markup of the April 25-27, 2005 Exelon Presentation to the NRC in Rockville, Enclosure 2, a Non-Proprietary version of the April 25-27, 2005 presentation, and Enclosure 3, an affidavit requesting protection of portions of the proprietary presentation, for review by the NRC.

The Enclosure 3 affidavit identifies that the designated information has been handled and classified as proprietary to GE. The designated information is suitable for review by the NRC when accompanied by the attached affidavit. GE hereby requests that the designated information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

GE requests that any transmittal of this proprietary information to the NRC be accompanied by the enclosed affidavit and proprietary notice. In order to maintain the applicability of the affidavit and to meet the requirements of 10CFR2.390, the transmittal to the NRC should:

1) faithfully reproduce the proprietary information,
2) preserve the proprietary annotations, and
3) include the words similar to "GE Proprietary Information" at the top of first page and each page containing the proprietary information.

Based on past discussions with the NRC, GE has been encouraged to request its customers to provide a paragraph similar to the following paragraph for inclusion in their transmittal letters in order to clearly indicate the proprietary nature of the information and to document the source of the proprietary information as indicated in the GE affidavit.

> "The attached Exelon presentation contains GE proprietary information as defined by 10CFR2.390. GE, as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the attached proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was provided to Exelon in a GE transmittal that is referenced by the affidavit. GE hereby requests that the enclosed

proprietary information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. A non-proprietary version of the attached presentation also is provided.

Further, 10 CFR 2.390 requires that the proprietary information be incorporated, as far as possible into a separate paper. Therefore, Enclosure 2 hereto contains the non-proprietary and redacted presentation version, and the proprietary information is provided in Enclosure 1. GE requests that the non-proprietary version be a hard copy. If an electronic copy of the non-proprietary information is provided to the NRC, GE requests that the non-proprietary information be removed from the file, not simply hidden with white fonts, hidden text or covered with electronic-drawn boxes, which can be readily defeated to reveal the proprietary information.

If you have any questions related to the enclosures, please contact the undersigned at (910) 675-6691.

Very truly yours,

For Carl Hinds

cc Roman Gesior (Exelon)
Keith Moser (Exelon)
John Dawn (Exelon)

Enclosures:

1. *Proprietary Version of Exelon Presentation, "Steam Dryer Design Technical Meeting," April 25-27, 2005* – Proprietary
2. *Non-Proprietary Version of Exelon Presentation, "Steam Dryer Design Technical Meeting," April 25-27, 2005*– Non-Proprietary
3. Affidavit, George B. Stramback, dated May 17, 2005

Enclosure 2

Non-Proprietary Version of Exelon Presentation, "Steam Dryer Design Technical Meeting," April 25-27, 2005

Non-Proprietary - Redacted

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Steam Dryer Design Technical Meeting

April 25 - 27, 2005

Agenda

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- Introduction
- Flow-Induced Vibration (FIV)
- New Dryer 50.59 Evaluation
- New Dryer Analyses
  - Design Process Overview
  - Steam Dryer Load Definition
  - Benchmarking Update
  - Finite Element and Stress Analyses
  - Dryer Load Analysis – Load Cases
  - Hammer Test Results
- Dryer Instrumentation
- Startup Test Plan
- Operational Plans for Quad Cities Unit 2 (QC2) and Basis
- Operational Plans for QC1 and Basis
- Revised Commitments for Extended Power Uprate (EPU) Operation

Exelon Nuclear

Introduction

Jim Meister

Vice President – Nuclear Services

Exelon
Nuclear

FIV

Chuck Alguire
Engineering Supervisor
Quad Cities Nuclear Power Station

Exelon Actions

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- Exelon established a comprehensive action plan which included three teams to identify actions to prevent future EPU failures
  - Steam Dryer Team
  - EPU Vulnerability Team
  - Vibration Team

Results

Vibration General Assessment

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- Evaluations concluded that all components are acceptable as originally designed for full-cycle operation at full EPU thermal power with the following exceptions:
  - ERV susceptibility to vibration at QC required upgrades of vulnerable parts
  - Target Rock Safety/Relief Valves (S/RVs) showed vibration wear degradation at both Dresden (DR) and QC
- The team identified additional recommendations for enhancements in testing, monitoring, and refueling outage inspections
  - An example is confirmatory vibration testing of Limitorque and Namco limit switches (completed successfully)

QC EPU Vibration Assessment
Vibration Summary – October 2004

Exelon Nuclear

- Validate preventive maintenance (PM) scope and frequency for all evaluated components
  - Electromatic Relief Valve (ERV) PM changes already implemented
- Replace ERV actuator parts for both DR and QC during future rebuilds
- Inspect ERV actuator internals each refueling outage until performance is validated
- Perform focused walkdowns during each refueling outage
- Inspect minimum of one Main Steam Isolation Valve (MSIV) internally each refueling outage until satisfactory performance is demonstrated
- Install upgraded Target Rock S/RVs

QC EPU Vibration Assessment
Open Items from October 2004

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- Perform detailed walkdowns
- Install upgrades on ERV actuators
- Finalize and install upgrade on Target Rock S/RV pilot valve
- Install new steam dryers

QC EPU Vibration Assessment
Actions Completed Since October 2004

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- Actuator components upgraded on all ERVs (Inconel X750 bushings/guide rods and chamfered springs)
  - QC2 upgraded in Spring 2004 refueling outage
  - QC1 upgraded in Spring 2005 refueling outage
  - Will inspect QC2 actuators during the planned outage scheduled to begin on May 9, 2005

QC EPU Vibration Assessment

Actions Completed Since October 2004 (cont.)

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- Target Rock S/RV bellows cap/setpoint spring upgrade
  - Electrolyzed bellows cap, 0.0015" minimum
  - Setpoint spring straightness within 0.02"
  - Coil perpendicularity within 0.03" top/bottom
  - No measurable cap wear after 24 hour shaker table test (simulates one operating cycle at EPU)
  - Installed on QC1 during Spring 2005 refueling outage
  - Install on QC2 during planned outage scheduled to begin on May 9, 2005

QC EPU Vibration Assessment

Actions Completed Since October 2004 (cont.)

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- QC1 Spring 2005 walkdown results
- New steam dryers
  - QC2 during planned outage scheduled to begin May 9, 2005
  - QC1 during planned outage scheduled for May 2005

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New Dryer 50.59 Evaluation

Roger Heyn
Design Engineer
Quad Cities Nuclear Power Station

New Dryer 50.59 Evaluation

Exelon Nuclear

- Significant changes evaluated in 50.59
  - Dryer design loads
  - Increased dryer weight
  - Reduced pressure drop across dryer
  - Displacement of steam/water mass by metal mass
- Dryer design loads
  - Impact on structural integrity of dryer
- Increased dryer weight
  - Negligible impact on reactor internals seismic analyses
  - Impacts support bracket loading (meets Code requirements)

New Dryer 50.59 Evaluation (cont.)

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- Reduced pressure drop
  - Impacts transient and accident pressure distribution
  - Negligible impact on reactor level measurement
  - No change in main steam line (MSL) maximum break flow
- Displacement of steam/water mass by metal mass
  - Impacts transient thermal limits (0.01 Operating Limit Minimum Critical Power Ratio increase)
- Safety Evaluation Report in support of the new steam dryer
  - Report will summarize cycle-independent analyses and evaluations

New Dryer 50.59 Evaluation (cont.)

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- Analyses and evaluations contained in Replacement Steam Dryer Analysis Report for QC1 and QC2
  - Reactor Internal Pressure Differences (RIPD)
    - Steam dryer normal conditions
    - Steam dryer upset conditions
    - Other internal components normal and upset conditions
    - Steam dryer faulted conditions
    - Other internal components faulted conditions
  - Seismic evaluation
  - Structural assessment
  - Anticipated Operational Occurrence evaluations
  - Stability evaluation
  - Appendix R evaluation
  - Anticipated Transients Without Scram

New Dryer 50.59 Evaluation (cont.)

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- Loss of Coolant Accident evaluation
- MSL Break Accident evaluation
- Water level instrumentation evaluation
  - Setpoint analytical bases
  - Channel A / Channel B mismatch
- Other system evaluations
  - Reactor heat balance
  - Reactor Recirculation System
  - Three bundle average quality limit
  - Other systems and evaluations not adversely affected

New Dryer 50.59 Evaluation (cont.)

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- Conclusions based upon analyses that have been completed or are final draft
  - no significant impacts identified (i.e., more than minimal increase)

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Steam Dryer Design Technical Meeting

April 25 - 27, 2005

Agenda

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- Introduction
- Flow-Induced Vibration (FIV)/Extent of Condition (EOC) Review
- New Dryer 50.59 Evaluation
- New Dryer Analyses
  - Design Process Overview
  - Steam Dryer Load Definition
  - Finite Element and Stress Analyses
  - Dryer Load Analysis – Load Cases
  - Hammer Test Results
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- Revised Commitments for Extended Power Uprate (EPU) Operation

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New Dryer Analyses

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Design Process Overview

Keith Moser
Asset Management Engineer

New Dryer Design Strategy

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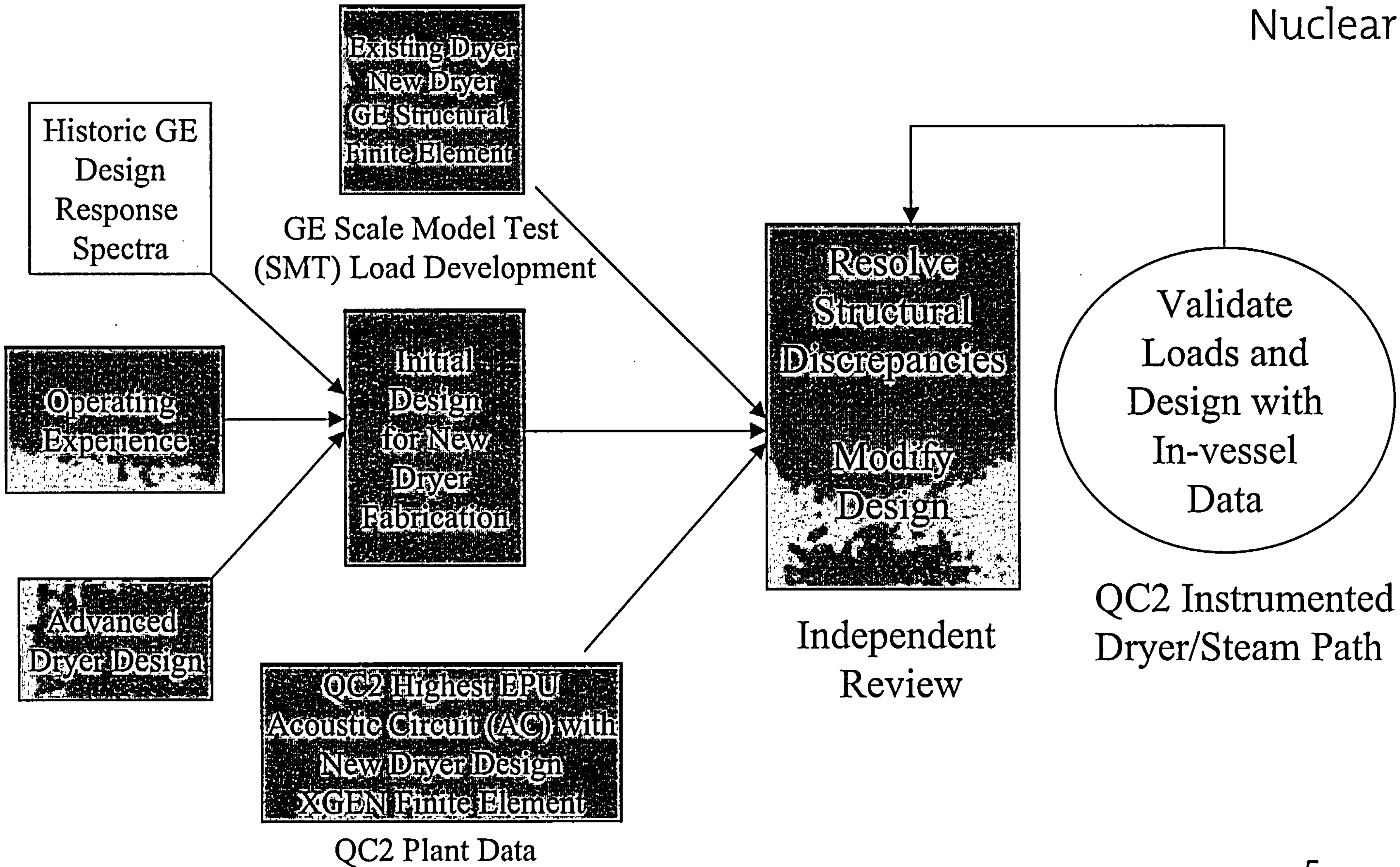

New Dryer Design Load Strategy

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SMT
QC1 Acoustic Circuit
Refined Load

↓

Exelon Benchmark of Acoustic Circuit
to SMT for Load Refinement Using
In-vessel Dryer Microphones
Produced Acceptable Results

↓

GE FEA Benchmark
Against Dryer Damage
Original Dryer Pre-EPU – Damage Predicted
2003 Repaired Dryer EPU – Damage Predicted

↓

New Dryer QC1 SMT Load Case
Tends to Over Predict Loads

AC Analysis
QC2 In-Plant MSL Strain Gauge
Venturi Instrument Line

↓

XGEN Finite Element Analysis (FEA)
Benchmark Against Dryer Damage
Original Dryer Pre-EPU – Borderline
2003 Repaired Dryer EPU – Damage Predicted

↓

New Dryer Shape
Analytically Inserted
Into 3-D Steam Dome
Volume for (AC)

↓

New Dryer QC2 In-plant Load Case
Results in Higher Peak Loads

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Scale Model Test Loads

Daniel Sommerville
General Electric

Presentation Scope

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- Discussion of January 2005 open items
- Plant data review
- Purpose of SMT
- Scaling methodology
- Test apparatus
- Outline of tests performed
  - Baseline
  - Source screening
  - Characterization
- Load definition
  - Original dryer
  - Replacement dryer

Presentation Scope (cont.)

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- Comparison of loading: original vs. replacement
- Source identification
- Preliminary explanation of frequency content
- Preliminary justification of model data
- Current open items

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Discussion of January 2005 Open Items

January 2005 Open Items

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- Significant open issues
  - Expected S/RV resonance amplitude occurs at a higher flow rate than predicted using scaling laws
  - Trend of fluctuating pressures vs. mean velocity increases faster in model data than in plant data
  - Model data has not been validated against plant data
- Status
  - Identification and resolution of flow measurement error in scale model test apparatus eliminated issues 1 and 2
  - Plant data will be available in May for comparison to model data

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Plant Data Review

Plant Data Review

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- In-vessel data available from 3 BWRs
  - BWR/3 – square hood, 188" vessel
  - BWR/4 – curved hood, 251" vessel
  - ABWR – curved hood, 280" vessel
- Power ascension tests performed with:
  - Accelerometers
  - Pressure transducers
  - Strain gauges
- Detailed summary available in SMT report

Frequency Trends

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Frequency Spectra Characteristics

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Structural Response

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Conclusions

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- The fluctuating pressure load spectra shown by the in-plant measurements indicate that the characteristics of the pressure loading on the steam dryer are similar for all BWRs, regardless of vessel size or steam dryer hood design
- Acoustic induced vibration is considered to be the dominant FIV excitation mechanism for the steam dryer
- The steam dryers instrumented with strain gauges demonstrate that the dryer panels will respond to frequencies across the entire bandwidth monitored
  - Significant response is observed at the high frequency S/RV modes
- Additional conclusions are presented in the SMT report

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Scale Model Tests

Purpose of SMT Apparatus

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- Enable a predictive load definition methodology
  - Use model data to predict plant loads
  - Use model to explore changes to system
    - Load reduction
    - Impact of new designs on FIV loading
- Develop an experimental tool to understand characteristics of steam dryer FIV loading
  - Source locations
  - Source mechanisms
  - Explanation of loading
  - Critical components that affect source characteristics or system response

Scaling Methodology

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Unsteady CFD Analysis

Investigate Importance of Re Number

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Unsteady CFD Results

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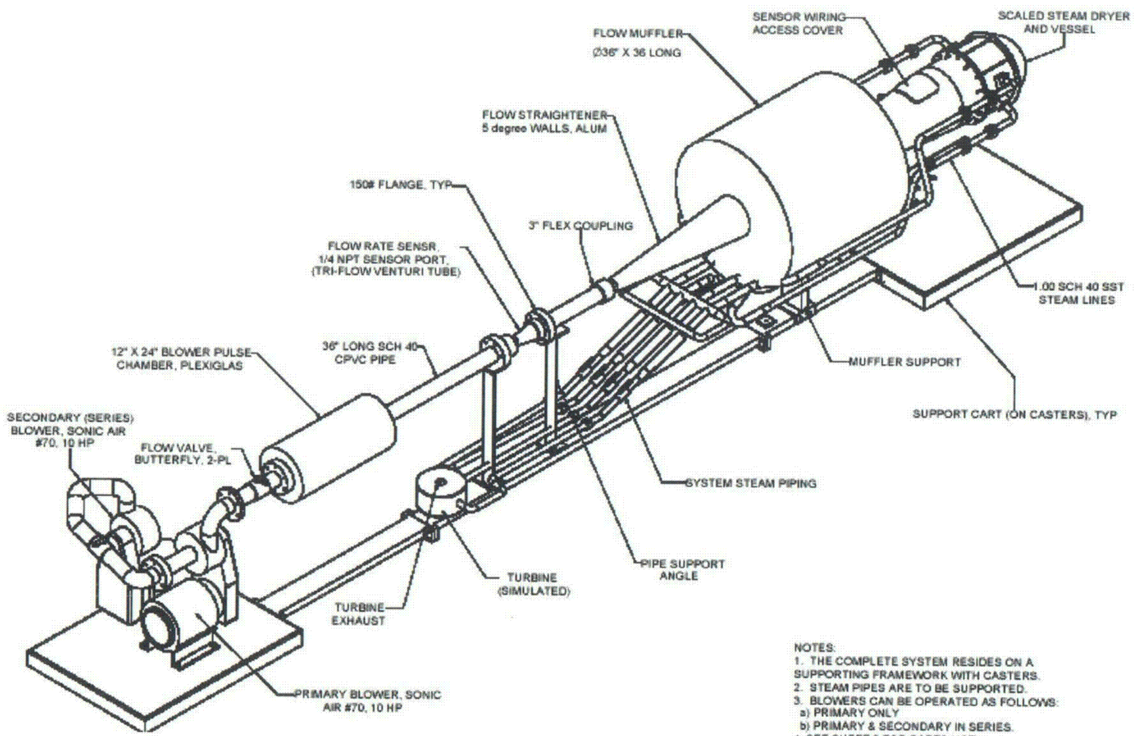
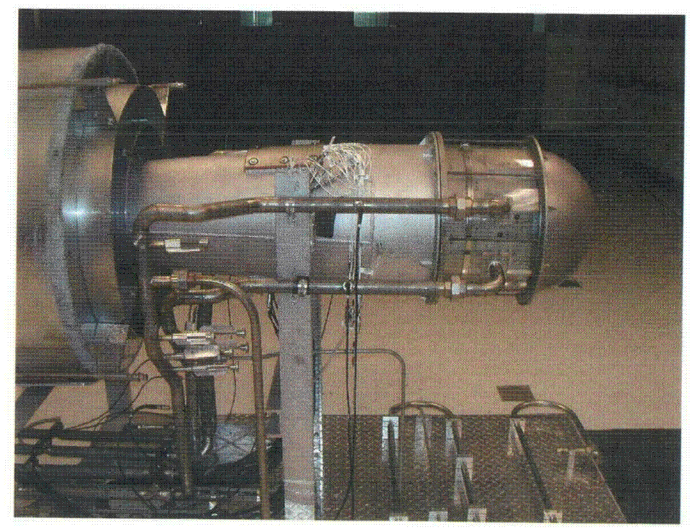
Images of SMT Apparatus

Exelon℠



NOTES:
1. THE COMPLETE SYSTEM RESIDES ON A SUPPORTING FRAMEWORK WITH CASTERS.
2. STEAM PIPES ARE TO BE SUPPORTED.
3. BLOWERS CAN BE OPERATED AS FOLLOWS:
a) PRIMARY ONLY
b) PRIMARY & SECONDARY IN SERIES.



