CR 02-04884 Root Cause Analysis Chronological (Narrative) Timeline

3/28/96	NG-NA-00702, Rev 01, C-1, Potential Condition Adverse to Quality Reporting
4/8/96	Begin 10 RFO
4/19/96	Weep hole video inspection
4/21/96	PCAQ 96-0551 issued due to inability to comply with NG-EN-00324. (Root Cause required) • Since the boric acid deposits are not cleaned, it is difficult to distinguish whether the deposits occurred because of the leaking flanges or the leaking CRDM. • 1) Boric acid at nozzle 67, 2) Rust brown stained, 3) Boron accumulation quantification, 4) Annular B.A. intrusion, 5) Wastage inspection
4/29/96	Plant Engineering Manager concurs with initial assessment as a conservative measure does not believe RPV Head is non-conforming. • Plant Engineering Manager expresses that the probability of nozzle cracking is relatively low.
5/9/96	PCAQ 96-0551 notes apparent cause as lack of removal of boron deposits from RPV Head after each operating cycle, also noted: • That boron removed from nozzle #67 and no visible appearance of corrosion found • In justification for component performing specified function, notes the possibility of through wall cracking existing is low since no large accumulation of boron was found
6/1/96	End 10 RFO
11/26/96	PCAQ 96-0551 notes previous 10RFO inspection was limited to 50 to 60% of the head, also noted: • If one could remove all the boron deposits from RPV Head, the issue of ongoing corrosion will go away. • The condition of the area from which boron could not be removed is not known.
4/1/97	NRC GL 97-01 issued by NRC for degradation of CRDM nozzle and other vessel closure head penetrations, also notes "any cracking would result in detectable leakage." • Also notes "any cracking would result in detectable leakage.
5/6/97	Root Cause extended 5 times for PACQ 96-0551

7/25/97 BWOG issues group response to NRC GL 97-001.

- BAW-2301 states: BWOG safety evaluation concluded cracking would be predominantly axial in nature. This would lead to a leak of 1 or more nozzles and result in significant deposition of boric crystals. It is very unlikely this type of accumulation would continue undetected with regular walk-down inspections of RPV Head area.
- BAW-2301 states In order to assure assumptions of original safety evaluation remain valid; an integrated inspection program has been developed to address this issue in BWOG.
- BAW-2301 states: PWSCC for CRDM nozzles, will not become a long-term safety issue provided enhanced boric and visual inspections performed IAW NRC GL 88-05 are continued.
- All BWOG plants perform visual inspection of RVP Head for potential leakage during each refueling outage, if not more often. Because of increased attention brought upon by European PWSCC events, in general more emphasis than required by NRC GL 88-05 has been placed on these inspections. Other than intermittent leakage, due to CRDM flange gasket degradation, there has not been any indication, there has not been any indication of leaking VHP at any BWOG plants.
- BAW-2301 Sect. 2.2.2 (Inspection Plan) all BWOG plants perform visual inspection of RPV Head for possible leakage during each refueling outage, if not more often. This ensures that external degradation of RPV Head, caused by boric acid corrosion, does not occur.

11/8/97 Centerior and Ohio Edison merge to form FirstEnergy.

12/17/97 PCAQR 96-0551 SYME response to alternative cleaning states no method available.

- Recommendation: Modify the support structure access to allow for a complete inspection of the head surface. SYME has determined that the modification to enlarge the access holes in the head support structure should be purchased.

2/98 Implemented Corrective Action Tracking System (CATS)

2/26/98 NG-NA-00702, Rev 02, Potential Condition Adverse to Quality Reporting

4/10/98 Begin 11 RFO

4/18/98 PCAQ 98-0649 Cat. 3 categorization CRDM (D-10) stated has minor leak. Should be Cat. 2 with an "use-as-is" disposition

4/25/98 PCAQ 98-0767 initiated by SYME – relative to clumps of BA on RPV Head. See response 7/16/98 (post outage) Categorization: Cat 3, Part 4a (apparent cause). This is a reoccurring condition. Boric acid not cleaned off head.

- NG-EN-00324 Step 5.3.3 Take necessary action to have boric acid residue removed
- NG-EN-00324 Step 5.3.4 Determine the root cause and source of the coolant leak
- NG-EN-00324 Step 5.4.1a Determine the extent of damage.

