FENOC

FirstEnergy Nuclear Operating Company

Control Room Habitability Improvements in Commercial Nuclear Power Plants

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TIME LINE

continued

- Draft AEC GDC 11 for CRH
- 1968 Atomic Industrial Forum (AIF) reemphasized need for CRH
- 1974 Murphy-Campe
- 1978 TMI
- 1978 RG 1.78, ‘Assumptions for ...Hazardous Chem Release’ RG 1.96, ‘Protection of CR Operators against an Accidental Chlorine Release’
- 9/13/79 First TMI related action for operating reactors by NRC to licensees
- 2/3/80 NRC approval of near term operating license reqm’ts if TMI Act Plan and 5 Reqm’ts for operating reactors of which III.D.3.4 was a part

TIME LINE

continued

- 5/80 — NUREG 660 listed action items for Post-TMI CRH
- 5/7/80 — NUREG 0737 reflected the approved action items in III.D.3.4 in an implementation schedule
- 9/5/80 — Draft clarification letter on TMI action items sent to licensees
- 9/22/80 — Workshops held for details and input
- 10/31/80 — NUREG 0737 issued under 10CFR50.54(f) requesting confirmation of dates
- 5/5/82 — GL 82-10 issued-III.D.3.4 items after 3/82
- 3/14/83 — TMI action items confirmed by order that Post-TMI action items improve plant safety and commitments are required

TIME LINE

continued

- 1985 NRC issues report that configuration control and staff documents were inadequate
- 1986 Numerous NRC communication documents voicing CRE concerns
- 1987 Generic Letter 87-13
- 1992 Zion Generating Station failed CRE unfiltered inleakage test
- 1992 Perry Nuclear Power Plant passed CRE unfiltered inleakage test (helium)
- 6/96 NUREG/CR 6210 issued reflecting combined CRH guidance
- 10/96 Dresden, Quad Cities, LaSalle Stations (18 Mos Restart) fail unfiltered inlkg test

TIME LINE

continued

- 1/97 NHUG Papers on CR Habitability
- 7/97 NHUG Forms CR Hab Committee
- 7/98 NRC held CRH workshop
- 1999 NEI engaged to assist industry
- 2000 17 Stations Tracer Tested, 1 passed initial test
- 2001 NEI 99-03 Rev 0 issued
- 2003 NEI 99-03 Rev 1 issued
- 6/03 GL 2003-01 issued
- 9/04 All plants plan to perform Tracer Gas Test and establish a Control Room Integrity Program

HISTORICAL PATH FORWARD

- SYMPTOMS OF A POSSIBLE ISSUE
- INCREASED NRC CONCERNS
- INDUSTRY ACCIDENT
- INCREASE IN REGULATORY REQUIREMENTS
- WORKSHOPS
- GENERIC LETTER
- ELEVATED AWARENESS
- PLANT MODIFICATIONS
- CONTINUED INDUSTRY DEFICIENCIES-1992, 1996
- LIMITED INDUSTRY ACTION
- WAIT AND SEE
- MORE WORKSHOPS TO INVOLVE PLANTS
- STILL-LIMITED INDUSTRY ACTION
- GENERIC LETTER
- REQUIRED INDUSTRY ACTION

LIMITATIONS

- Differing Licensing Bases by plant
- System dynamics related to unfiltered inleakage not understood
- Low Safety Significance served to reduce concern
- Cost Justification or Wait and See Attitude
- Meeting Licensing Basis-No motivation to justify projected expenditures
- Meeting Technical Specifications
- LB/DB not consistent or understood

VULNERABILITIES

- LOCATION OF ALTERNATE SHUTDOWN PANEL (ASP)
- FIRE HAZARDS ANALYSIS
- TECHNICAL SUPPORT CENTER
- HAZARDOUS CHEMICAL SURVEYS
- FLOW RATES
- EQUIPMENT RELIABILITY
- LIFE EXTENSION
- PLANT TESTING CAPABILITY
- ADJACENT UNIT EFFECTS
- RIGOR IN ALL AREAS

RIGOR

- RETRIEVALBILITY OF LB/DB INFORMATION
- PEER CHECK/INDEPENDENT REVIEW
- LIMITATIONS UNDERSTOOD
- UNCERTAINTY PROPERLY APPLIED
- ASSUMPTIONS MUST BE EXPLICIT
- VERIFY ASSUMPTIONS BY INSPECTION OR TESTING
- USE OF PROBLEM SOLVING TEAMS
- FORMAL TRANSMITTAL OF TECHNICAL INFORMATION

PLANT HEALTH

- ESTABLISH ACCEPTABLE CRITERIA FOR LONG TERM RELIABILITY
- IDENTIFY TROUBLE SIGNS
- RECOGNIZE TROUBLE SIGNS
- MANDATORY REGULAR CHECKUPS
- UNDERSTAND SYNERGY OF EFFECTS
- TREAT SYMPTOMS OR CAUSE
- KNOW WHEN TO INTERVENE
- KNOW WHAT IS RIGHT
- COURAGE TO DO WHAT IS RIGHT