SMT Component Identification

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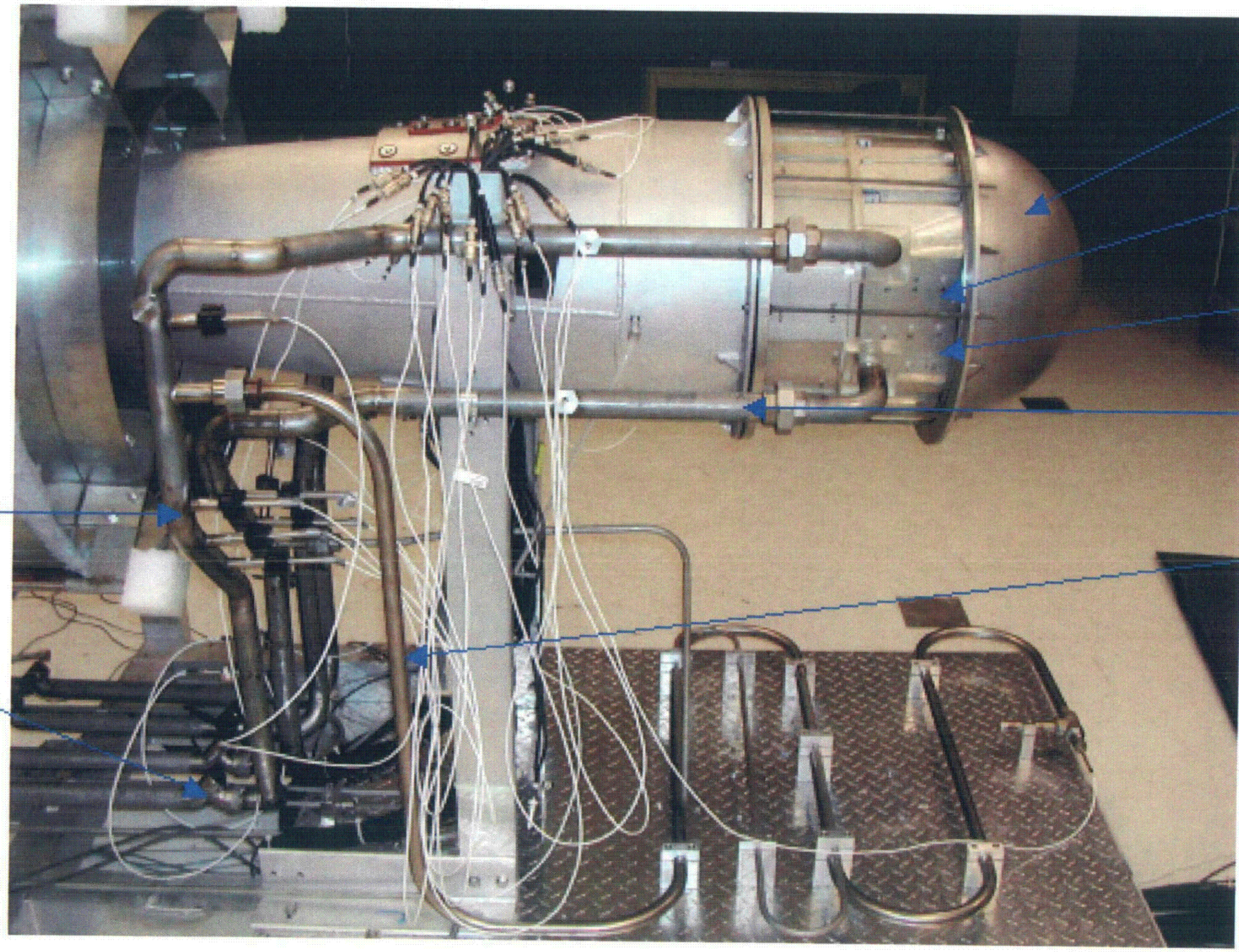

Data Acquisition/Instrumentation

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- Data Acquisition System
  - LMS SCADAS III dynamic signal analyzer
  - LMS test.Lab software
  - Dell D600 laptop
    - Time history data is stored in digital format on computer hard drive
- Instrumentation
  - ICP Electret microphones
  - Venturi flow meter
  - Velocity probes (averaging pitot tube)
  - Thermocouple
  - Static pressure transducer
- Calibration
  - All equipment calibrations are NIST traceable
  - Microphone end-to-end calibration checks were performed before and after each test

Sensor Locations
Original Dryer

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Sensor Locations
New Dryer

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Sensor Locations
MSL

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Test Performed for QC Dryer

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- Baseline
  - Original
  - Replacement
- Source Identification
  - Original
  - Replacement
- Characterization
  - Replacement
- Sweep tests and Dwell tests performed for both dryer designs
  - Sweep Test: Flow is increased at a constant rate
  - Dwell Test: Flow is held constant

Baseline case used for load definition

Environmental Conditions

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- Test Conditions
  - Test Fluid: Air
  - Test Pressure: Ambient (~14.7 psia - ~19 psia)
  - Temperature: 60-120 °F
  - Flow Rates: $130 < Q < 225$ SCFM

Baseline Test Results

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Trend of Frequency Spectra at Different Dryer Regions

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Trend of Frequency Spectra at Different Dryer Regions (cont.)

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Baseline Test Observations

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Comparison of Scale Model Loads

Original Dryer vs. Replacement Dryer

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RMS Loads
Frequency Band 5-3200 Hz

Overlaid Frequency Spectra
Each QC Dryer Design

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SMT Based Load Definition Process

Source Identification Tests

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MSL Source Identification Test

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MSL Source Identification
Test Results

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MSL Source Identification

Test Results (cont.)

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MSL Test Observations

Summary

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MSIV Source Identification Test

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MSL Source Identification
Test Results

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S/RV Source Identification Test

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S/RV Source Identification Test

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QC1 Source Testing Results

Summary

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Frequency Content

Preliminary Explanation

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Low Frequency Content
f < 350 Hz

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Mid-Frequency Content
f > 350 Hz

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Acoustic FEM of QC1 Scale Model

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Prediction of RPV Acoustic Modes

Model (Plant) Frequencies

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Prediction of RPV Acoustic Modes
Model (Plant) Frequencies (cont.)

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High Frequency Content
1600-1700 Hz

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Agreement Between Test Data and Model Prediction

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Acoustic Modes of Steam System

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Model Data Preliminary Justification

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Model Data Preliminary Justification
Frequency Trends with Power

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Model Data Preliminary Justification
Fluctuating Pressure Trends with Mean Velocity

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Model Data Preliminary Justification
Comparison of Frequency Spectra

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Model Data Preliminary Justification

Comparison of Frequency Spectra

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Current Open Items

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- SMT data is not currently validated against full scale data
- SMT data will be validated against in-plant measurements obtained from QC1 dryer instrumentation
  - May 2005 (OLTP)
  - Summer 2005 (EPU)

Conclusions

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- Acoustic induced vibration is dominant FIV excitation mechanism
- SMT frequency content is consistent with available in-vessel plant data
  - In-vessel data available from three BWRs (BWR/3, BWR/4, ABWR)
- SMT data appears to be conservative in mid frequency range (30-100 Hz)
- SMT apparatus method is viable tool to predict fluctuating pressure loads on a BWR steam dryer

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QC2 In-Plant Loads

Keith Moser
Asset Management Engineer

QC2 In-Plant Load Definition

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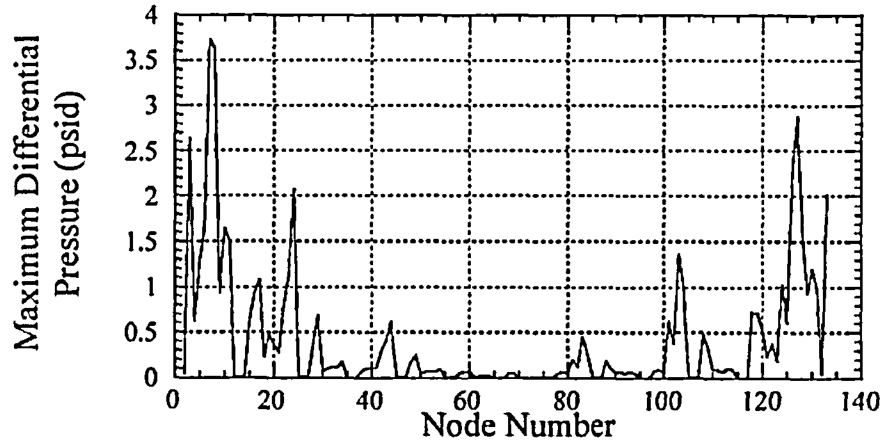
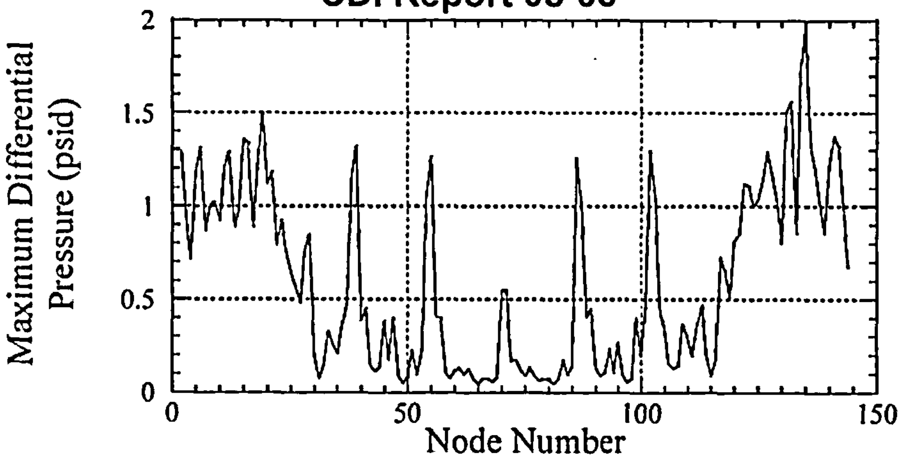


New Dryer QC2 In-plant Peak Load at EPU Scaled Flow CDI Report 05-03



New Dryer QC1 SMT Peak Load at EPU Scaled Flow (CDI Report 05-04)

- QC2 data collected August 2004
- 1 strain gauge, 4 venturi instrument and two water reference lines used
- New dryer shape analytically installed into Helmholtz solver
- Results produce the highest peak stress for the two load definitions

QC2 In-Plant Load Definition (cont.)

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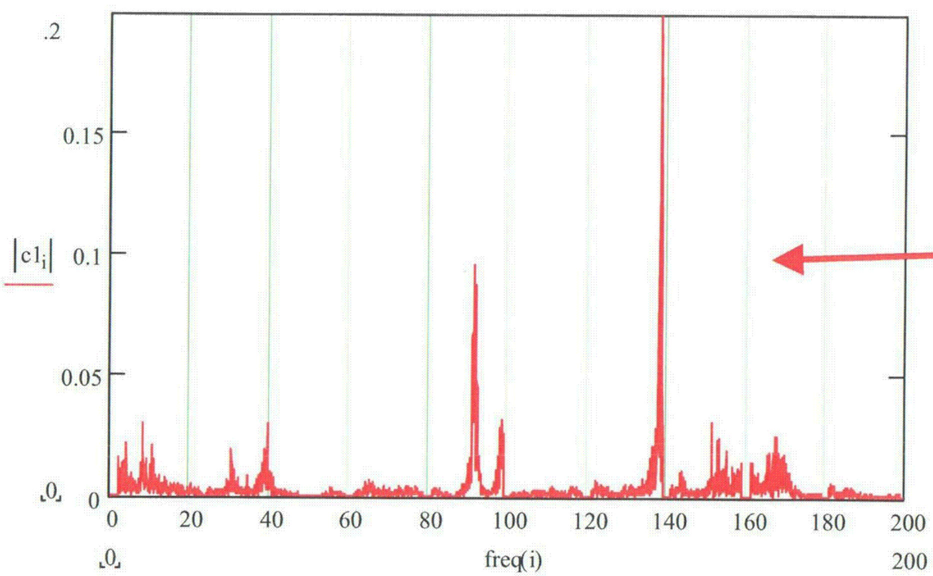

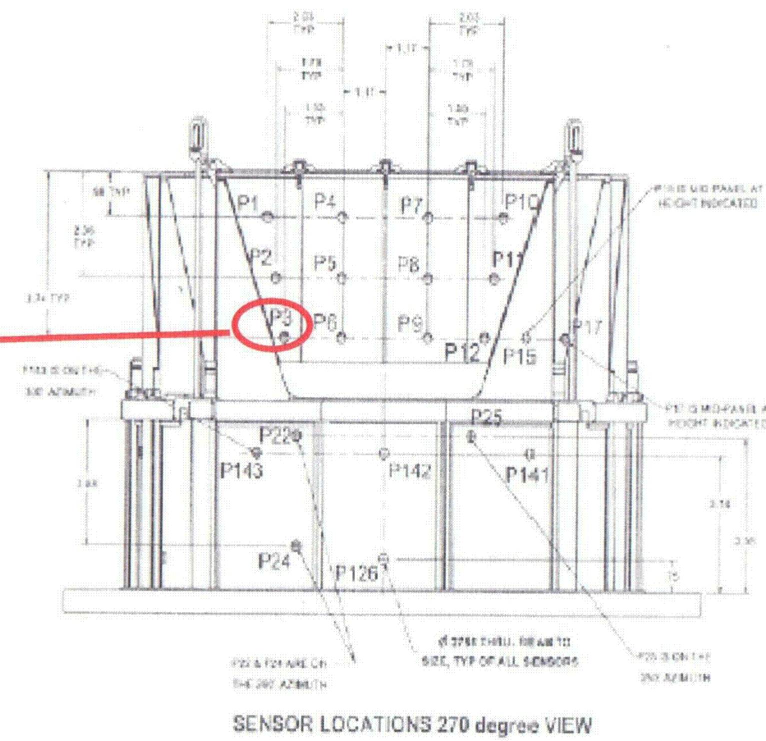

QC2 In-plant Load Case at P3 Transducer
Fast Fourier Transform (FFT) of Design Load Case

QC1 SMT Load Definition

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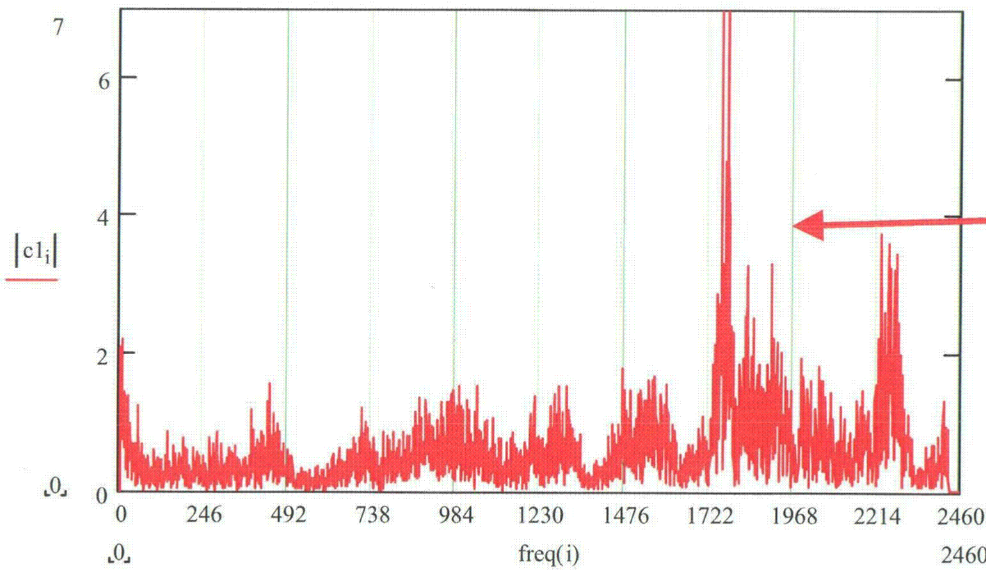

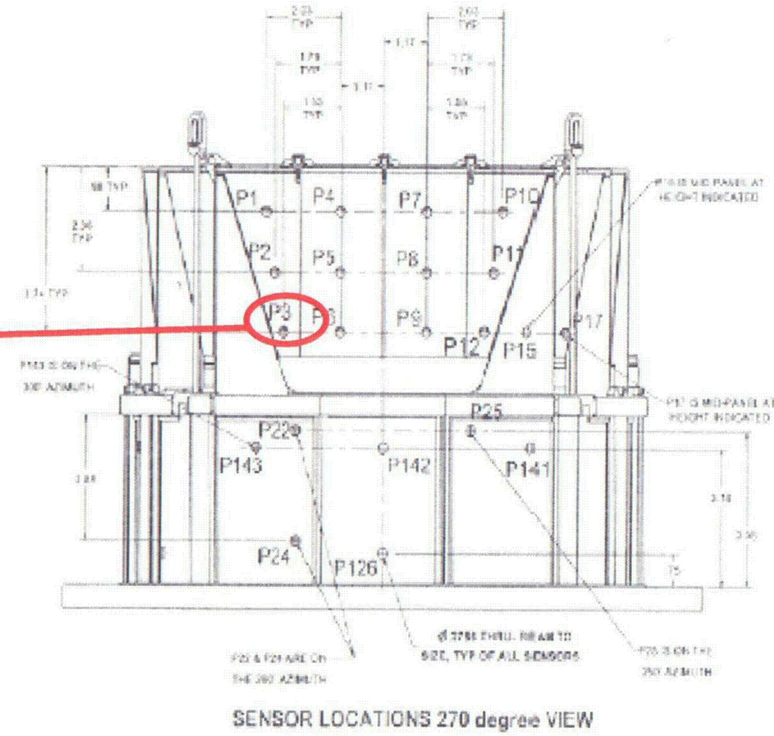

QC1 SMT Load Case at P3 Transducer
FFT of Design Load Case

Units: Pascal (pa)

Frequency SMT Factor: 12.13

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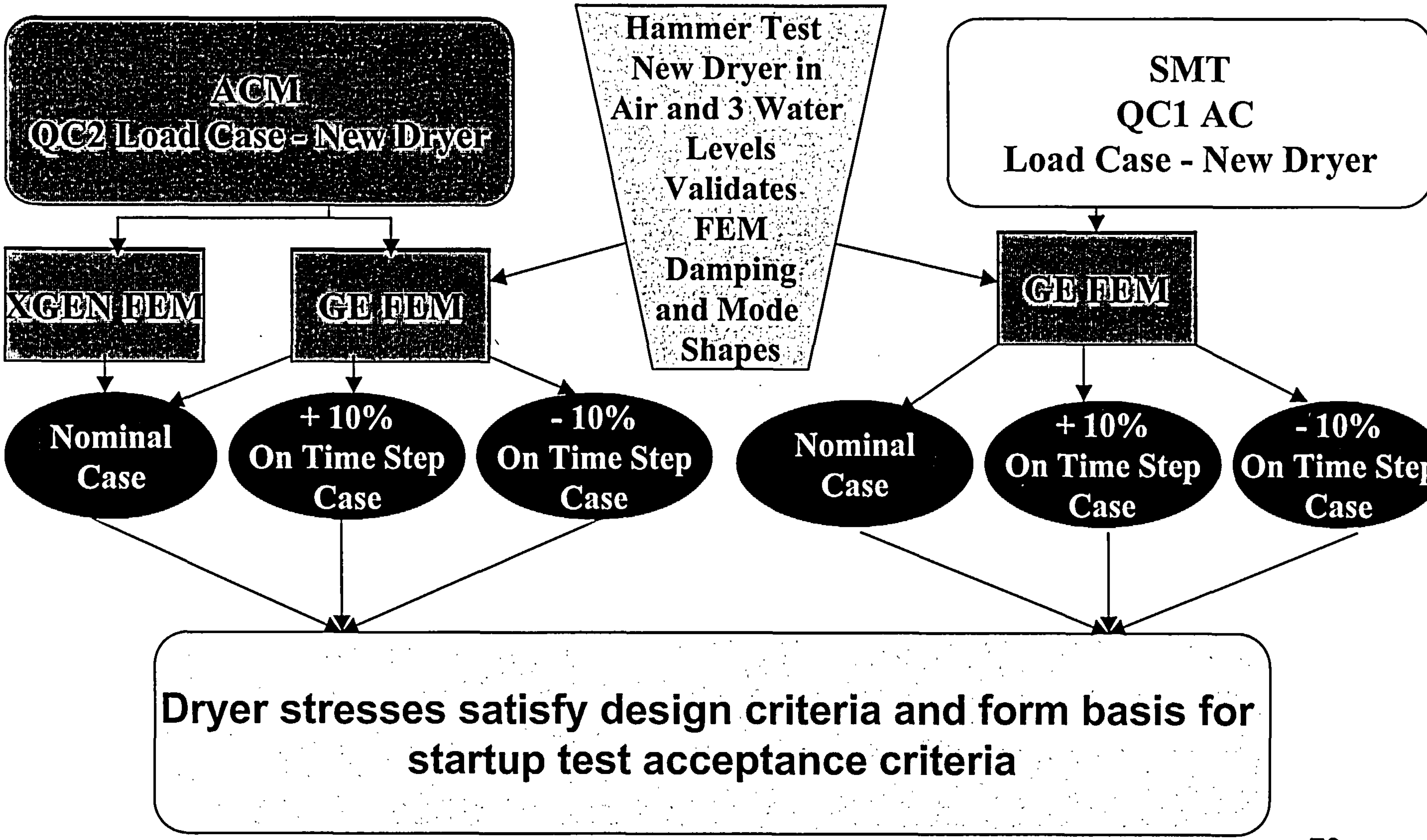
Finite Element and Stress Analyses

Guy DeBoo
Asset Management Engineer

Finite Element and Stress Analyses

Exelon Nuclear



GE Dryer Stress Analyses

Leslie Wellstein
General Electric

Structural Analysis Agenda

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- Summary of time history analyses
- Replacement dryer shell finite element model
  - Super elements
- Applied loads
- Structural response to loads and modal analysis (outer hood and skirt)
- Fatigue analysis
  - Time history results summary
  - Weld factors
  - Solid models
- ASME Code Cases

Summary of Time History Analyses

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- 6 time history dynamic analyses using full shell FEM
  - 2 load cases: In-Plant and SMT
  - 3 analyses for each load case: nominal, +10%, and -10% frequency shifts
- Fatigue analysis using weld factors applied to time history analysis results
- Disposition of high stress locations using:
  - Local solid FEMs with forces extracted from the full shell model, and
  - Increased damping for skirt and vane banks

Dryer Model

Full Model Without Super Elements

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Dryer Model
FEM Boundary Conditions

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Dryer Model

Outer Details

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Dryer Model
Hoods

Dryer Model
Support Structure

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Dryer Model
Troughs

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Dryer Model
Cross Beams

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Dryer Model
Vane Banks (No Super Element Shown)

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Full Model with Super Elements

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Vane Bank Assembly

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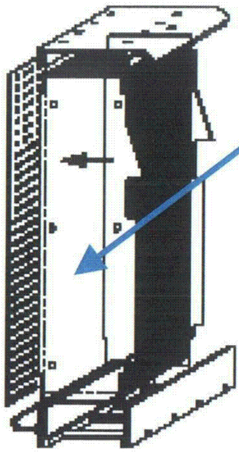

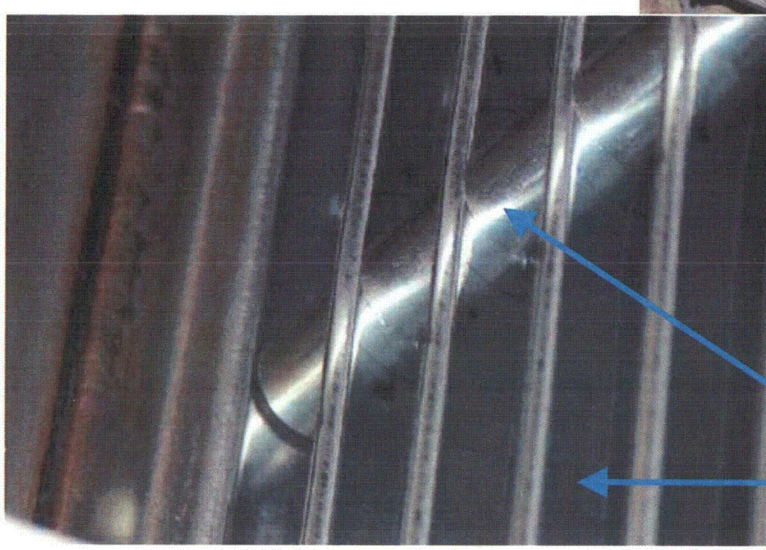

Vane Bank Super Element

Vane Bank Super Element (cont.)