4/30/98 PCAQ 98-0649 CRDM flange leak was D-10 not B-10. No repair to be made until 12RFO

- Accumulation of BA on the RV caused by leaking CRDMs has not resulted in any BAC. This was identified through inspections following RVH cleanings in past outages.
- B&W documentation discussing CRDM nozzle cracking further stated that boron deposits on the head caused by leaking CRDM flanges would not result in head corrosion
- Categorization Assigned Cat 3 Repeat Issue

5/5/98 PCAQ 98-0915 was issued by System Engineer to replace the RC-2 yoke due to "severe corrosion"

5/10/98 PCAQ 98-0915 was marked Category 2 with "no" marked off as requiring CATPR's. Also evaluator, states RC-2 is ASME Class 1 & work is considered "repair." Also components affected are part of Section XI.

- DEMS and Supervisor sign/approve "Apparent Cause." Cause = Boric Acid corrosion of cast steel.

5/19/98 RC-2 found leaking 60 drops per minute during VT-2 exam. "minor" leakage.

- Power production involved in decision to start-up of RC-2 leak, Success = operate. Start-up inertia, Design Engineer, Operations Manager
- Interviews determined management decided to restart with "high" unidentified leakage following 11RFO.

5/20/98 PCAQ 98-1130 Discussion with outage central on proposed actions for RC-2 leakage – (depressurize and rework packing or Furmanite). (Plant start-up in progress)

- During heat-up RC-2 found to have packing leak. Category 2: AC/CATPR
- Decision to not shut down made because leak did not warrant it. "We have had a leak on RC-2 before" (one of many reasons).

5/23/98 End 11RFO

- Plant started with known CRDM flange leakage PCAQR 98-0649
- No "Use-AS-Is" disposition

5/25/98 NG-NA-00702, Rev 02, C-1 Potential Condition Adverse to Quality Reporting

7/16/98 PCAQ 98-0767 Specific action necessary: remove boric acid deposits from the Reactor Vessel Head Action not completed

- There were slight boron deposits left on the head after the cleaning. These deposits will not create any corrosion since the head temp is $\geq 550°$ F., this is based on the result of boric acid corrosion test performed by B&WOG (Reference. #51-1229638-1)
- White streaks on the OD of CRDM flanges. It appears that the leaking CRDM flanges contributed to the deposit of boric acid layer and lumps.
- The rust brown color is an indication of the old boric acid deposits.
- PCAQ 98-0767 can be closed once the root cause & CATPR for PCAQ 96-0551 are complete.

8/6/98 Approved/closed CR 96-0767 (note rolled to 96-0551)

9/1/98 PRG concurs that Mod 94-025 should be approved for implementation for 13RFO

- Mod resolves PCAQ 96-0551, one of the oldest open PCAQRs.
- Cannot do complete head inspection or cleaning
- Less than 50% accessibility to RX Vessel Head
  Desired to implement in 12RFO to establish baseline of potential past boric acid Corrosion on RPV Head
- Mod 94-0025 recommended by for approval to 13RFO at PRG Ref: DBPRC Mtg. History.

9/2/98 PCAQ 98-1642 issued to document RC-2 leakage increased, inspected by MOV Engineer also, first nut found missing. "large chunk" of BA removed. RSE was notified of leakage and missing nut. DEMS contacted to evaluate missing nut.

9/2-3/98 RSE & MOV Engineer inspected & confirmed 1st nut was missing.

- Boric Acid (brown) not cleaned off bolts to allow inspection
- DEMS states: missing nut is OK and valve is functional.

9/9/98 CR 98-0020 Cleaned off boric acid build-up. Found metal filings in boric acid RC-2 (root cause)

- Discovered RC-2 body-to-bonnet nut #4 missing (carbon steel)
- Boric acid removed to install 1st missing nut when 2nd nut found. PCAQ 98-1681 issued. DEMS starts evaluation past operability. Plant Manager req's multi-discipline Root cause team, Senior Projects Advisor for Maintenance is lead

9/10/98 Decision made to inject sealant into RC-2 to stop leak

- RC-2 packing leak stopped after injection.

9/11/98 MRC assigns PCAQ 98-1681 2nd missing nut, a Cat. 2, Required Root Cause.