SUCCESS PATH

- SAFETY IS HIGHEST PRIORITY
- KNOWLEDGE & USE OF LB AND DB
- INTOLERANCE FOR FAILURES
- ACTION TO PREVENT RECURRENCE
- OWNERSHIP-CAs Eng Programs
- PROBLEM SOLVERS & PREVENTERS
- RIGOROUS APPLICATION OF ENG PROC & METHODS
- STRICT COMPLIANCE WITH TECH PROGRAMS AND PROC'S
- RESULTS ORIENTED

SYSTEM ENGINEER

- KNOW THE DESIGN BASIS
- KNOW THE LICENSING BASIS
- KNOW THE COMMITMENTS
- ALL CONSISTENTLY APPLY LB/DB
- KNOW THE DB CALCULATIONS
- BE A PART OF THE CHANGE TEAM
- TAKE OWNERSHIP FOR EVERYTHING THAT HAPPENS TO THE SYSTEM
- BE INTOLERANT OF FAILURES
- UPGRADE AND IMPROVE
- EXPECT SUPERIOR SYSTEM PERFORMANCE

TEAM PROCESS

- FORM SYSTEM TEAM
- REGULARLY REVIEW SYSTEM PERFORMANCE AND DEFICIENCIES
- IDENTIFY NEEDED UPGRADES
- GET TEAM APPROVAL FOR CHANGES
- INITITATE CHANGE PROCESS
- BE PATIENT-BE VIGILANT-BE CONSPICUOUS
- RAISE THE BAR

TYPICAL CHANGE PROCESS

- IDENTIFY A DEFICIENCY
- INITIATE THE CHANGE PROCESS
- PRESENT TO PLANT HEALTH COMMITTEE (PHC)
- PLACE HOLDER IN BUDGET
- PRESENT TO PROJECT REVIEW COMMITTEE (PRC)
- PRESENT TO SENIOR LEADERSHIP TEAM (SLT)
- OBTAIN BUDGET APPROVAL
- PERFORM PROJECT

CRE PROJECT

- AST SCOPING STUDY
- AST FOR EACH DESIGN BASIS
- SEALING CRE
- TEST AND BALANCE SYSTEMS
- TRACER GAS TEST

AST SCOPING STUDY

- TID OR TEDE PLANT
- WILL AST EXPENDITURE BE COST EFFECTIVE
- IF TID 14844 PLANT, PUT TEDE RESULTS IN TERMS OF TID
- DBA PER RG 1.183
- SOURCE TERM INVENTORY BOUNDING

SEAL CRE

- IDENTIFY ALLOWABLE UNFILTERED INLEAKAGE
- IDENTIFY VULNERABLE AREAS
- IDENTIFY SEALING SCOPE
- DETERMINE FULL OR PARTIAL SEAL
- IDENTIFY RISKS OF PARTIAL SEAL
- IDENTIFY CONTINGENCY IF FAIL

TAB SYSTEMS

- TAB ESTABLISHES THE BASELINE FOR SYSTEM INTERRACTION
- STATIC PRESSURES
- FLOW RATES
- DIFFERENTIAL PRESSURES
- ALLOWABLE PENETRATIONS

TRACER GAS TEST

- COMPONENT TEST
- INTEGRATED TEST
- MULTIPLE TRACER OR SINGLE
- PLANT VS. VENDOR
- LONG TERM PLANS
- CRITERIA FOR RETEST

CONTINGENCY ACTIONS

- SEALING CRE
- TAB SYSTEMS
- AST CALCULAITIONS
- ATMOSPERHIC DISPERSION FACTORS
- KI CALCULATIONS
- TOXIC GAS CALCULATIONS

MAJOR EVENT COSTS

- CHI/Q $ 50,000
- AST $250,000
- SEALING $600,000
- TAB $200,000
- TRACER $100,000
- TOTAL $1,200,000

MAX MAJOR EVENT COSTS

CHI/Q	$ 100,000
AST	$ 350,000
SEALING	$1,600,000
TAB	$ 700,000
TRACER	$ 200,000
SYSTEM MODS	$3,000,000
INSPECTIONS	$25,000,000
REPL POWER	18 MONTHS DUAL UNIT

SUPPORT EVENT COSTS

CONTINGENCY CALCS	$100,000
DESIGN MODS	$ 50,000
REGULATORY REVIEW	$ 20,000
SCAFFOLDING	$ 70,000
ENG EVALUATIONS	$ 10,000
TOTAL	$250,000

COST EFFICIENCY

- AST INPUT BOUNDING FOR POWER UPRATE
- REVERSE AUCTION PROCESS
- LB/DB INTERNALIZED
- HEIGHTENED AWARENESS

FINAL ANALYSIS

- FUTURE ISSUES REDUCED
- THERE WILL BE OTHER ISSUES
- WILL THE ISSUE BE RECOGNIZED?
- HOW RESPONSIVE WILL PLANTS BE?
- WILL INDUSTRY LEAD OR LAGG?
- REGULATORY COMPLIANCE-INCREASED PROBABILITY OF ACTION
- INCREASED REGULATORY INSPECTION
- INCREASED PLANT EXPECTATIONS