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Vane Bank Super Element
Details

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Vane Bank Super Element

Attachment to Vane Bank Tops

Vane Bank Super Element
Attachment to Perforated Plates

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Vane Bank Super Element
Attachment to Vane Bank End Plates

Tie Bar Handle Super Element

Skirt Super Element

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Skirt Super Element (cont.)

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Skirt Super Element Detail

In-Plant Loads

Max Pressure = 3.52 psi

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SMT Loads
Max Pressure = 318.7 Pa

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Frequency Content
QC In-Plant Load

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Frequency Content
SMT Load

Stress Response
In-Plant Loads: Outer Hood

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Stress Response

In-Plant Loads: Skirt, Vane Bank Top, and End

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Stress Response

SMT Loads: Outer Hood

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Stress Response

SMT Loads: Skirt, Vane Bank Top, and End

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Skirt Frequency 13.0 Hz

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Skirt Frequency 31.2 Hz

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Outer Hood Frequency 88.4 Hz

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Time History Analysis Results

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Time History Analysis Results
With Weld Factors

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High Stress Locations
Disposition

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Skirt 1% Damping

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Skirt 2% Damping

Justification: Hammer Test Results

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Support Ring

Force Extraction
Trough Attachment Shell Model

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Maximum Stress Intensity

Trough Attachment Solid Model – Support Ring

Maximum Stress Intensity Weld
Trough Attachment Solid Model

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Cross Beams

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Finite Element Solid Model
Cross Beam to Outer Trough Lower Brace

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Maximum Stress Intensity

Cross Beam to Outer Trough Lower Brace

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Maximum Stress Intensity

Cross Beam to Outer Trough Lower Brace Weld

Weld Stress at Support Ring

Cross Beam to Outer Trough Lower Brace

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Vane Bank Inner End Plates

Exelon Nuclear

Vane Bank Outer End Plates

Exelon Nuclear

Damping in Vane Banks

Justification of 4%

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- Bolted assembly
- Clearances between components (vanes to tie rods, vanes to spacers, and spacers to tie rods)
- Significant amount of energy loss due to friction between these components

Force Extraction
Vane Bank Tie Rod

Exelon Nuclear

Vane Bank End Plate Solid Model

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Vane Bank Inner End Plate Stress

4% Damping Stress Intensity (Sint) = 11855 psi

Vane Bank Outer End Plate Stress

4% Damping Sint = 7989 psi

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Vane Cap Curved Part

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Inner Hoods

Outer Hood

Fatigue Analysis Summary

ASME Code Case

Load Case Combinations

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Load Case	Service Condition	Load Combination
A	Normal	DW + DPn ± FIVn
B1	Upset	DW + DPn + TSV1 ± FIVn
B2	Upset	DW + DPn + TSV2
B3	Upset	DW + DPu ± FIVu
B4	Upset	DW + DPn ± OBE ± FIVn
D1A	Faulted	DW + DPn + $[SSE^2 + AC1^2]^{1/2}$ ± FIVn
D1B	Faulted	DW + $[DPf1^2 + SSE^2]^{1/2}$
D2A	Faulted	DW + DPn + AC2 ± FIVn
D2B	Faulted	DW + DPf2

ASME Code Case
Load Definitions

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AC1 = Acoustic load due to Main Steam Line Break (MSLB) outside containment, at the Rated Power and Core Flow (Hi-Power) Condition.

AC2 = Acoustic load due to Main Steam Line Break (MSLB) outside containment, at the Low Power/High Core Flow (Interlock) Condition.

DW = Dead Weight

DPn = Differential Pressure Load During Normal Operation

DPu = Differential Pressure Load During Upset Operation

DPf1 = Differential Pressure Load in the Faulted condition, due to Main Steam Line Break Outside Containment at the Rated Power and Core Flow (Hi-Power) condition

DPf2 = Differential Pressure Load in the Faulted condition, due to Main Steam Line Break Outside Containment at the Low Power/High Core Flow (Interlock) condition

FIVn = Flow Induced Vibration Load (zero to peak amplitude of the response) during Normal Operation

FIVu = Flow Induced Vibration Load (zero to peak amplitude of the response) during Upset Operation

OBE = Operating Basis Earthquake

SSE = Safe Shutdown Earthquake

TSV1 = The Initial Acoustic Component of the Turbine Stop Valve (TSV) Closure Load (Inward load on the outermost hood closest to the nozzle corresponding to the TSV closure)

TSV2 = The Flow Impingement Component (following the Acoustic phase) of the TSV Closure Load; (Inward load on the outermost hood closest to the nozzle corresponding to the TSV closure)

ASME Code Case
Design Allowables

Exelon Nuclear

Service Level	Stress category	Class 1 Components Stress limits (NB)	
			Stress Limit, KSI
Service Levels A & B	P_m	S_m	14.4
	$P_m + P_b$	$1.5S_m$	21.6
Service Level D	P_m	Min(.7Su or 2.4 Sm)	34.56
	$P_m + P_b$	1.5(Pm Allowable)	51.84

Legend:

- P_m: General primary membrane stress intensity
- P_b: Primary bending stress intensity
- S_m: ASME Code stress intensity limit
- S_u: Ultimate strength

ASME Code Case
Service Levels A and B

Exelon Nuclear

GE Proprietary Information

ASME Code Case

Service Levels A and B (cont.)

Exelon
Nuclear

ASME Code Case
Service Level D

Nuclear

ASME Code Case

Service Level D (cont.)

Exelon Nuclear

ASME Code Case

Stress Margins

Exelon.[SM]
Nuclear

Structural Analysis Conclusions

Exelon. Nuclear

- Replacement dryer meets the design fatigue limits for EPU Conditions
- Replacement dryer meets the ASME Code limits for all service levels (normal, upset and faulted)
- Replacement dryer is structurally adequate for EPU conditions

Exelon Nuclear

Preliminary Hammer Test Results

Guy DeBoo – Asset Management Engineer
Richard Wu – General Electric

Hammer Test Results

Purpose of Hammer Test

Exelon Nuclear

- Obtain actual (as-built) dynamic characteristics of the new dryer:
  - Modal frequencies
  - Mode shapes
  - Modal damping
- Validate new dryer FEM
- Confirm critical damping for FEA

Hammer Test Results

LMS International

Exelon Nuclear

Hammer Test Results
Excitation/Response Points

Exelon Nuclear

Hammer Test Results
Excitation/Response Points (cont.)

Exelon.
Nuclear

Hammer Test Results
Excitation/Response Points (cont.)

Exelon Nuclear

Hammer Test Results
Excitation/Response Points (cont.)

Exelon Nuclear

GE Proprietary Information

Hammer Test Results
Excitation/Response Points (cont.)

Exelon. Nuclear

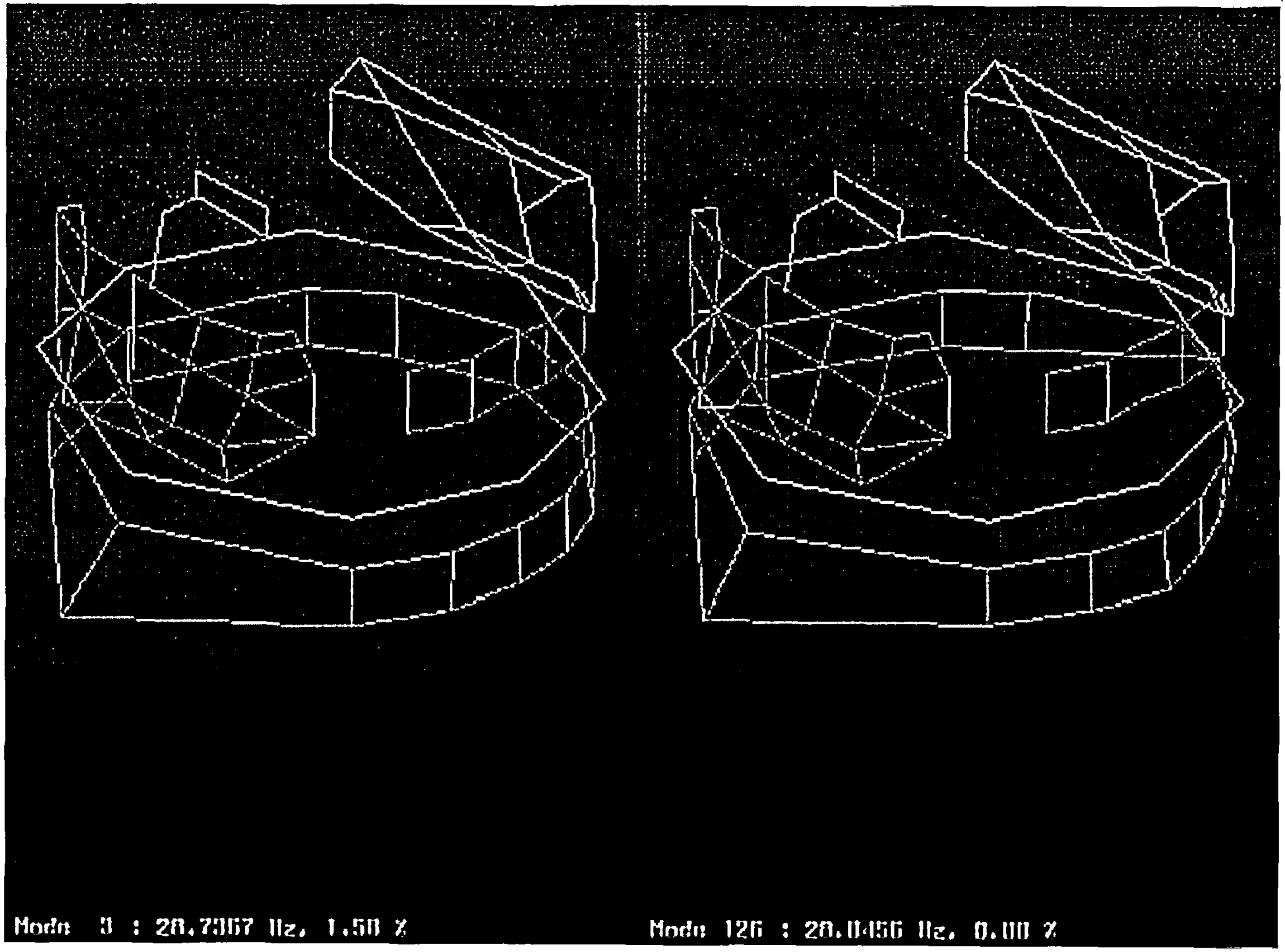
Hammer Test Results

Hammer Test vs. FEA Frequencies

Exelon Nuclear

Modes Shapes for Skirt

Left-Test, 28.7 Hz, Right-FE 28.0 Hz



Hammer Test Results

Excitation/Response Points

Exelon Nuclear

Hammer Test Results

Modal Analysis – Initial Correlation

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Damping Values
Dryer Dynamic Structural Analysis

Exelon Nuclear

Hammer Test Results

Skirt Damping Values

Hammer Test Results
Excitation and Response Time Histories

Exelon Nuclear

Damping Values
Dryer Dynamic Structural Analysis

Exelon. Nuclear

Hammer Test Results

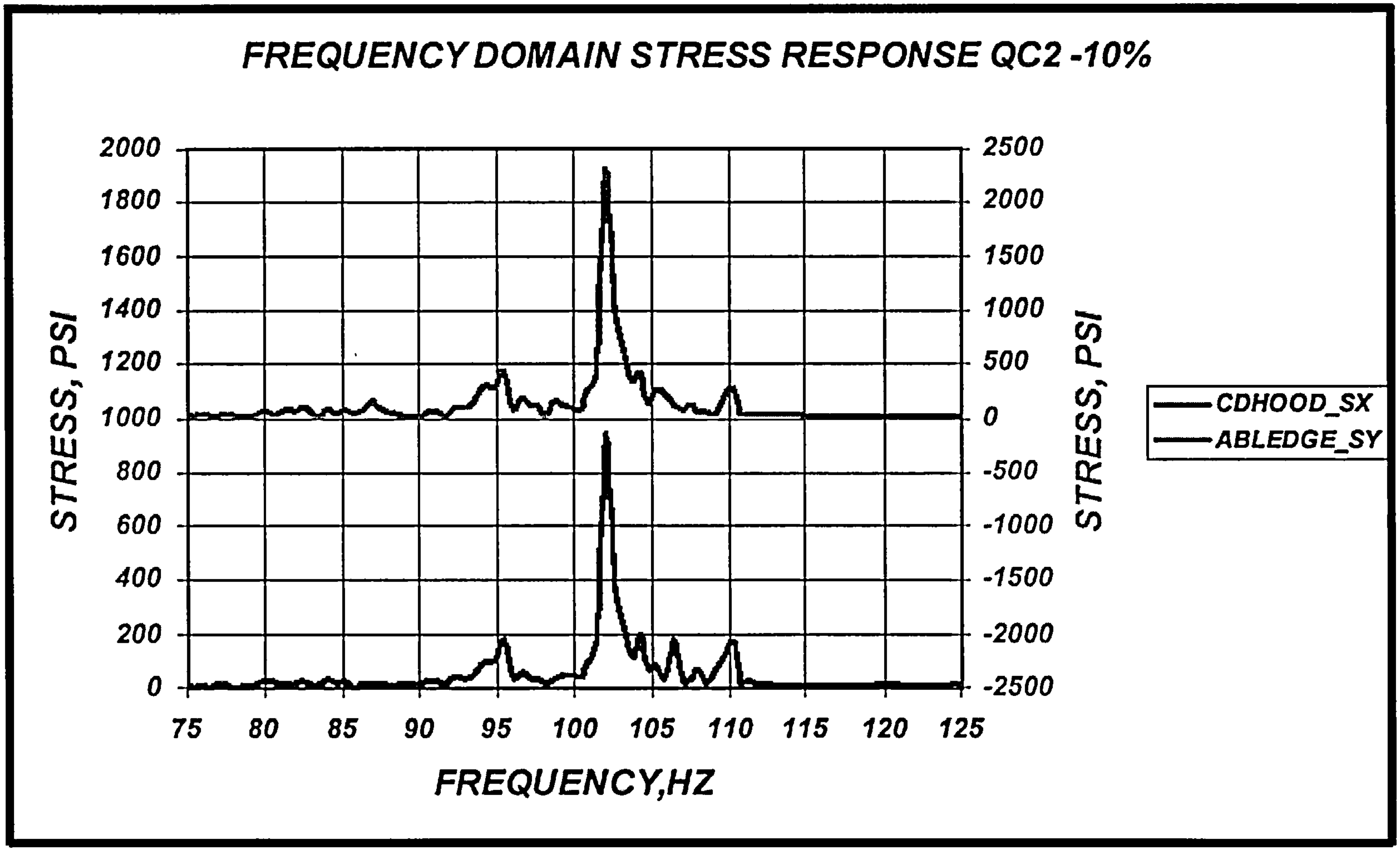
Hood Damping Values

Exelon Nuclear

New Dryer Outer Hood Response

In-Plant – 10% Load Case

Exelon Nuclear



Damping Values

Dryer Dynamic Structural Analysis

Exelon Nuclear

Damping Values

Dryer Dynamic Structural Analysis (cont.)

Exelon Nuclear

Regulatory Guide 1.61

Table 1 Damping Values (Reference 1)
(Percent of Critical Damping)

Structure or Component	Operating Basis Earthquake or ½ Safe Shutdown Earthquake	Safe Shutdown Earthquake
Equipment and large-diameter piping systems, pipe diameter greater than 12 inch	2	3
Small-diameter piping systems, pipe diameter equal to or less than 12 inch	1	2
Welded steel structures	2	4
Bolted Steel Structures	4	7
Prestressed concrete structures	2	5
Reinforced concrete structures	4	7

Viscous Modal Damping for All Modes

Damping Values

Dryer Dynamic Structural Analysis (cont.)

Exelon Nuclear

Hammer Test Results
Conclusions

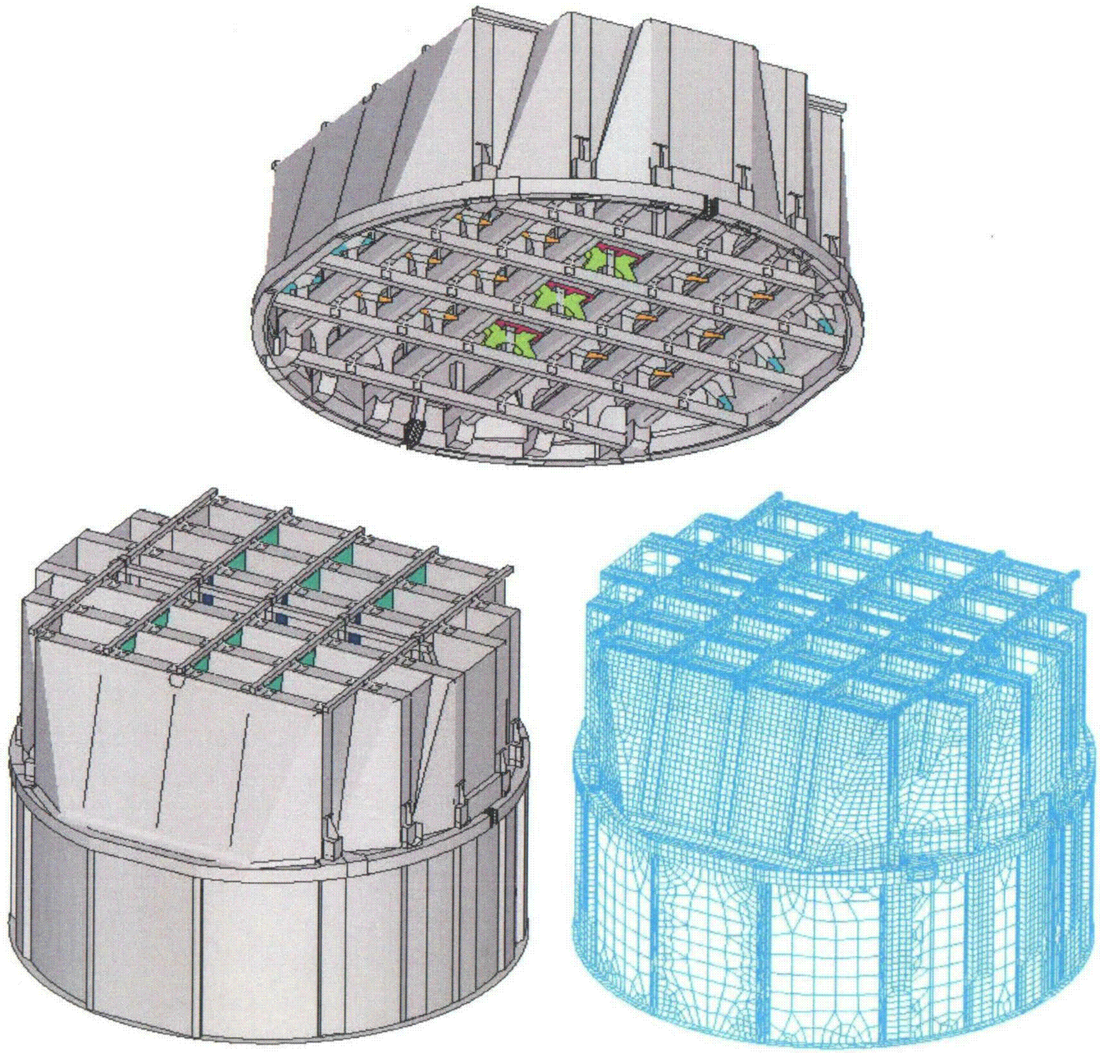
Exelon Nuclear

Exelon Nuclear

XGEN FEM and Analysis

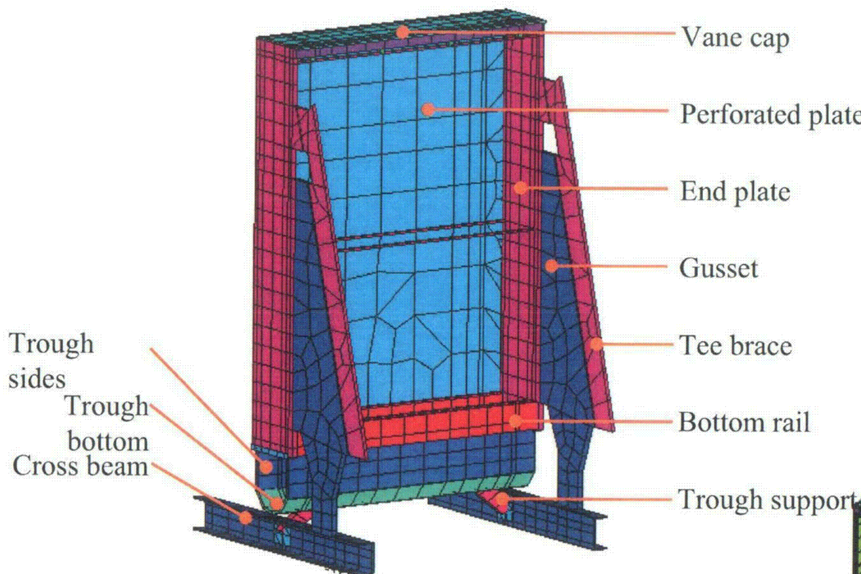
Guy DeBoo
Asset Management Engineer

XGEN FEM

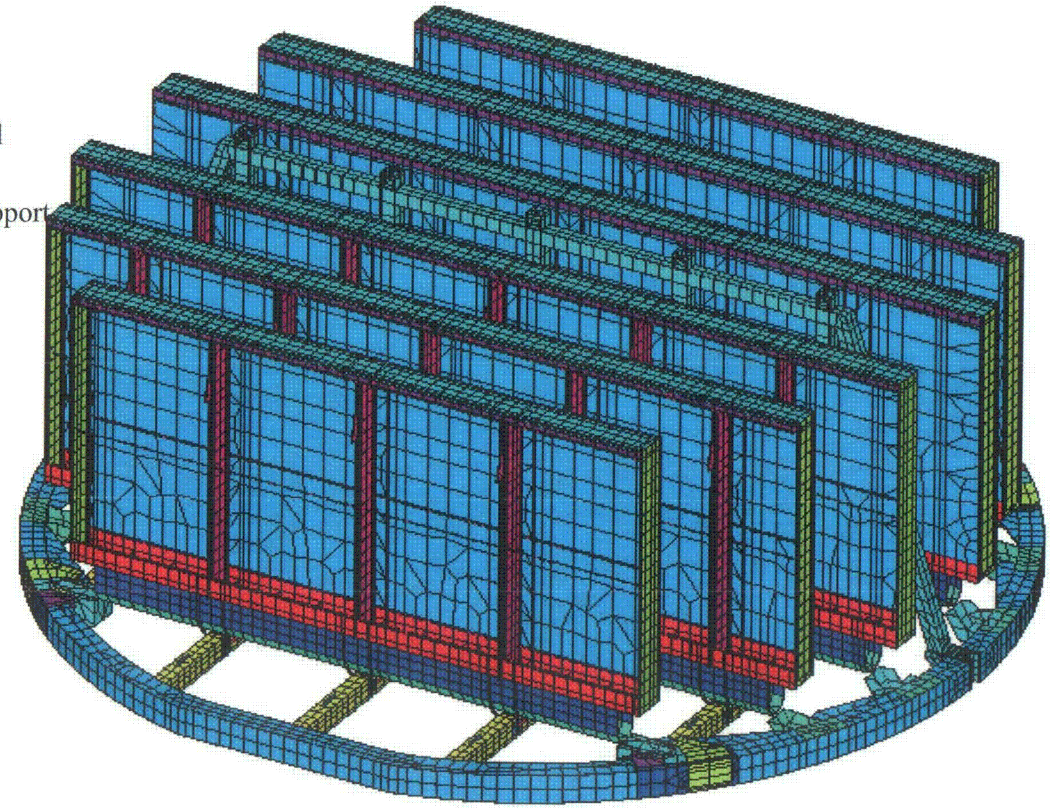


XGEN FEM (cont.)

Exelon Nuclear



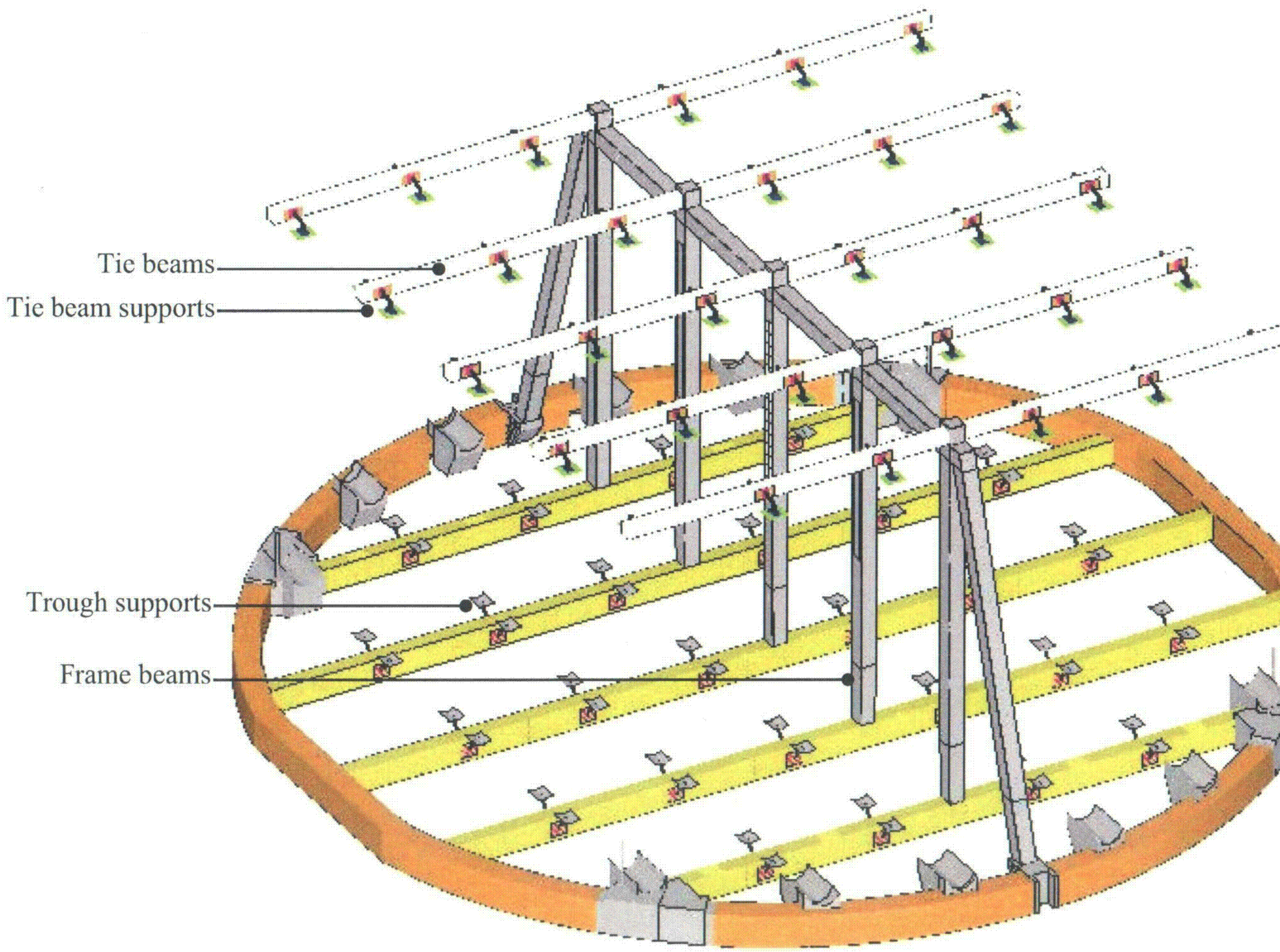
Analysis Model: Dryer Banks



XGEN FEM (cont.)

Exelon Nuclear

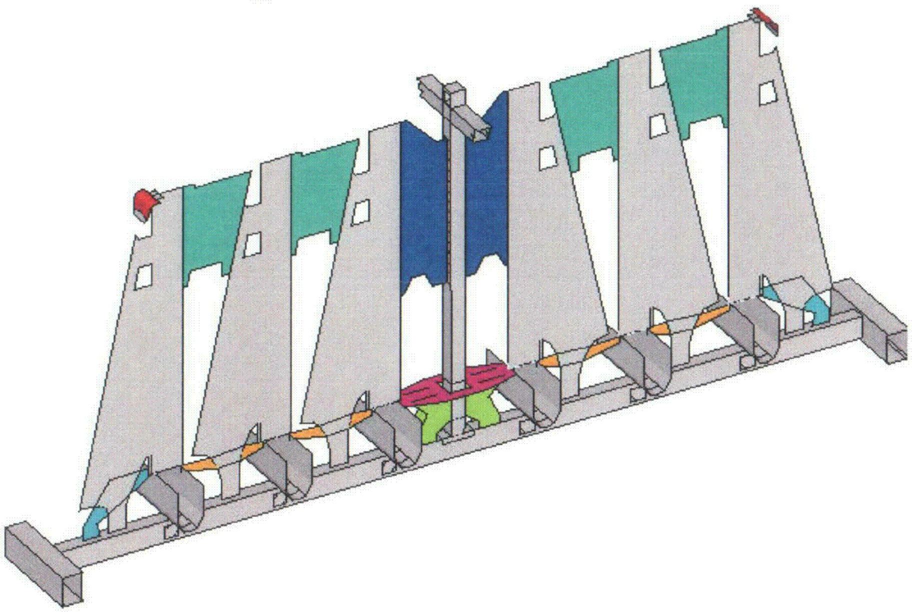
Support Ring, Cross Beams, and Tie Bars

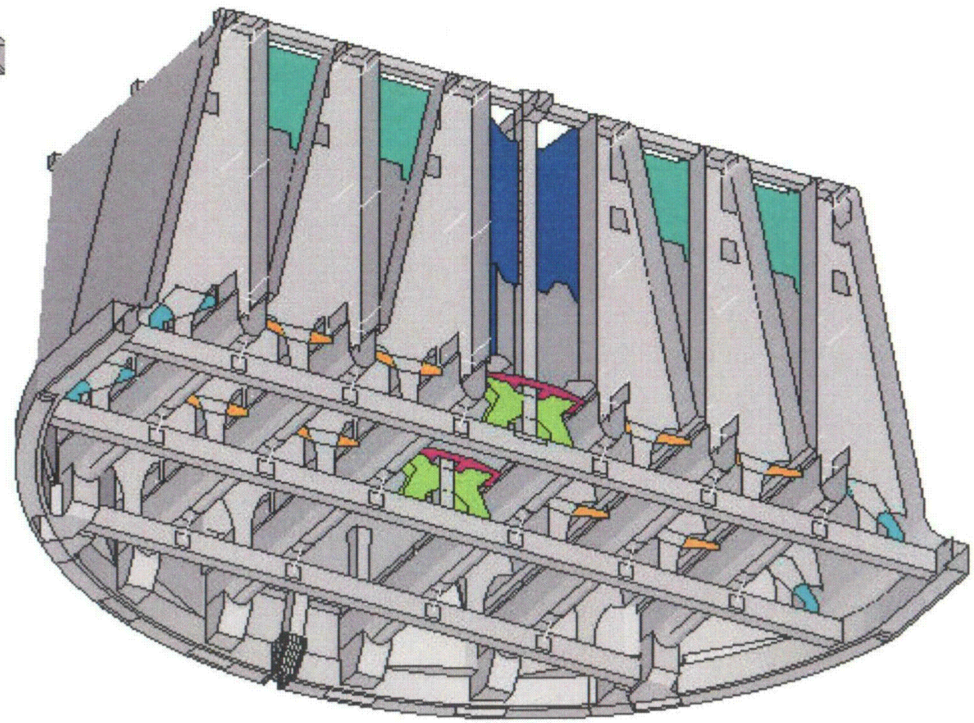


XGEN FEM (cont.)

Exelon Nuclear

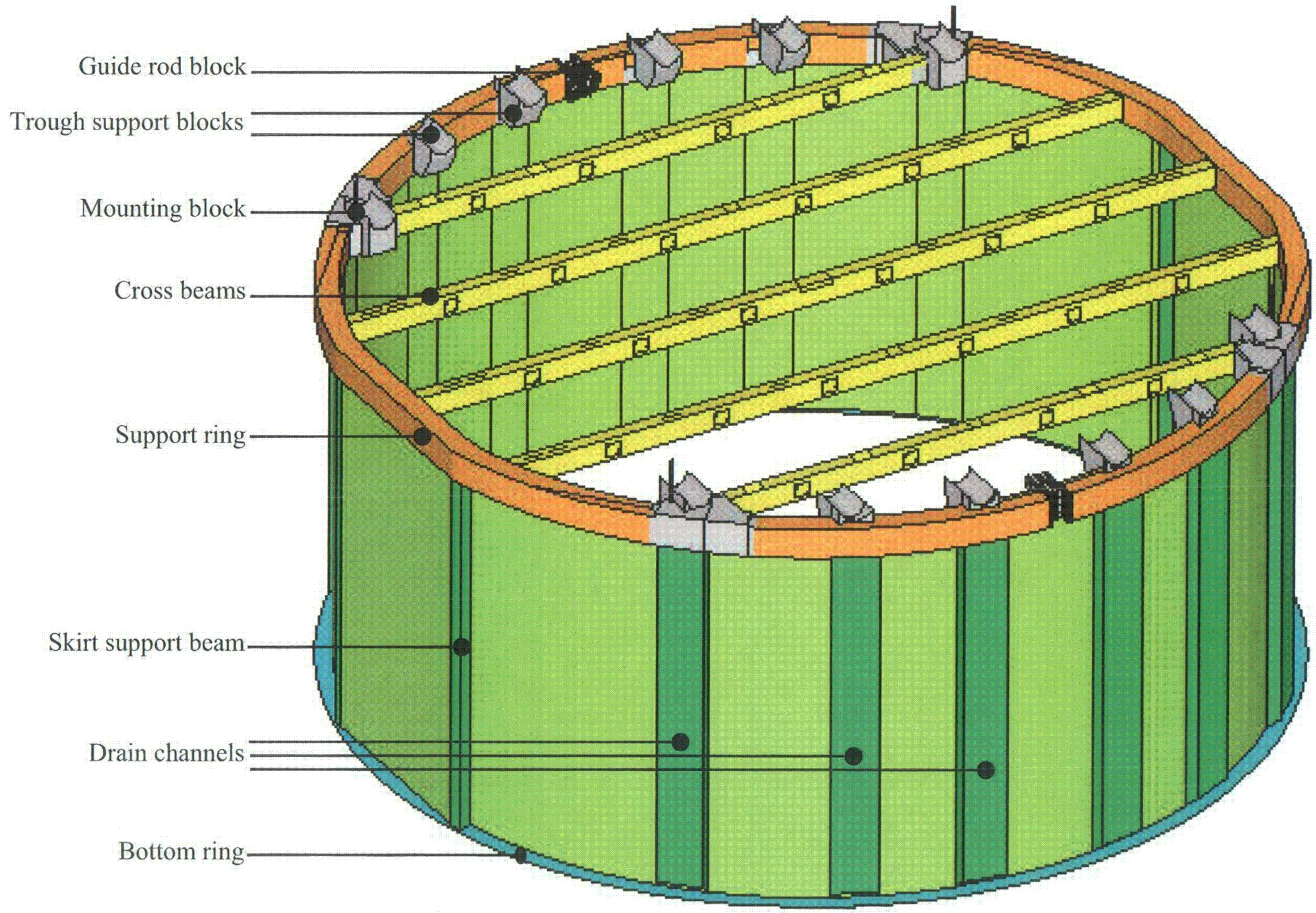
Design modifications: reinforcement in the horizontal load path





XGEN FEM (cont.)

Dryer Support Ring and Skirt

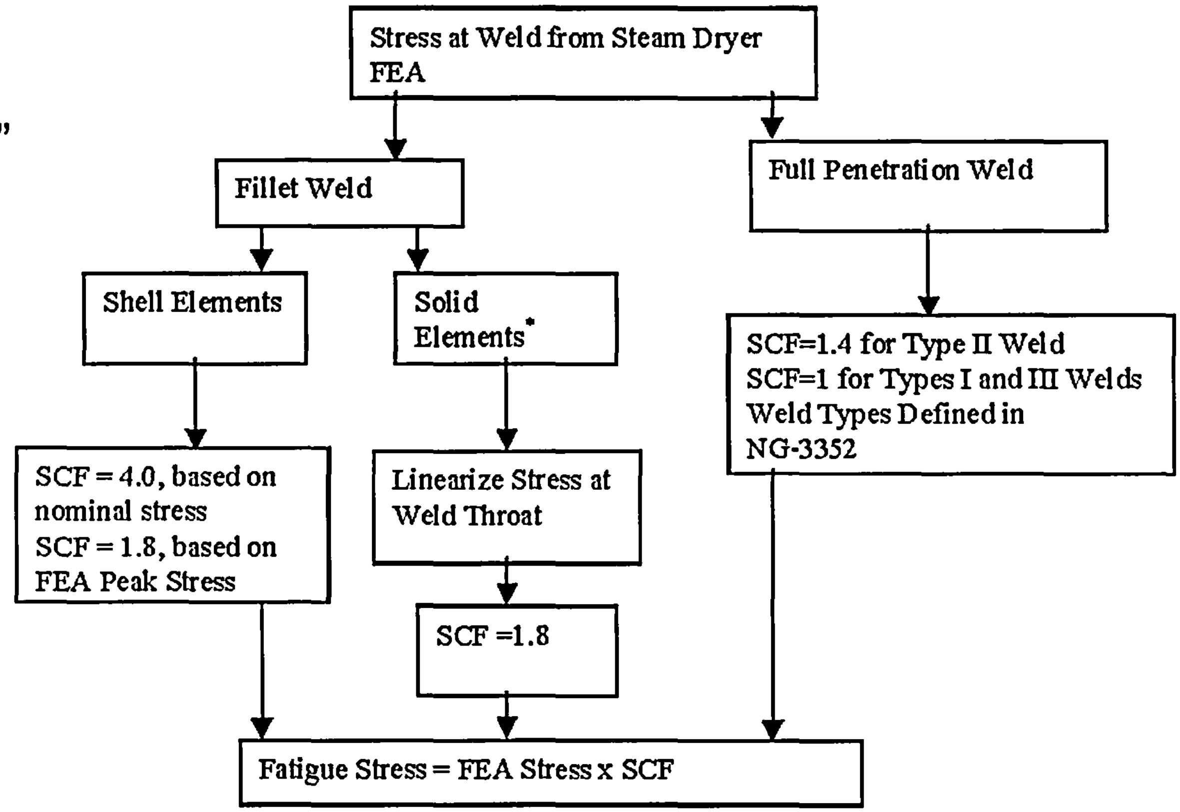


XGEN FEA

Exelon Nuclear

- Load definition
  - QC2 In-plant nominal acoustic pressure time histories
- Shell model
  - Mesh size as small as 4”
- Direct integration
  - 1% damping
  - 0.0005 sec time step

Weld Qualification

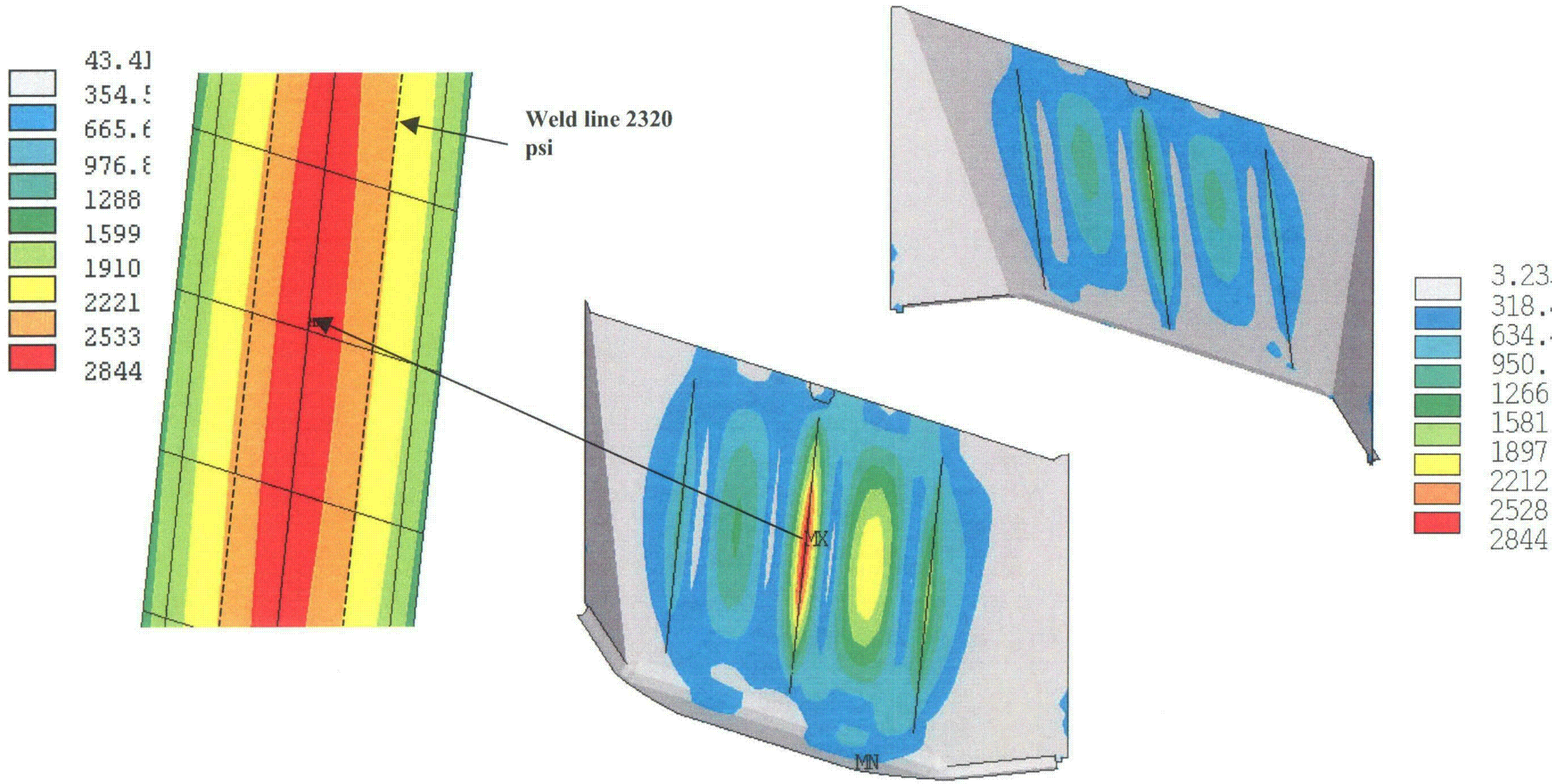


* SCF at the end of a parallel fillet weld = 2.7 (based on nominal stress)

XGEN FEA (cont.)

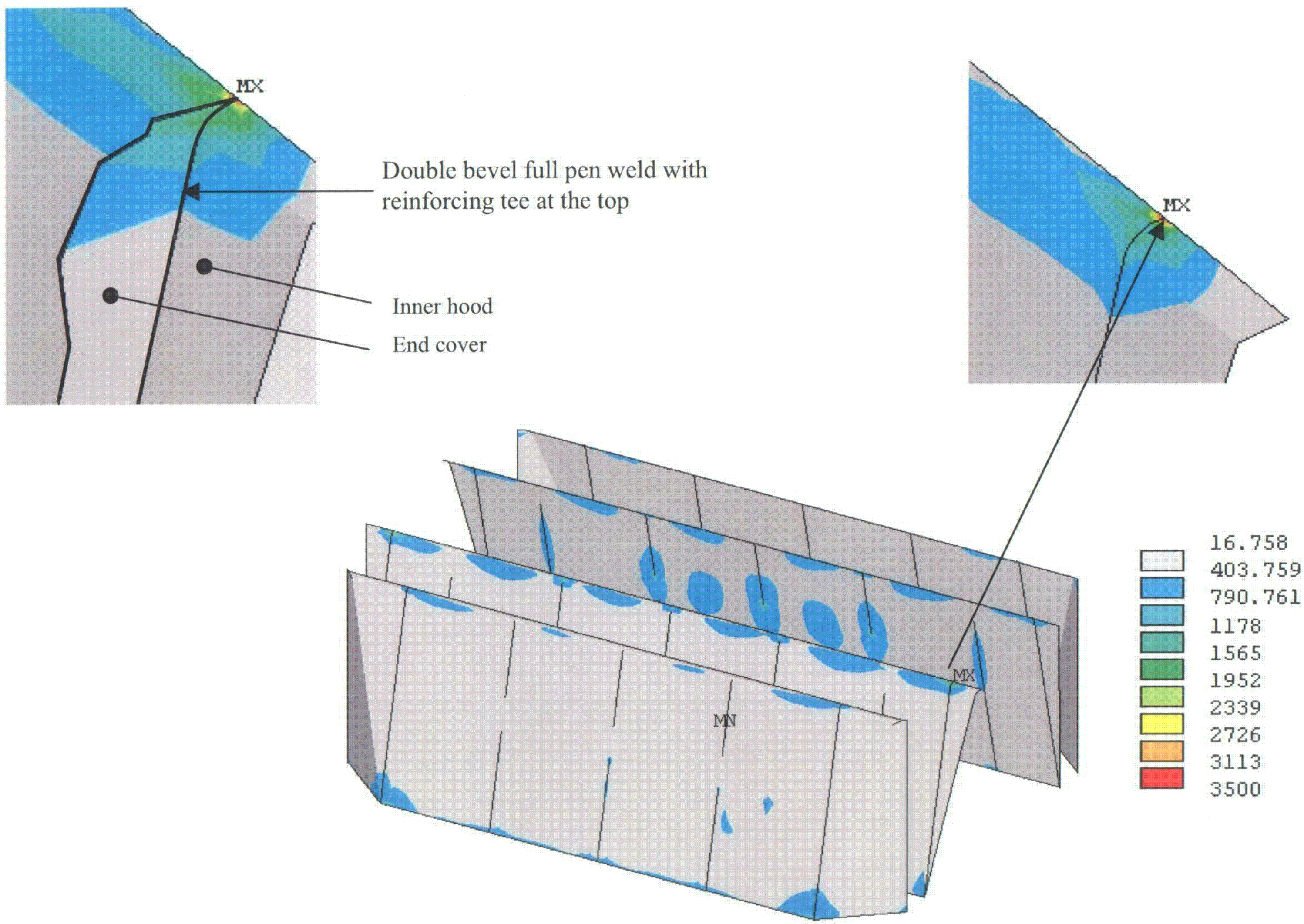
Exelon Nuclear

Outer Hood Maximum Stress Intensity



XGEN FEA (cont.)

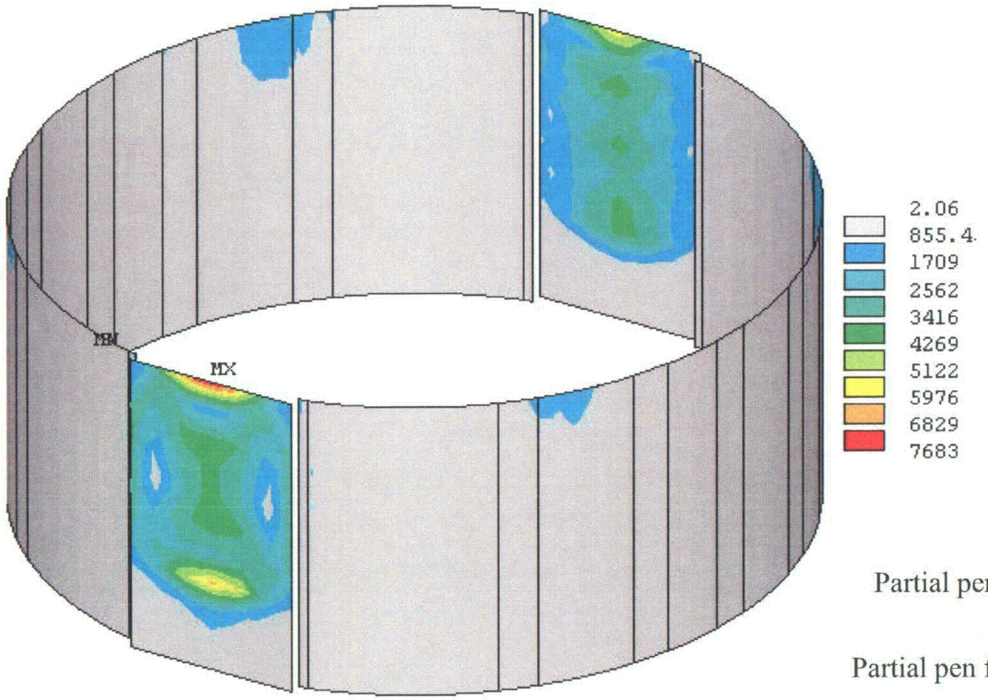
Vane Cap Maximum Stress Intensity

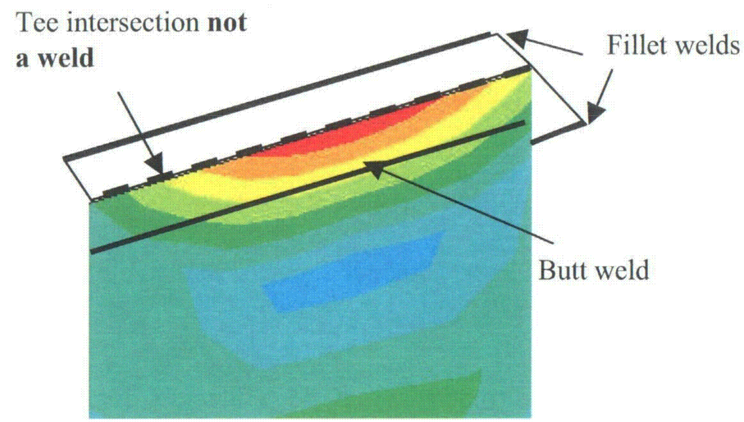


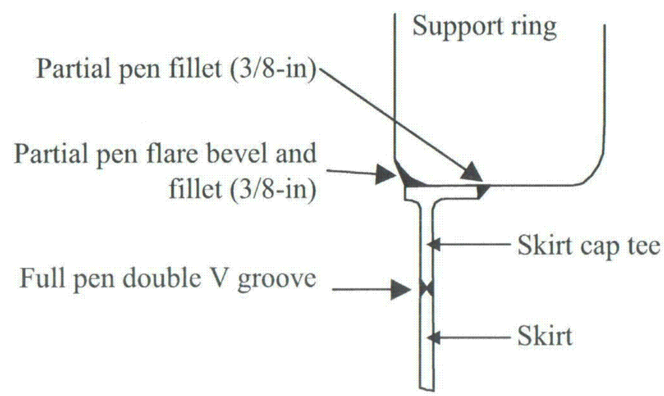
XGEN FEA (cont.)

Exelon Nuclear

Skirt Maximum Stress Intensity

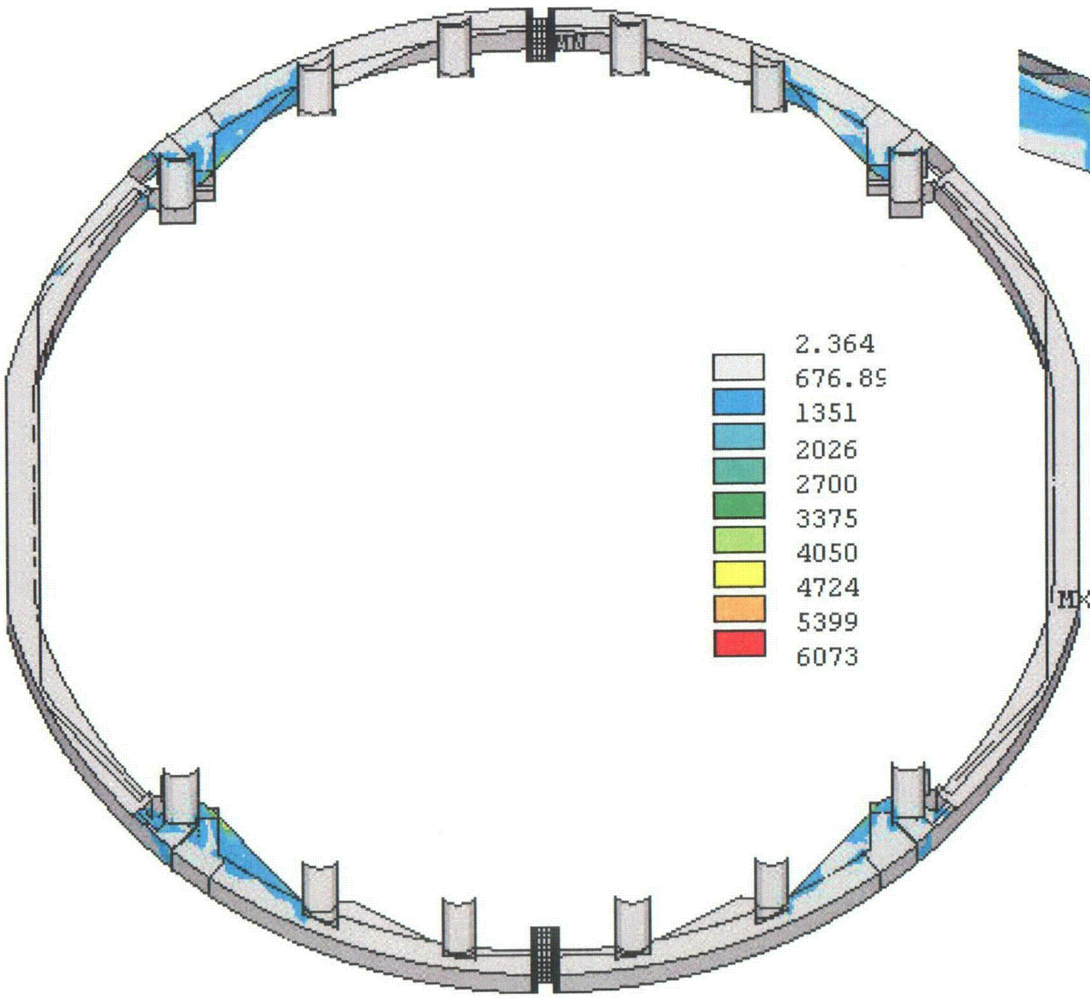


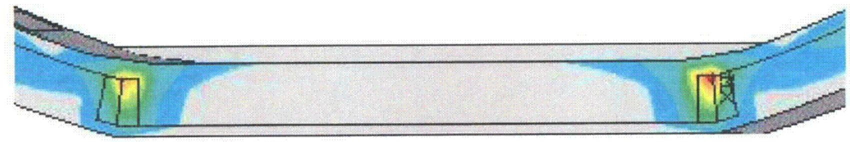


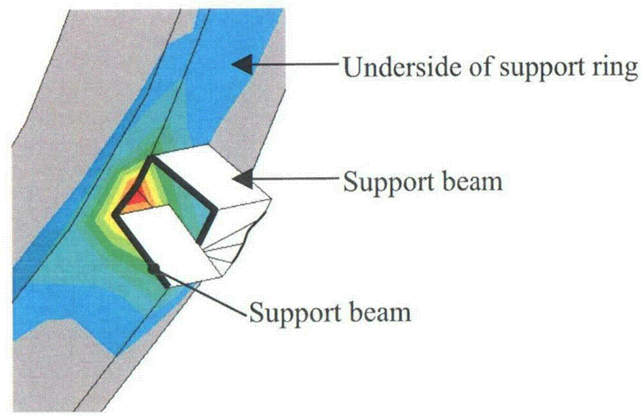


XGEN FEA (cont.)

Support Ring Maximum Stress Intensity







XGEN FEA (cont.)

Exelon Nuclear

Component	Max stress, psi	Stress Limit, psi	*Design Margin
Hoods			
Outer hoods	3982	10800	**1.71**
Inner tee – webs	4917	13600	**1.77**
Inner gussets	2741	13600	**3.96**
Support structure			
Frame beams	9207	13600	**0.48**
Cross beams	11552	13600	**0.18**
Tie beams	2926	13600	**3.65**
Trough ends	5087	13600	**1.67**
Floor plate	4689	13600	**1.90**
Skirt assembly			
Support ring	10931	13600	**0.24**
Skirt	10756	13600	**0.26**
Drain channels	8182	13600	**0.66**
Drain channel sides	9024	13600	**0.51**
Mounting block	6077	13600	**1.24**
Bank cover plate assembly	5193	13600	**1.62**
Dryer banks			
Vane cap	8285	13600	**0.64**
Vane top rail	4273	13600	**2.18**
Vane bottom rail	2700	13600	4.04
Vane inner endplate	7297	13600	**0.86**
Vane outer endplate	3816	13600	2.56

XGEN FEA (cont.)

Exelon Nuclear

	XGEN Stress Intensity (psi)	GE Stress Intensity (psi)
Outer Hood Tee flange	2844	3943
Inner Hood at Closure Plate	1578	2683
Vane Cap Center Hood at End Plate	3500	3175
Inner Hood Tee Web	3512	2964
Outer Hood Gusset	2102	3425
Skirt at Support Ring Flange	7683	10260
Inner Trough Brace	4275	2490
Outer trough Brace	862	1802
Center Support Gusset	1569	2951

XGEN FEA (cont.)

Exelon. Nuclear

- XGEN FEM is a reasonable representation of the structural characteristics of the replacement steam dryer
- XGEN stress results are within the design stress endurance limits
- Stress results are generally lower and compare reasonably well to the equivalent GE stress levels
- XGEN analysis results provide a reasonable verification of the GE analysis results
- XGEN analysis results provide added confidence that the replacement dryer is acceptable for EPU operation

Exelon
Nuclear

Steam Dryer Instrumentation

Richard Wu
General Electric

Steam Dryer Instrumentation

Exelon Nuclear

Instrumented new dryer face prior to hammer test

Startup Test Instrumentation

Exelon Nuclear

Startup Test Instrumentation (cont.)

Exelon Nuclear

Startup Test Instrumentation (cont.)

Exelon Nuclear

Startup Test Instrumentation (cont.)

Exelon Nuclear

Startup Test Instrumentation (cont.)

Exelon Nuclear

Startup Test Instrumentation
Pressure Sensors

Exelon Nuclear

Startup Test Instrumentation

Pressure Sensors (cont.)

Exelon Nuclear

Startup Test Instrumentation
Pressure Sensors (cont.)

Exelon Nuclear

Startup Test Instrumentation
Pressure Sensors (cont.)

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Pressure Sensor Mounting Bracket

Exelon. Nuclear

Startup Test Instrumentation

Pressure Sensors

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Nuclear

Startup Test Instrumentation

Pressure Sensors (cont.)

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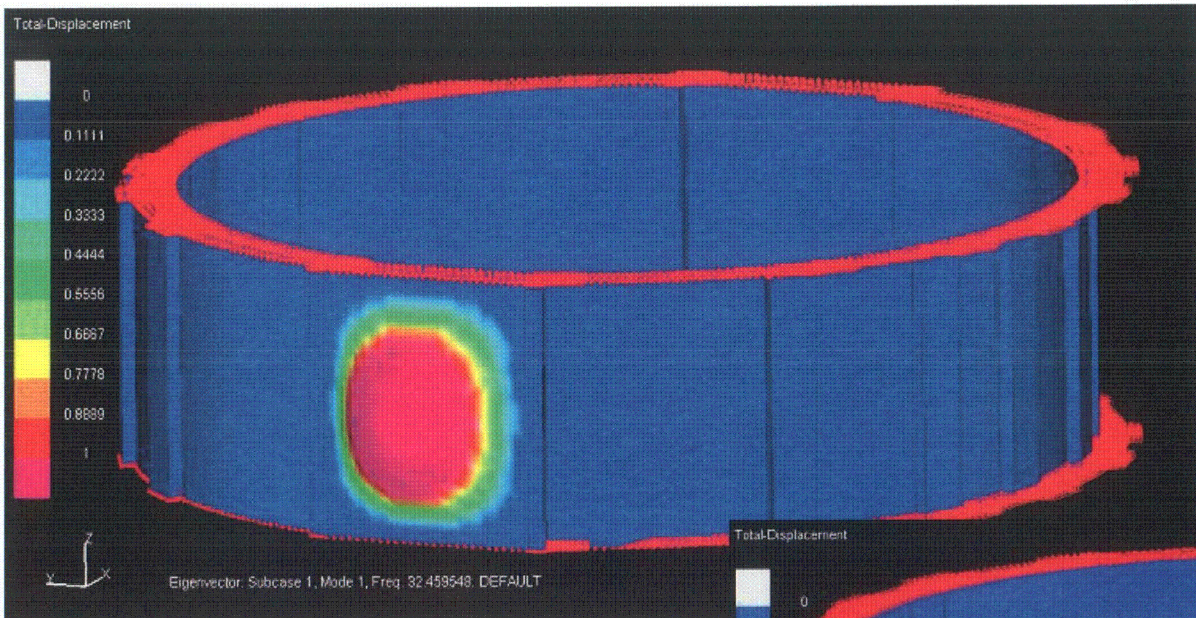
Start-Up Test Instrumentation
Weld Pads, Clamps, and Conduits

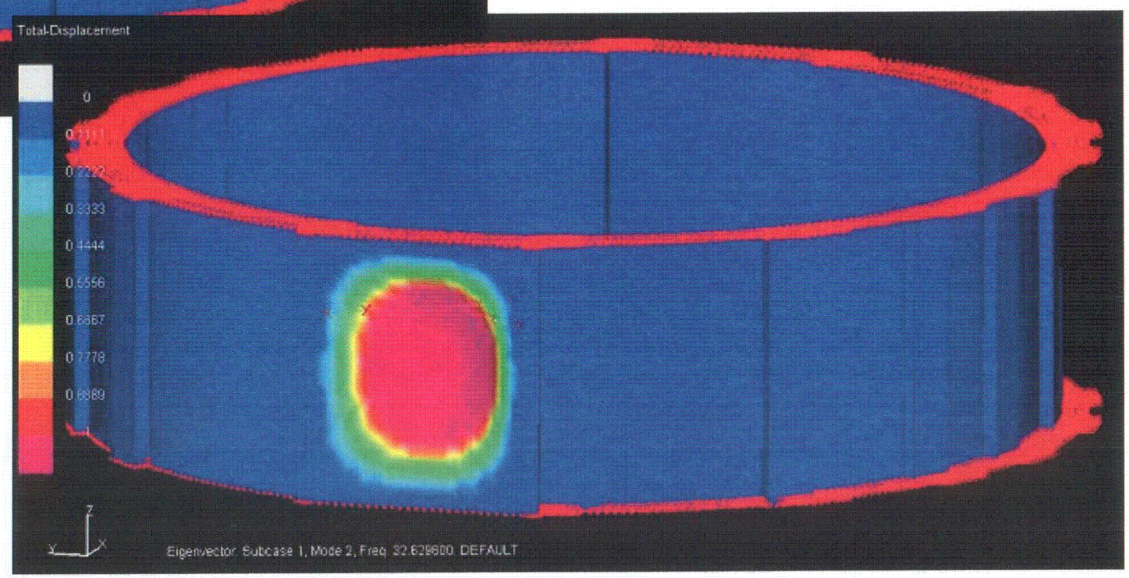
Exelon Nuclear

Mode 1

Exelon Nuclear



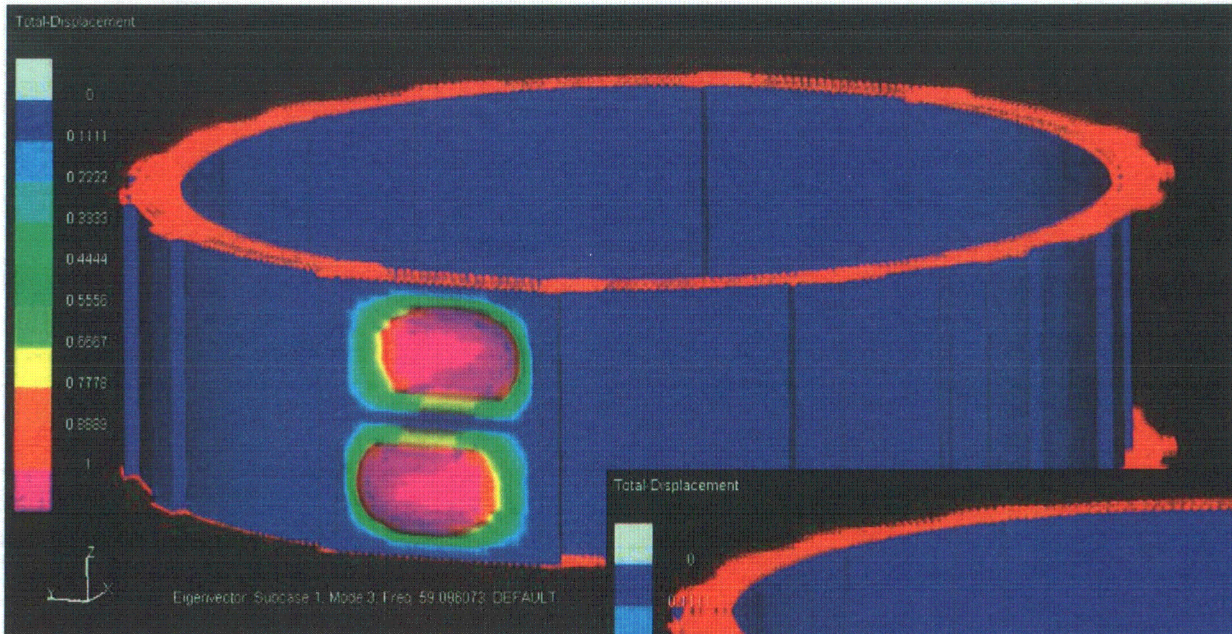
- Without conduit
- 32.46 Hz



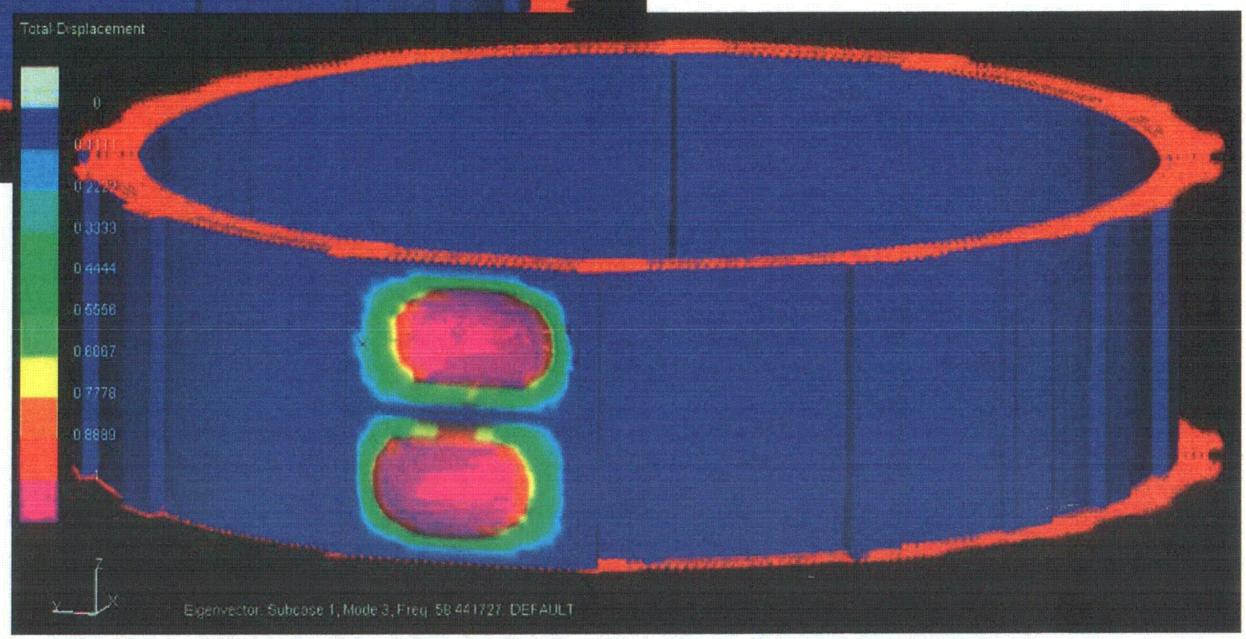
- With Instrumentation
- 32.62 Hz

Mode 2

Exelon Nuclear

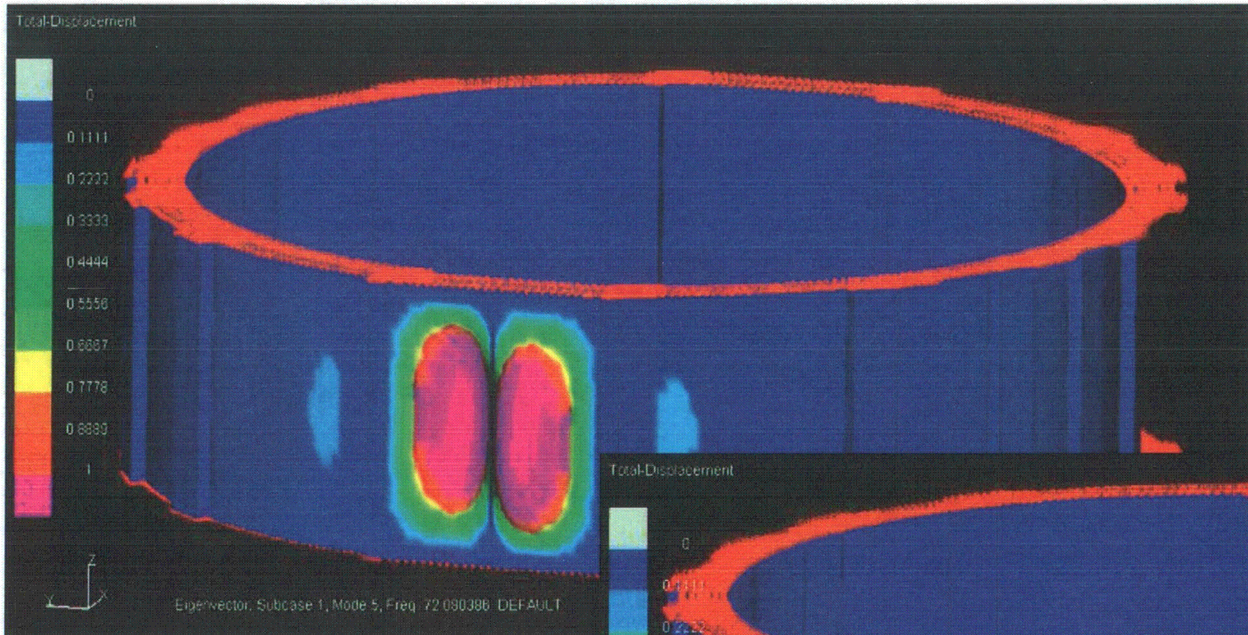


- With Instrumentation
- 58.44 Hz

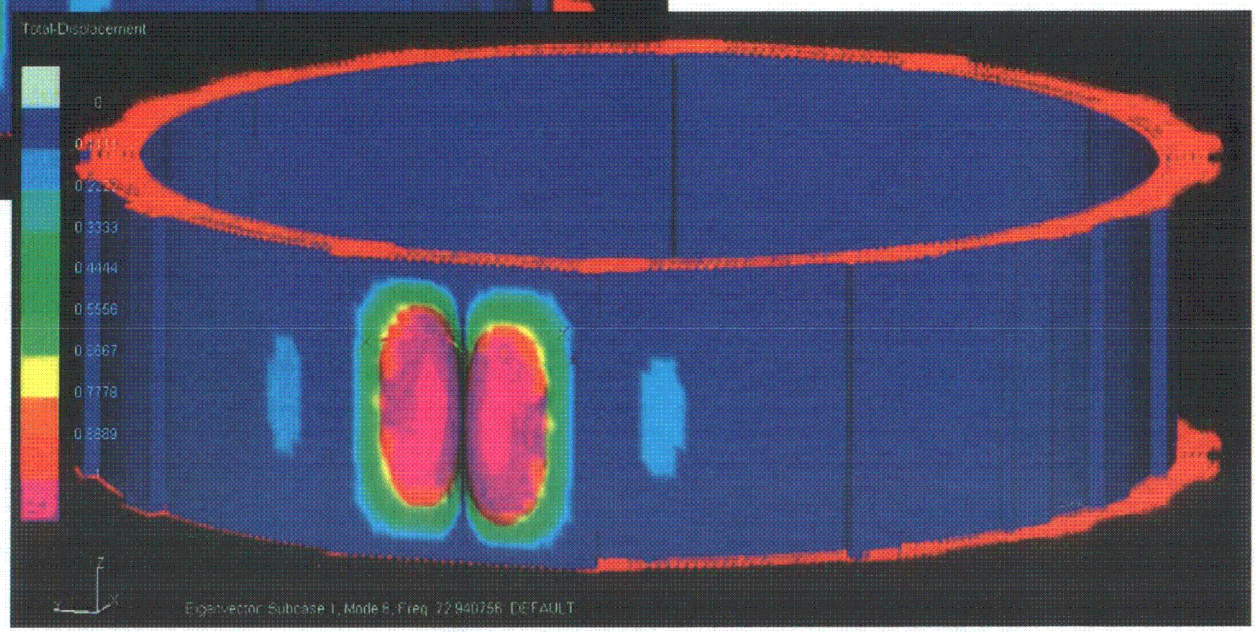


- Without conduit
- 59.09 Hz

Mode 3



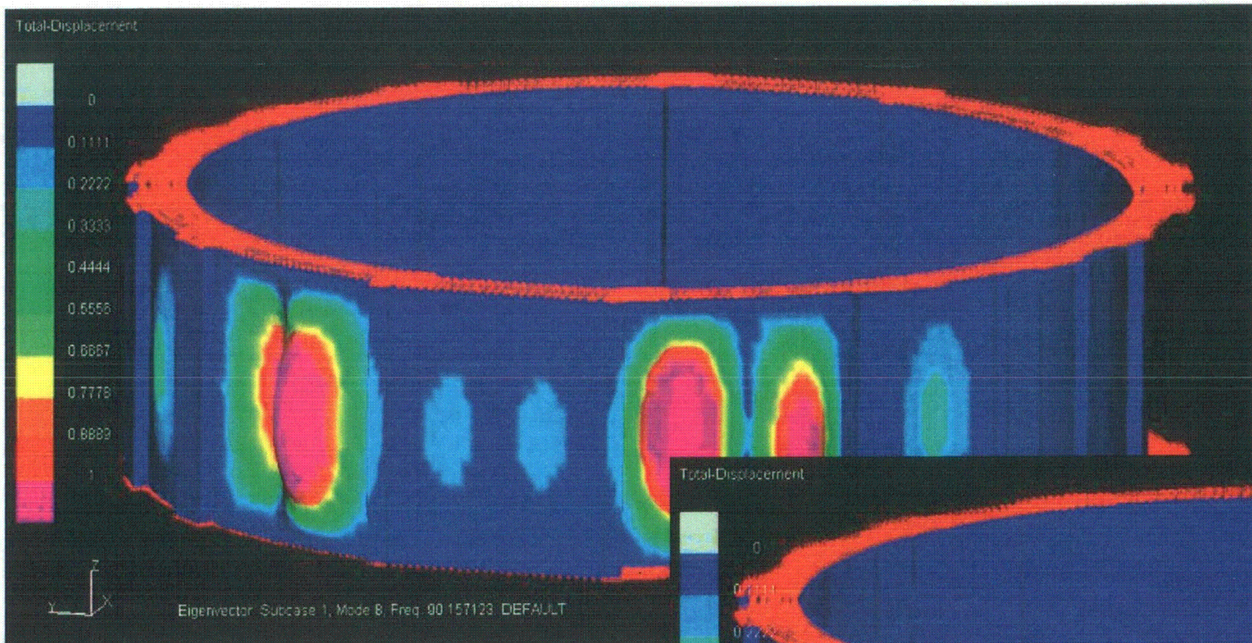
- Without conduit
- 72.08 Hz



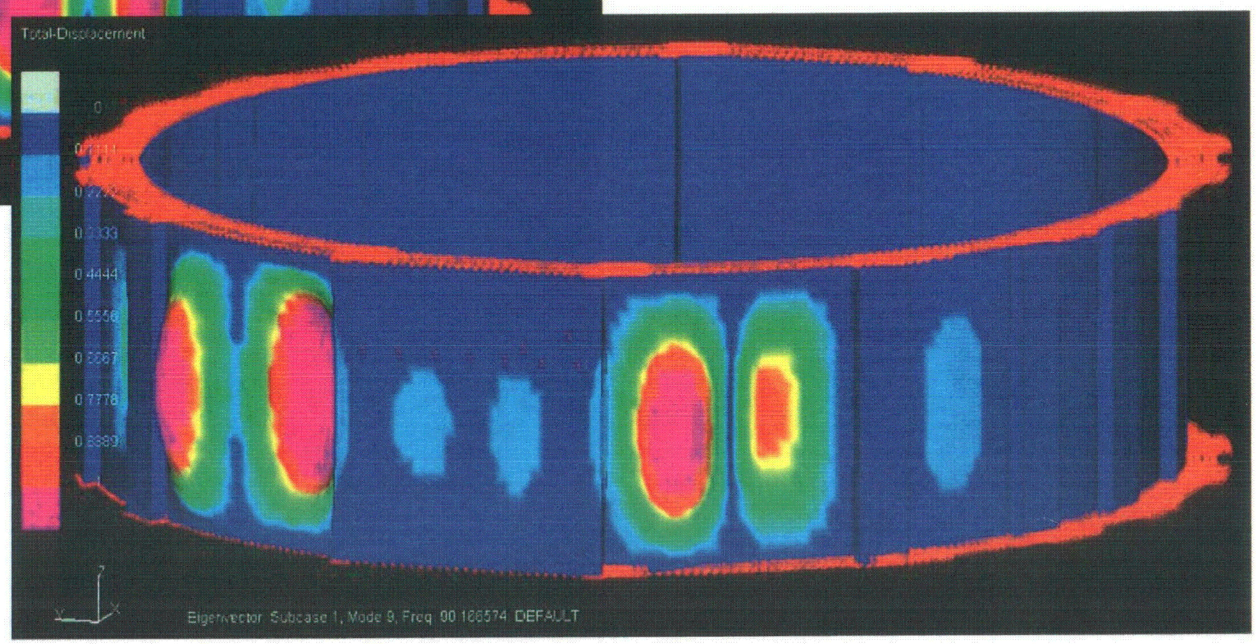
- With Instrumentation
- 72.94 Hz

Mode 4

Exelon Nuclear



- With Instrumentation
- 90.16 Hz



- Without conduit
- 90.15 Hz

Start-Up Test Instrumentation

Start-Up Test Instrumentation
Pressure Sensors

Exelon Nuclear

GE Proprietary Information

Start-Up Test Instrumentation
Accelerometers

Exelon Nuclear

Start-Up Test Instrumentation
Strain Gauges

Exelon Nuclear

Start-Up Test Instrumentation

Strain Gauges (cont.)

Exelon Nuclear

Start-Up Test Instrumentation

Strain Gauges (cont.)

Exelon Nuclear

Exelon Nuclear

Instrumentation Acceptance Criteria

Richard Wu
General Electric

Acceptance Criteria
Strain Gauges

Acceptance Criteria
Strain Gauges S1, S-3 through S-9

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Acceptance Criteria
Strain Gauges Below the Water Line (S-2)

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GE Proprietary Information

Acceptance Criteria

Sample Calculation for Hood Strain Gauge, S-3

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Acceptance Criteria

Sample Calculation for Skirt Strain Gauge, S-8

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Acceptance Criteria
Strain Gauges

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Acceptance Criteria
Strain Gauges (cont.)

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Acceptance Criteria
Pressure Sensors

Exelon Nuclear

Acceptance Criteria
Pressure Sensors (cont.)

Exelon Nuclear

Acceptance Criteria
Accelerometer

Exelon Nuclear

Acceptance Criteria
Accelerometer (cont.)

Exelon Nuclear

Acceptance Criteria
Accelerometer (cont.)

Exelon. Nuclear

- Accelerometer acceptance criteria determination for strain gauges (only in event inadequate number of strain gauges are available)
  - Above water
  - Similar process used for strain gauge criteria
  - Acceleration time history used to determine maximum value
  - Same stress normalized factor as previously defined for strain criteria is applied to maximum acceleration at the accelerometer location
  - Below water
  - Same as for above water however the modal accelerations are calculated at each of the accelerometer locations

Exelon Nuclear

Benchmarking Update

Keith Moser
Asset Management Engineer

Benchmarking ACM

Load Definition Methodology

Exelon Nuclear

Acoustic Circuit Analysis
QC2 In-Plant MSL Strain Gauge
Venturi Instrument Line

↓

XGEN FEA Benchmark Against Dryer Damage
Original Dryer Pre-EPU – Borderline
2003 Repaired Dryer EPU – Damage Predicted

↓

SMT
QC1 ACM

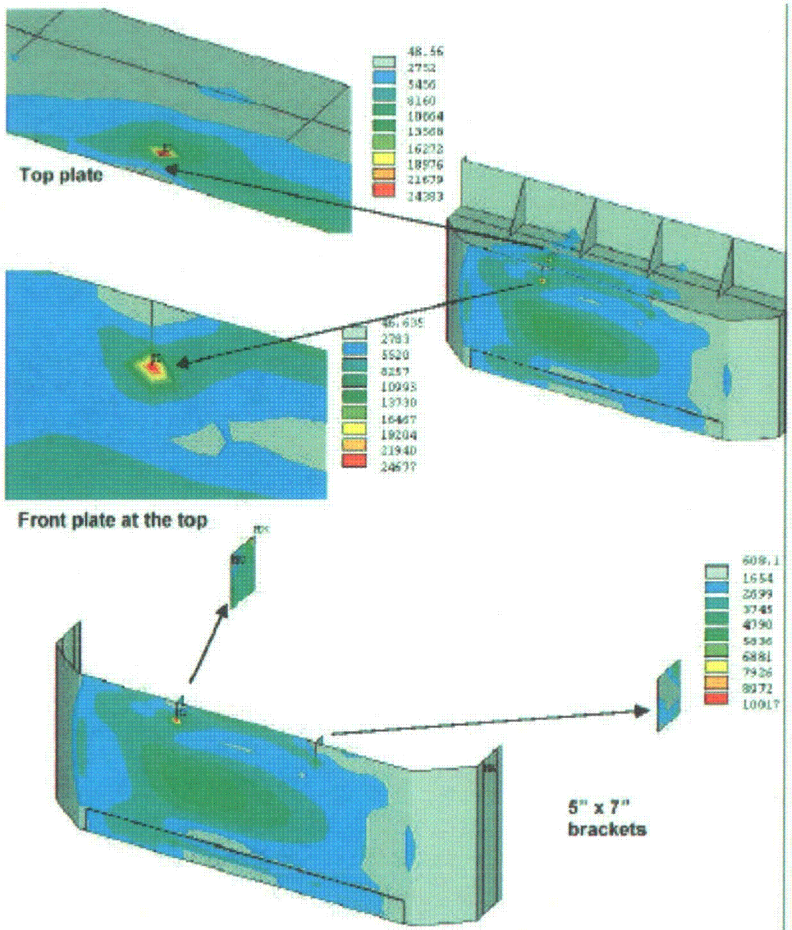
↓

Exelon Benchmark of ACM with SMT In-Vessel Dryer Microphones Produced Acceptable Results

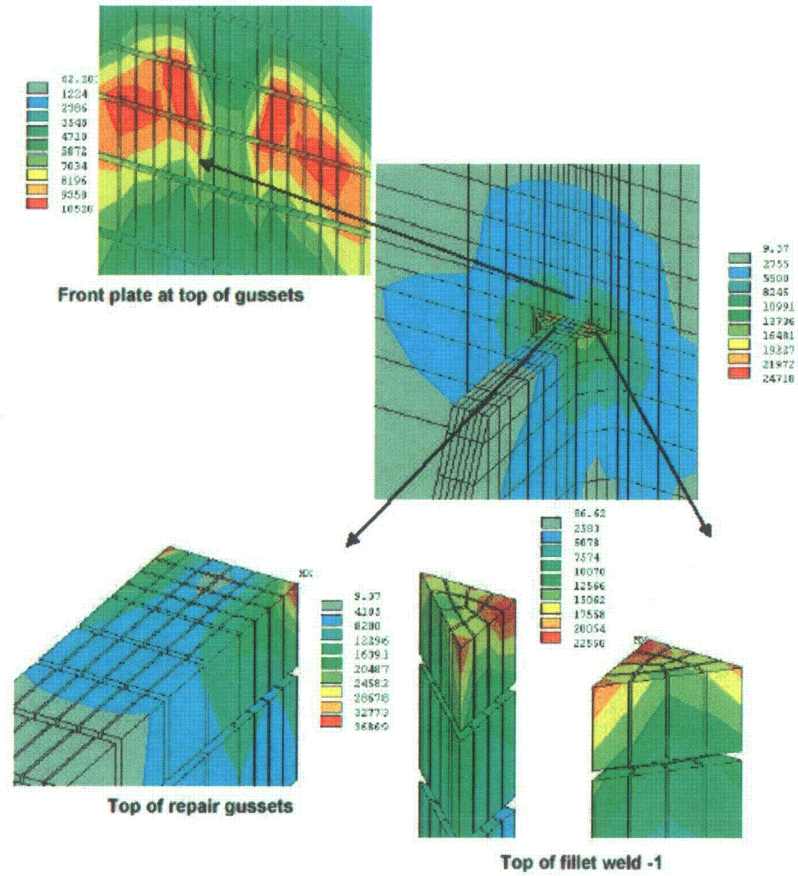
Exelon Benchmark of ACM with SMT MSL Microphones Produced Acceptable Results

XGEN FEA Benchmark

Exelon Nuclear



Original Dryer QC2 Pre-EPU
CDI Acoustic Circuit



2003 Modified Dryer QC2 EPU
CDI Acoustic Circuit

GE FEA Benchmark

Nuclear

Exelon Steam Dome Benchmark

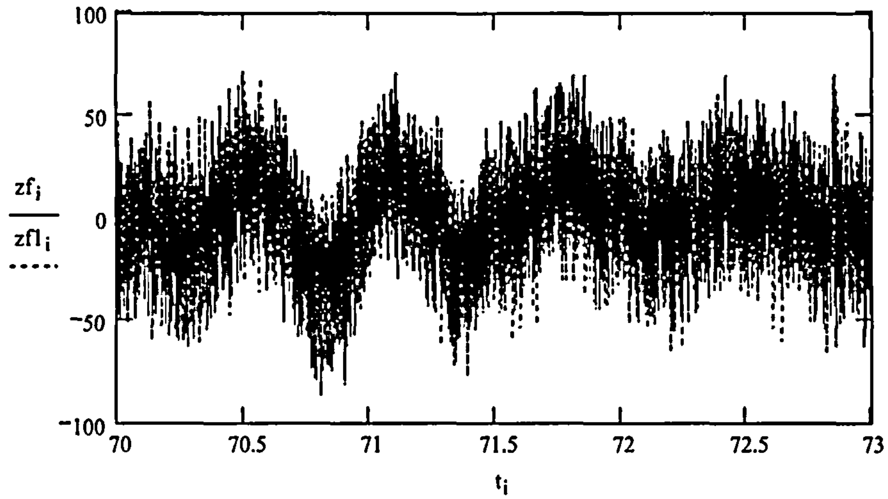
Exelon Nuclear

Comparison of Results for Data Point 21:

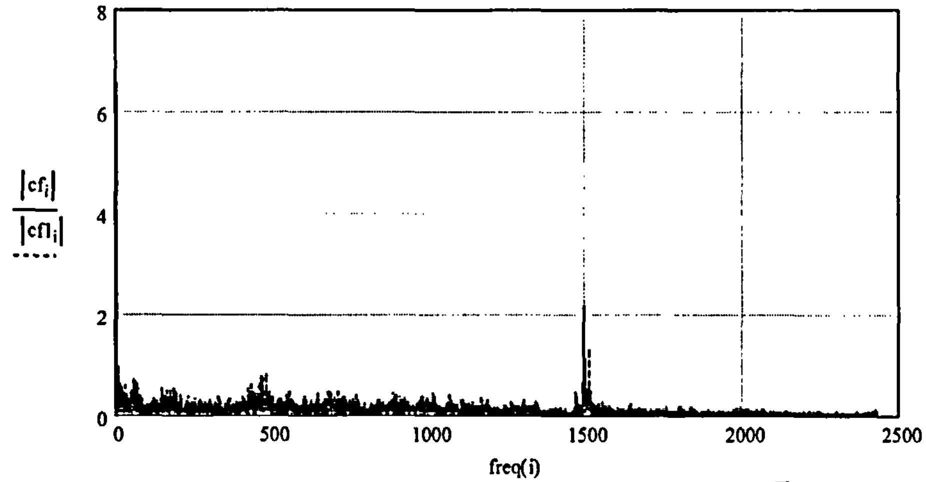
First Benchmark (No Annular Seal in CDI Model) – Data Point M21:

Raw Data M21	CDI Predicted Data M21
$\text{mean}(zf) = 3.70093\times 10^{-15}$	$\text{mean}(zfl) = 1.46813\times 10^{-15}$
$\text{Stdev}(zf) = 22.06467$	$\text{Stdev}(zfl) = 20.146$
$\max(zf) = 71.23197$	$\max(zfl) = 70.63575$
$\min(zf) = -86.15166$	$\min(zfl) = -81.85192$

Plot of Filter SMT data (Red) compared to CDI predicted data (Blue) - First Benchmark Data Point M21



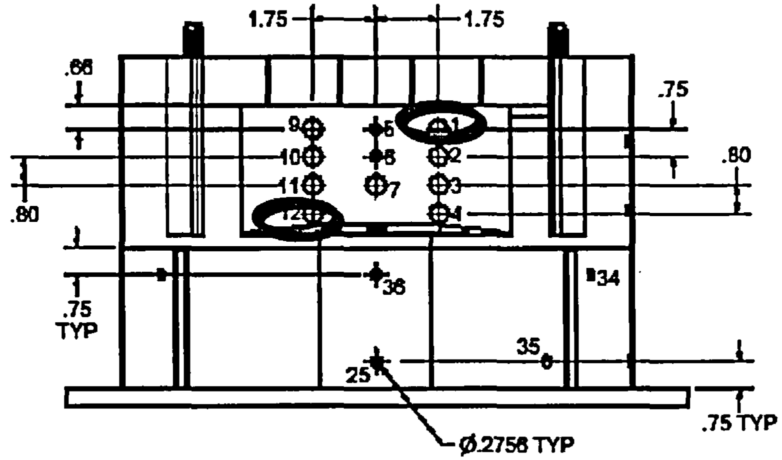
Plot of Filter SMT data (Red) compared to CDI predicted data (Blue) - First Benchmark Data Point M21



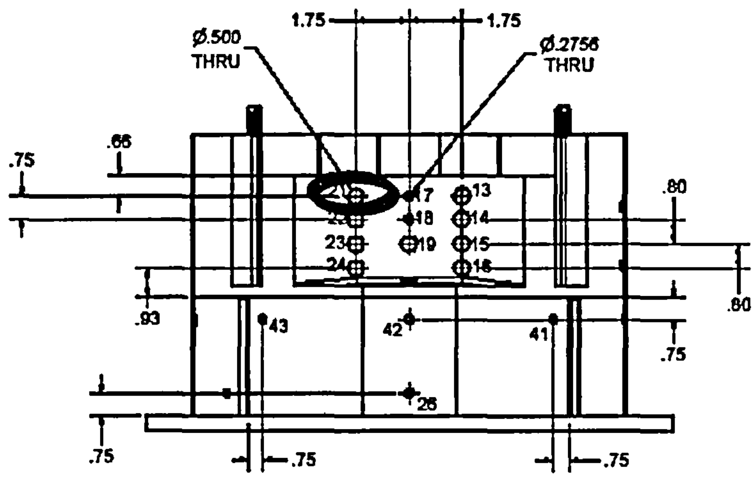
Exelon Benchmark with MSL

Exelon Nuclear

- Exelon requested additional SMT runs during the VY benchmarking effort
  - Flow rate 144 CFM Approx OLTP
  - 8 pressures measured on MSL
    - Down stream of RPV nozzle
    - Up stream of S/RVs
  - SMT of original dryer configuration
- Only 8 microphone data on MSL provided to CDI
- CDI used AC to predict pressures measured on steam dryer at 21 locations
- Locations analyzed to date
  - M1, M12, and M21



90 deg VIEW



270 deg VIEW

Exelon Benchmark with MSL

Exelon Nuclear

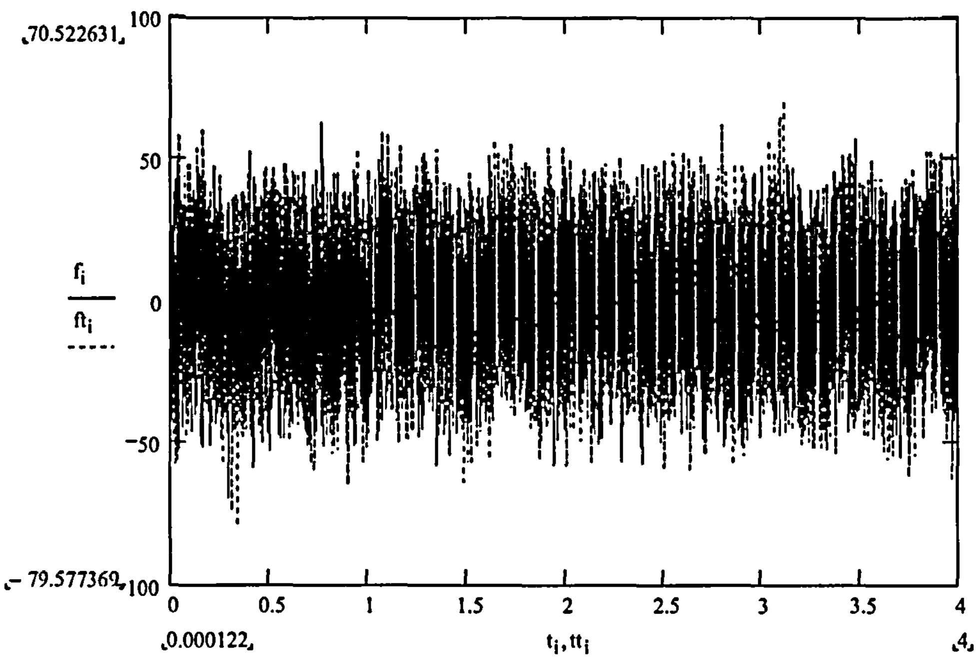
- Preliminary results
  - Two predictions provided
    - First prediction incorporated transition cone into the Hemholtz Solution for the steam dome
    - Second prediction truncated transition cone at steam dome to water interface and increased dampening

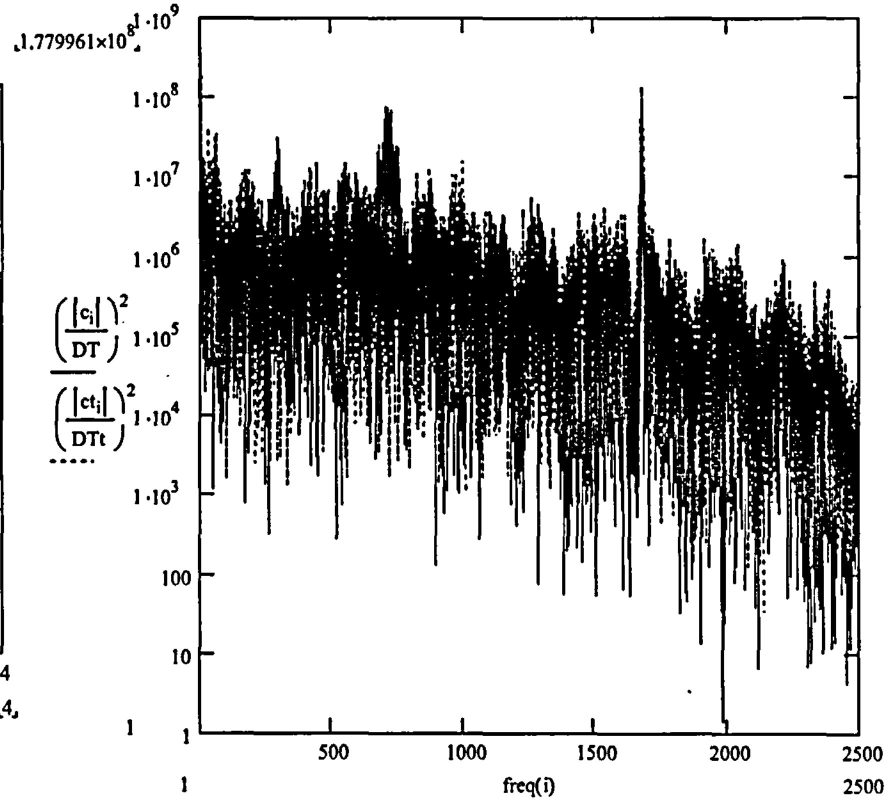
Transducers	Prediction 1	Measured	Prediction 2
M1	27.8	17.4	15.8
M12	41.7	19.1	26.4
M21	25.3	15.9	12.4

RMS (pa)

Exelon Benchmark with MSL

Exelon. Nuclear





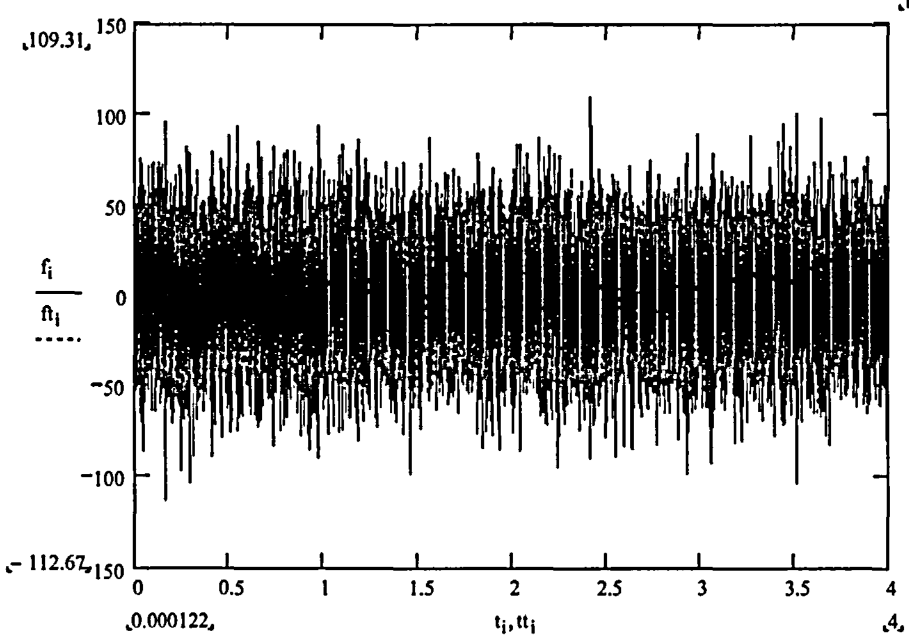
Second Prediction for M1

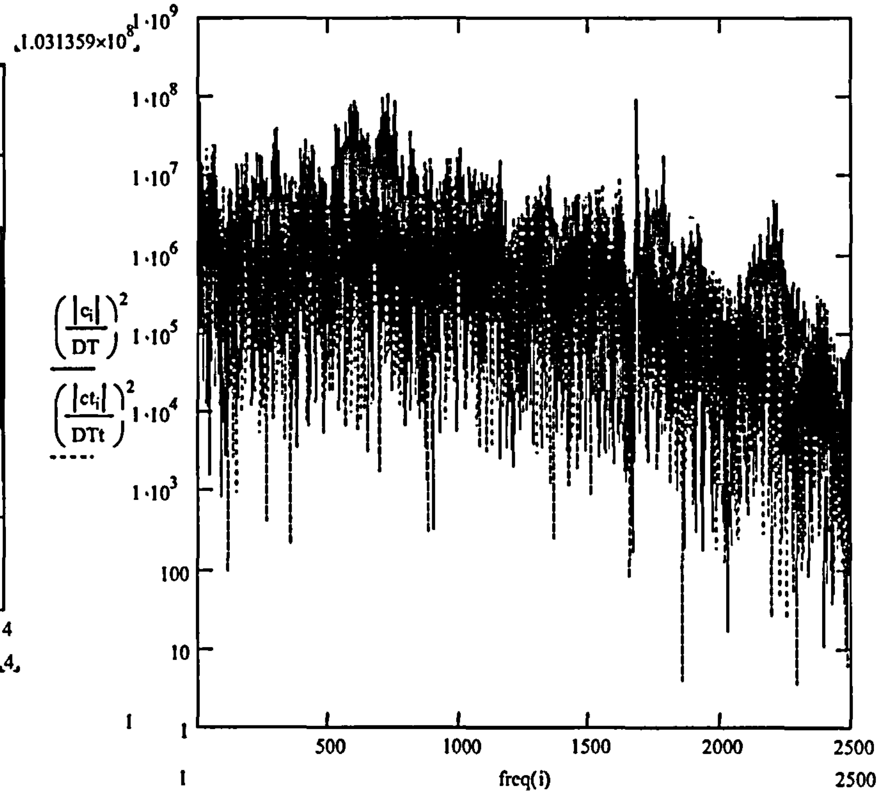
Blue is measured

Red is predicted

Exelon Benchmark with MSL

Exelon Nuclear

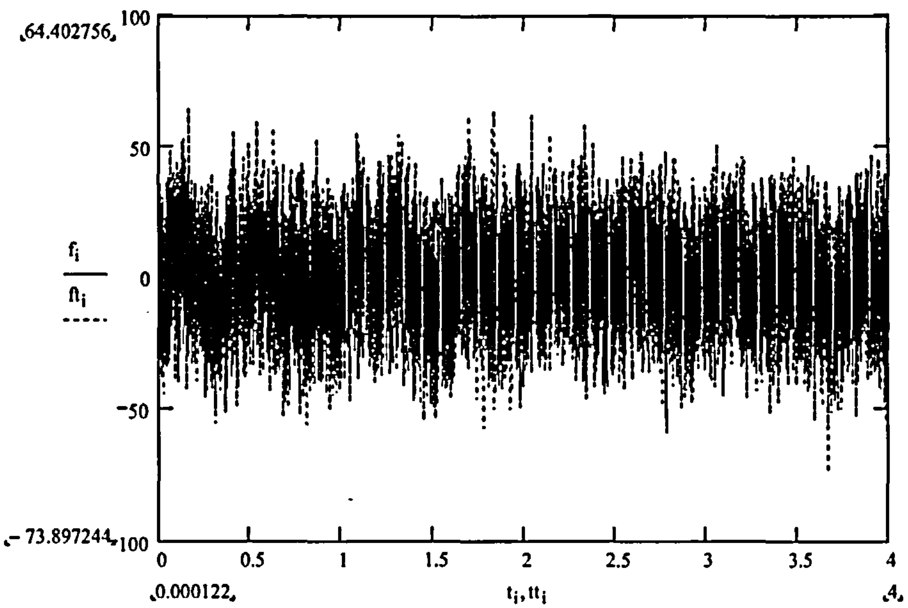


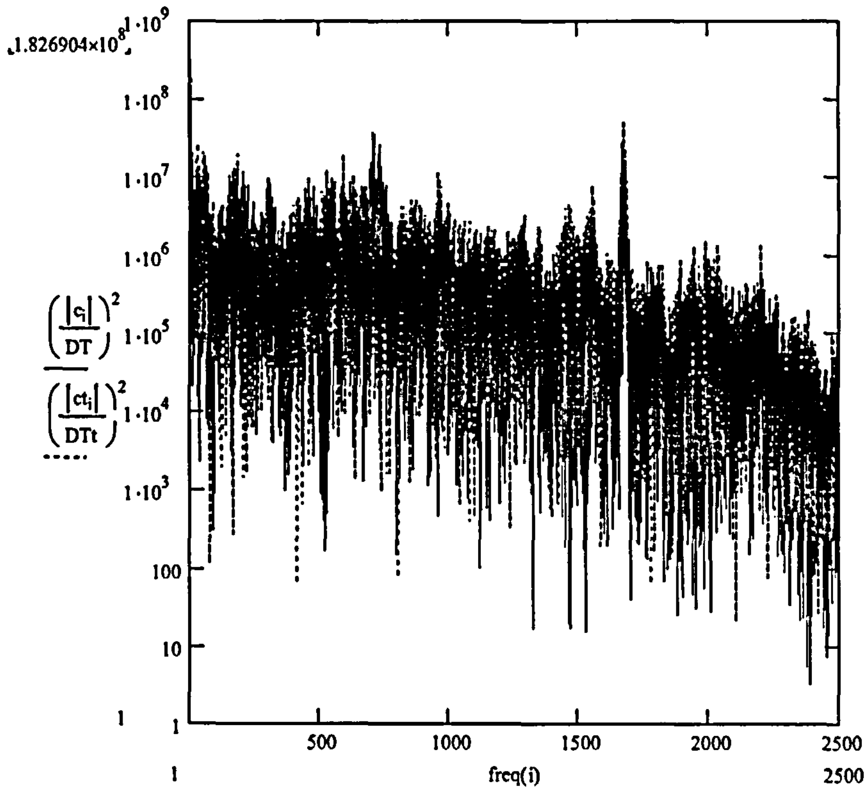


Second Prediction for M12
Blue is measured
Red is predicted

Exelon Benchmark with MSL

Exelon. Nuclear





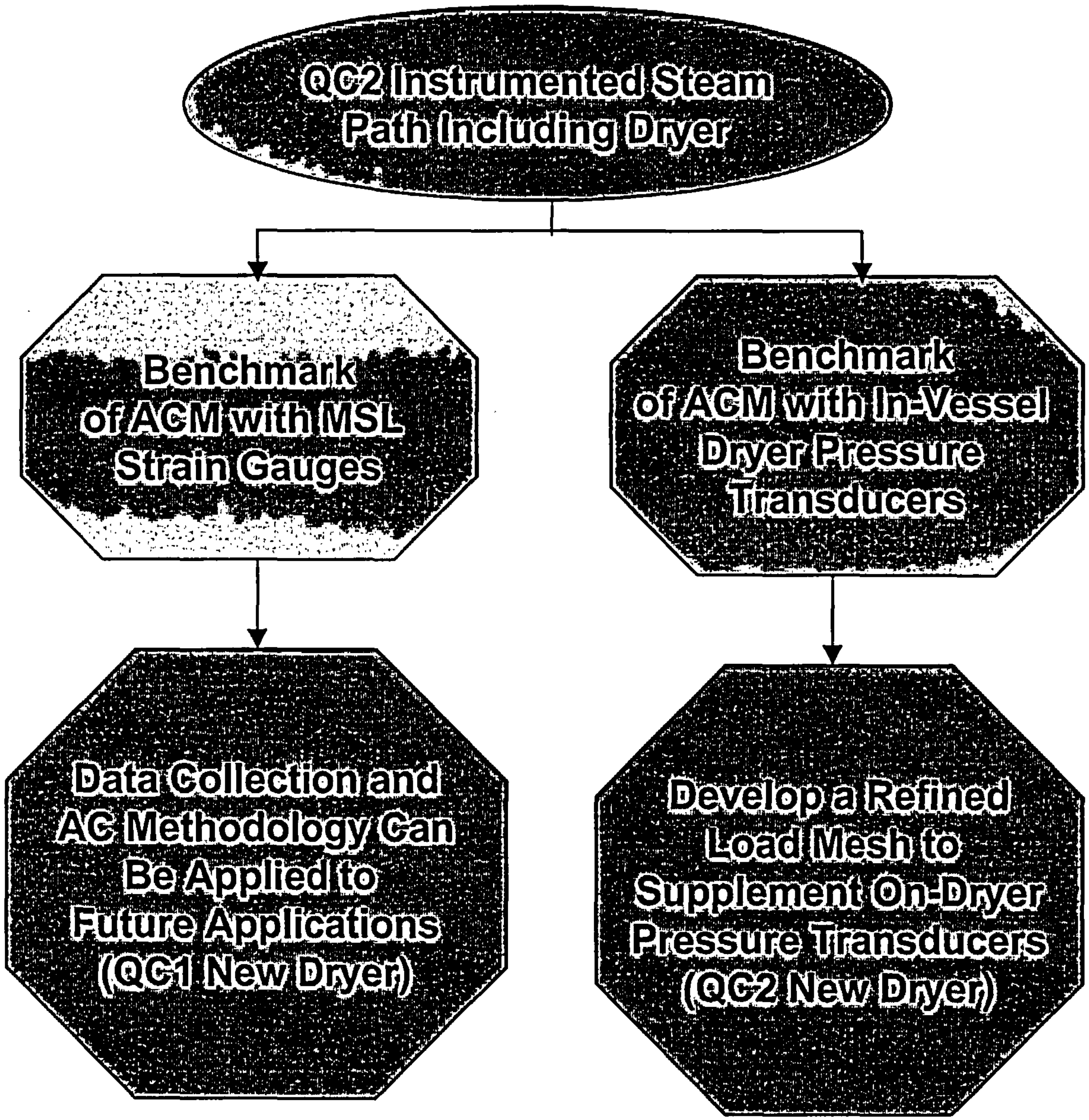
Second Prediction for M21

Blue is measured

Red is predicted

Benchmarking ACM
Load Definition Methodology (cont.)

Exelon Nuclear

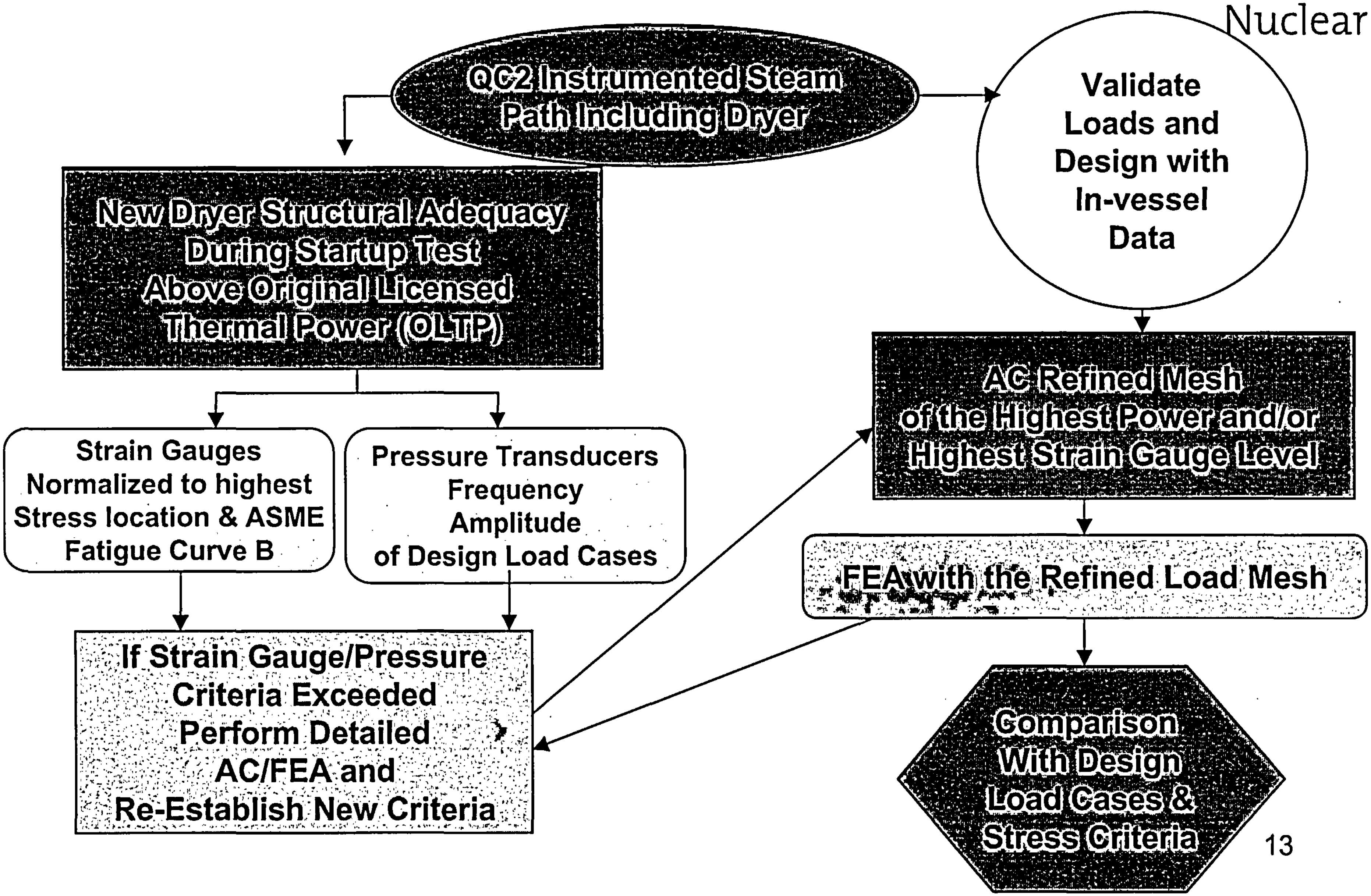


Startup Test Plan

Brian Strub
Design Engineer
Quad Cities Nuclear Power Station

QC2 Startup Test Strategy

Exelon Nuclear



Startup Test Plan
Approach

Exelon. Nuclear

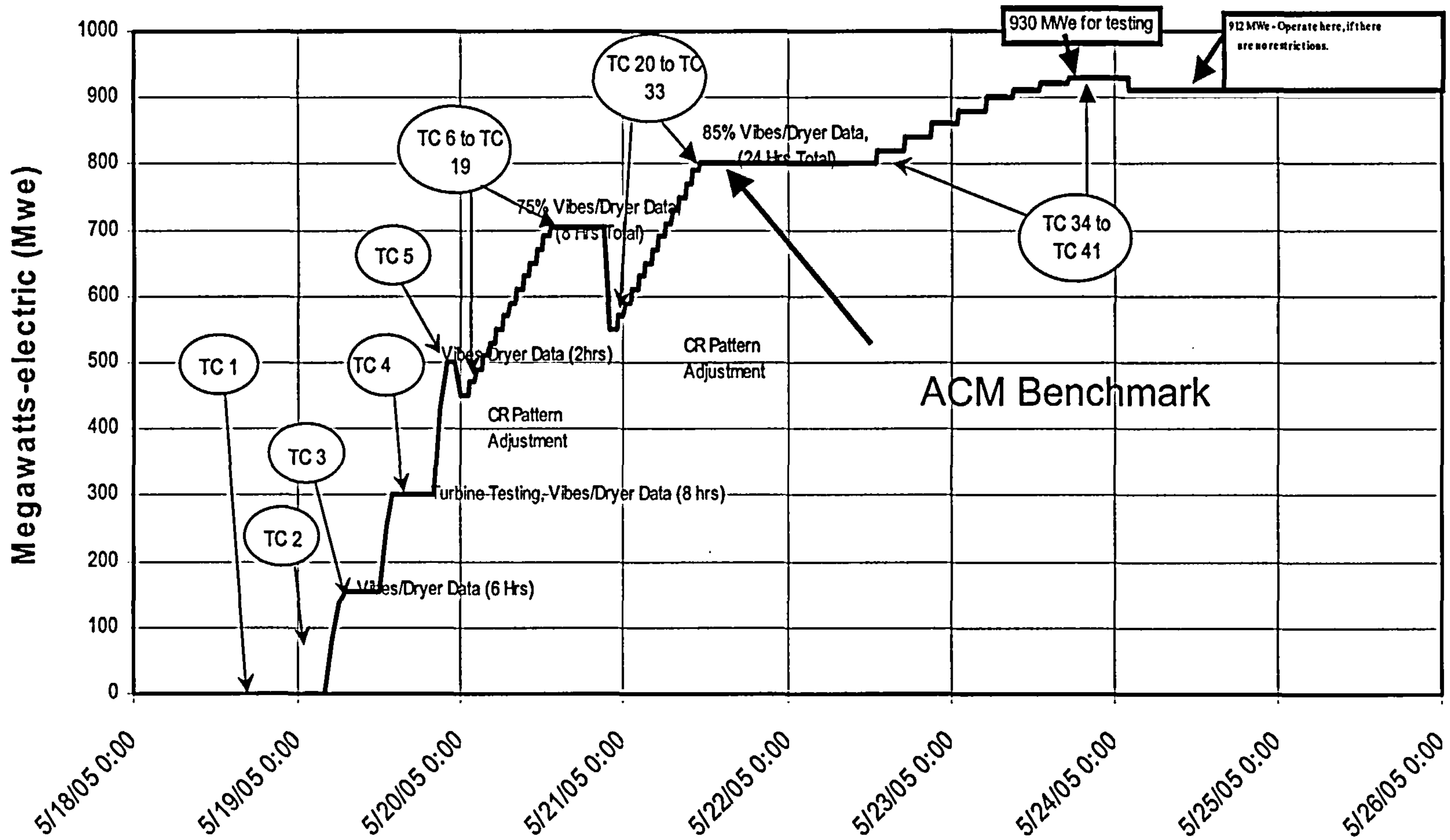
- Power will be raised to OLTP level over a 3.5-day period
  - Data will be taken at 33 Test Conditions (TCs) to this point
  - Three levels of Acceptance Criteria evaluated at each power level:
    - Plant Equipment Acceptance Limits: Normal alarm points or established equipment operating limitations based upon historical performance data
    - Level 2 Criteria: Not necessarily alter plant operation or test plan but will initiate an Issue Report (IR)
    - Level 1 Criteria: Initiate an IR and seek immediate resolution; repeat test portion to verify Level 1 can be satisfied; documented resolution within the test procedure (Examples: dryer strain gauges and moisture carryover)
  - Will have Acceptance Criteria for dryer measurements (Go/No-Go decision)
- Will then raise to EPU power level over 29-hour period (TCs 34-41)

Startup Test Plan

Approach (cont.)

Exelon Nuclear

QC2 MAY 2005 PLANNED OUTAGE STARTUP POWER ASCENSION



Startup Test Plan
Approach (cont.)

Exelon Nuclear

- Planned data measurements
  - 42 dryer sensors recorded on GE data acquisition system (DAS)
  - 3 reactor steam dome pressure sensors and 4 pressure measurements at the MSL flow venturis recorded on high speed recorders
  - 4 control valve positions recorded on high speed recorder
  - 56 strain gauges on MSLs in drywell/heater bay recorded on DAS
  - 33 accelerometers on MSLs in drywell recorded on tape drives
  - System equipment parameters recorded by computer points and by Operator rounds (approximately 1000 data points)
  - Hand held measurements for vibration levels and local temperatures

Startup Test Plan

Dryer Acceptance

Exelon. Nuclear

- The dryer will have four Acceptance Criteria:
  - Criterion A – Dryer strain gauges indicate that the peak dryer stress levels have reached ASME Fatigue Curve "B" (16,500 psi)
  - Criterion B – Dryer strain gauges indicate that the peak dryer stress levels have reached 10,800 psi for outside dryer components, or 13,600 psi for inside dryer components
  - Criterion C – Six pressure gauges on the steam dryer (actual plant pressure data) will be compared to two load case frequencies and amplitudes; load cases are the SMT and QC2 data from power accession to EPU power levels in August 2004
  - Criterion D – If less than the minimum number of strain gauges are functioning, then accelerometer criteria will be used as a backup

Startup Test Plan
Dryer Acceptance (cont.)

Exelon. Nuclear

- Criterion C will be implemented above 2511 MWt and when the strain gauges reach 50% of Criterion A
- In addition, strain gauge and accelerometer results will be trended during power ascension based on direct readings and FFT analysis
- Moisture carryover will be sampled and trended during the approach to full power; the dryer design criterion of 0.1% will be a Level 1 Criterion

Exelon Nuclear

Startup Test Plan Update

Keith Moser

Asset Management Engineer

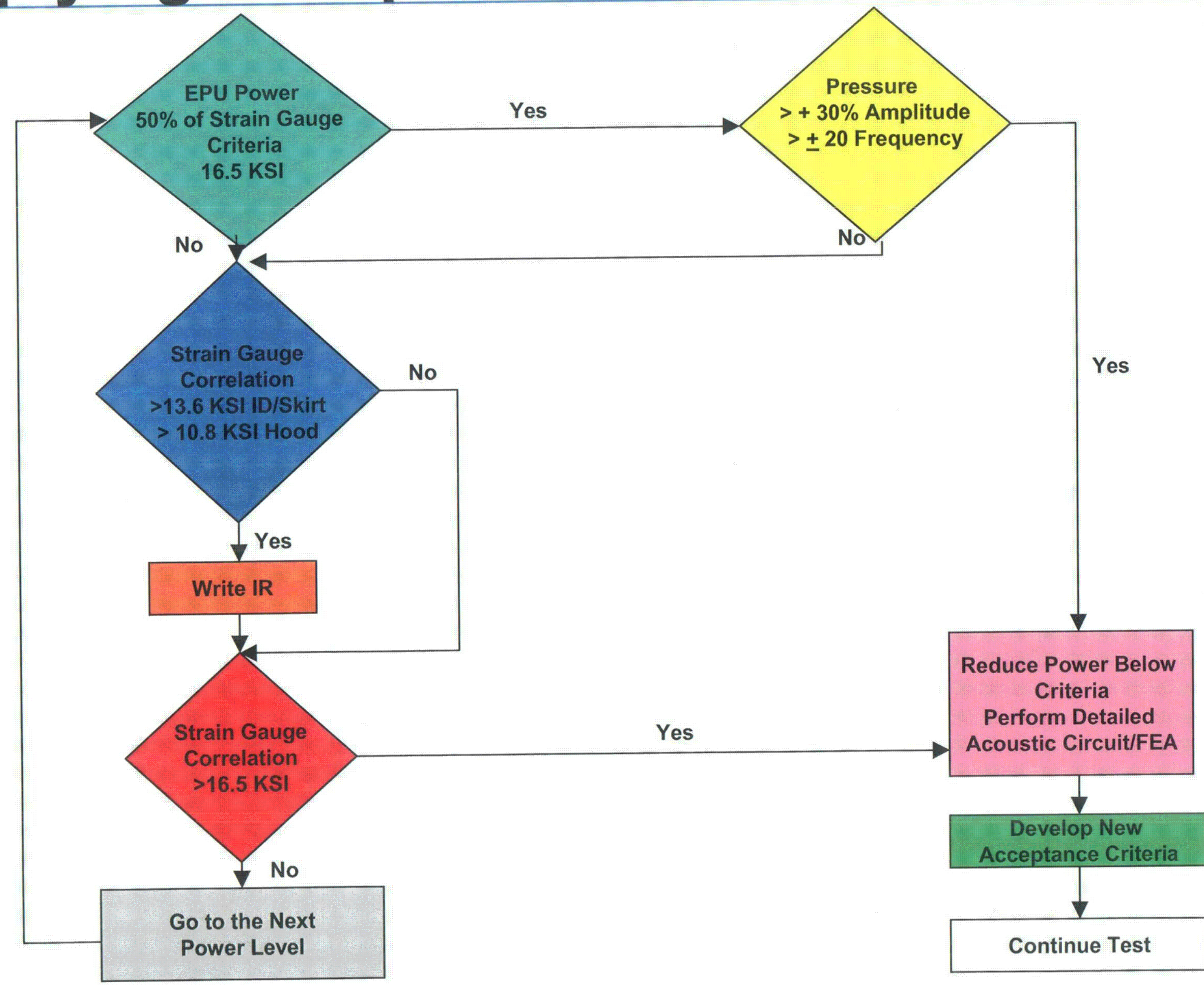
Startup Test Plan Update

Exelon Nuclear

- Incorporated comments from NRC meeting April 11 - 13, 2005, into startup plan
  - Trending strain gauge from previous power levels
    - Direct reading
    - FFT
  - Trending accelerometers
    - Direct reading
    - FFT
  - Added Level D acceptance criteria for accelerometers in the event that strain gauges fail

Applying Acceptance Criteria

Exelon Nuclear



Exelon. Nuclear

Operational Plans for QC2 and Basis

Roman Gesior
Director – Asset Management

QC2 Operational Plan

Exelon Nuclear

- Shutdown for QC2 dryer replacement outage on May 9, 2005
  - Outage duration expected to be 10 days
  - Upgrade Target Rock S/RVs
  - Replace dryer
  - Install dryer instrumentation, cabling, and data acquisition system (DAS)
  - Install steam line strain gauges
  - Confirm instrumentation operation prior to restart

QC2 Operational Plan (cont.)

Exelon Nuclear

- Execute Startup Test Plan
  - Expect to be at full pre-EPU power (2511 MWt) ~ May 21
  - Expect to reach full EPU power (2957 MWt or 930 MWe) ~ May 23
    - Operate at this level 5 – 8 hours to collect data
  - Return to 912 MWe ~ May 24
  - Confirm acoustic circuit analysis results demonstrate reasonable loads
  - Confirm dryer qualification through FEA of instrumented dryer pressure gauge information
- Operate remainder of cycle at 912 MWe
    - Within any limitations identified during startup test
  - Continue to monitor strain gauge data throughout the cycle as thermal power increases due to environmental factors to confirm dryer stress is bound by predictions

QC2 Operational Plan Basis

Exelon. Nuclear

- Rigorous steam dryer qualification provides confidence in integrity at EPU operation
  - Design philosophy that minimizes FIV susceptibility
  - Diverse loads applied to conservatively bound uncertainty
    - QC1 SMT
    - QC2 In-plant loads
  - Diverse and comprehensive FEMs conservatively bound analysis uncertainty
    - Solid models
    - Weld evaluations
  - Load frequency sensitivity analysis to address model uncertainties
    - Each model run with nominal and +/- 10% shift in time step
  - Hammer test reduces uncertainty in as-built dryer frequency and damping

QC2 Operational Plan Basis (cont.)

Exelon Nuclear

- Startup test plan
  - Instrumented dryer data to confirm analysis load inputs (e.g., frequency and amplitude)
  - Dryer strain gauge data to confirm stress levels remain bounded by predictions
  - MSL strain gauges will be used to confirm acoustic circuit loads are reasonable
  - Dryer data will be trended to address unexpected change in key monitored parameters (e.g., pressure and strain)
  - If Criteria A are exceeded, power will be reduced

QC2 Operational Plan Basis (cont.)

Exelon Nuclear

- Startup test plan (cont.)
  - Monitoring of reactor parameters for timely identification of issues
  - Other plant equipment will also be monitored to identify adverse conditions (e.g., ERVs, Target Rock S/RV, B MSL, B MSIV, High Pressure Coolant Injection (HPCI) valve actuator)
  - Moisture carryover

QC2 Operational Plan Basis (cont.)

Exelon Nuclear

- Conclusions
  - Conservative design
  - Extensive evaluations
  - Detailed startup test plan
- Exelon has taken the necessary steps for safe EPU operation of QC2

Exelon Nuclear

Operational Plans for QC1 and Bases

Roman Gesior

Director – Asset Management

QC1 Operational Plan

Exelon Nuclear

- Outage to replace steam dryer expected last week of May 2005
  - Outage duration expect to be ~6 days
- Expect to execute a startup test plan similar to QC2 without dryer instrumentation
  - Power ascension to 912 MWe
  - No dryer instrumentation installed
  - MSL strain gauges will be installed to confirm, using acoustic circuit analysis, that dryer loads remain reasonable
- Power operation for remainder of cycle at 912 MWe if no limitations identified during startup test or from QC2 instrumented dryer results

QC1 Operational Plan Basis

Exelon Nuclear

- QC1 dryer qualification is equally as robust as QC2
- Same design as QC2
- No evidence that QC1 loads are greater than QC2
- SMT loads obtained with QC1 configuration
- MSL strain gauge data will be acquired
  - Acoustic circuit analysis will be performed to confirm dryer loads are consistent with those used in FEA
  - Acoustic circuit analysis method will be evaluated during startup testing of QC2

Exelon Nuclear

Summary of Commitments for EPU Operation

Patrick Simpson
Manager – Licensing

Regulatory Commitments – QC2

Exelon Nuclear

- After dryer replacement, operation at EPU power levels will continue while detailed evaluations of the instrumented data are performed, if the Startup Test Plan acceptance criteria (i.e., go/no-go decision) are met
  - If the detailed evaluations are not completed within 60 days of data collection at 930 MWe, power will be reduced to OLTP until the evaluations are completed
- EGC will obtain NRC approval for long-term EPU operation of QC2
- EGC will conduct daily monitoring of MCO and other key reactor and plant parameters while operating at full power
  - If indications of dryer damage or structural integrity concerns are identified, power will be reduced to OLTP and the issue will be evaluated in accordance with the corrective action process
- During the Spring 2006 refueling outage for QC2:
  - EGC will perform a general visual inspection of the RPV internals, steam, and feedwater systems, including inspection and disassembly if needed of the most susceptible components, which include ERVs
  - EGC will conduct an inspection of the QC2 dryer using BWRVIP inspection guidance

Regulatory Commitments – QC1

Exelon. Nuclear

- After dryer replacement, operation at EPU power levels will continue while detailed evaluations of the QC2 instrumented data are performed
  - If the QC2 detailed evaluations are not completed within 60 days of data collection at 930 MWe, QC1 power will be reduced to OLTP until the evaluations are completed
- EGC will obtain NRC approval for long-term EPU operation of QC1
- EGC will conduct daily monitoring of MCO and other key reactor and plant parameters while operating at full power
  - If indications of dryer damage or structural integrity concerns are identified, power will be reduced to OLTP and the issue will be evaluated in accordance with the corrective action process
- During the Spring 2007 refueling outage for QC1, EGC will conduct an inspection of the QC1 dryer using BWRVIP inspection guidance

Regulatory Commitments – DNPS

Exelon. Nuclear

- EGC will conduct daily monitoring of MCO and other key reactor and plant parameters while operating at full power
  - If indications of dryer damage or structural integrity concerns are identified, power will be reduced to OLTP and the issue will be evaluated in accordance with the corrective action process
- During the Fall 2005 refueling outage for D2:
  - EGC will perform a general visual inspection of the RPV internals, steam, and feedwater systems, including inspection and disassembly if needed of the most susceptible components, which include ERVs
  - EGC will conduct an inspection of the D2 dryer using BWRVIP inspection guidance
    - Results will be evaluated, considering the analytical work done to date, to determine appropriate action for D3
    - Evaluation results and plans for D3 (e.g., potential need for mid-cycle outage) will be shared with the NRC within one month of completion of the Fall 2005 refueling outage for D2
  - EGC will attempt to locate and retrieve the lost D2 feedwater sample probe

Regulatory Commitments

Exelon. Nuclear

- EGC will evaluate the AC model using the MSL strain gauge data without bias from the QC2 instrumented dryer test data, and take appropriate action in response to the application of the test results to the DNPS dryers. EGC will share the predicted QC2 dryer loads based on the AC model using the MSL strain gauge data with the NRC for comparison to the actual QC2 loads obtained from the instrumented dryer. EGC will meet with the NRC technical staff in late June 2005 to discuss:
  - Results of the collected QC2 instrumented dryer data evaluations,
  - Results of SMT of the QC1 steam dryer, and
  - The decision and its basis regarding SMT of the D2 and D3 dryers.
- EGC will meet with NRC management in mid-July 2005 to present and summarize the information above as it applies to operation of D2 and D3 at EPU conditions

Enclosure 3

Affidavit

General Electric Company

AFFIDAVIT

I, George B. Stramback, state as follows:

(1) I am Manager, Regulatory Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GE letter GE-ENG-DRY-085, Michael J. Dick (GE) to John Nosko (Exelon), *Exelon Integrated Steam Dryer – April 25 to April 27, 2005 – NRC Presentation with GE Proprietary & Non-Proprietary Information,* dated May 17, 2005. The proprietary information in Enclosure 1, *Proprietary Version of Exelon Presentation, "Steam Dryer Design Technical Meeting," April 25-27, 2005*, is the slide pages that are identified by the marking "GE Proprietary Information[3]." Paragraph (3) of this affidavit provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed design information related to the BWR Steam Dryer. Development of this information and its application for the design, procurement and analysis methodologies and processes for the Steam Dryer Program was achieved at a significant cost to GE, on the order of approximately two million dollars.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends

beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 17th day of May 2005.

George B. Stramback

George B. Stramback
General Electric Company