9/17/98 Mod 94-0025 Budget approved by DBWSC $250K for 13RFO DBATS

- Basis for 13RFO (deferral) schedule:
  Issue started 94 (86); No failures in industry;
  Engineers say it's OK;
  RCS leakage source known NOT on head;
  "We have inspected any BA sitting on head";
  BA has been in dry condition and corrosion attack is not an issue;
  Delay to 13RFO does not add risk;
  Aging is factor & Mod should be addressed.
- RPV Head cannot be completely inspected or cleaned
- Less than 50% accessibility to RX Vessel Head DBPRC Mtg. History
- Mod 94-0025 to address ongoing industry concern of boric acid leak from CRDM RPV Head nozzles.

9/18/98 PCAQ 1716 issued by DEMS, DEMS, determined RC-2 inoperable with 2 missing nuts

- LER 98-0009 issued for inoperable RC-2 with 2 nuts missing.

9/21-22/98	PCAQ 96-0551 Postponed Mod to 13RFO
9/24/98	Manual Plant Trip during Steam FW Rupture Control System Testing
9/24/98	Plant returns to Power Operation from 9/24/98 shutdown

10/01/98	Nuclear operations policy Tech-12 no mention of nuclear safety
	• Corrective Action Policy, Effective 10/98
	  • Identify and communicate problems and potential problems accurately and clearly stating the description of the problem.
	  • Effectively resolve identified problems. This includes generation and selection of corrective actions that address the causes...
	  • Prompt identification of corrective actions
	  • Effectively analyze identified problems. This includes: determination of trends related to frequency: collective significance: nature and cause of identified problems

10/14/98	Manual Plant Trip CCW Transient.
10/17/98	PCAQ 98-1885 Remains of carbon steel nut found at location #4 on RC-2. MRC assigned a Cat. 1 (Multi-Discipline Root Cause)
11/2/98	PCAQ 96-0551 Downgraded to Apparent Cause (had remained open 2yrs. 9 months)
12/1/98	DB becomes part of FENOC
12/15/98	PCAQ 98-1885 Root Cause Report approved by Plant Manager
12/17/98	CR 98-0020 issued at MRC's request to replace PACQ 98-2069 to evaluate management issues related to RC-2 (Significant/Root Cause)
1/99	Established Site Root Cause Team
1/6/99	PCAQ 98-1904 Themes identified in collective significance review were: 1) Technical discussions lacked thoroughness; 2) Human Errors contribute to events; 3) Priorities aren't commonly understood; 4) Material Condition; 5) Organization behaviors; 6) Poor monitoring of performance and effectiveness
1/14/99	Serial 2581 - Responses to NRC request for additional information pertaining to GL 97-01 (from 9/8/98) • The B&WOG placed Davis-Besse in the second of three Assessment Groups for susceptibility to CRDM nozzle cracking (Enclosure #1).
1/19/99	PCAQ 96-0551 closed. Mod 94-0025 is not installed.

2/4/99 CR 98-0020 (RC-2-issues) Concluded that management standards were LTA

- CR 98-0020 - Concludes causes for RC-2 included incomplete or missing communication,
- CR 98-0020 - Concludes there was an over-reliance on the CAP to manage significant issues
- CR 98-0020 - Concluded that problem solving and evaluation were LTA
- Plant Engineering Manager states: "Corrective actions were weak"

3/6/99 CR 99-0372 documented RE 4597AA/AB high, at this point filters are changed approximately weekly (Important/Apparent Cause)

3/16/99 Senior Engineer (ISE) issues memo on implementation date for MOD 94-0025 to Manager Nuclear Safety

- Concluded MOD 94-0025 could be delayed to 13RFO
- Basis for conclusion was temperature at full power at corrosion sites of concern, and the requirements for wetted surfaces.
- State: Residual boric acid would not present any corrosion concerns during full power operation nor during start up or shutdown.
- QAD 99-70070 Notes: Since 100% inspection and cleaning is not possible, the intent of NG-EN-00324 really is not being met.
- QAD 99-70070 Notes: "The ability to inspect and clean is important in that it helps identify if leakage has occurred, but boric acid buildup in itself is not a driver for boric acid corrosion.

3/16/99 NQA issues Audit: AR-99-CORAC-1 on CAP. Conclusion is CAP effective.

- AR-99-CORAC-1
  - Quality trending was not being completed.
  - Quality trending summary had not been completed in nearly two years.
  - 80% of condition reports reviewed contain coding errors
  - Self-assessments were not completed by the corrective action program to measure performance
- AR-99-CORAC-1 QA Notes: Corrective Action due dates are extended with minimal evaluation.
- AR-99-CORAC-1 QA Notes: Trending has not been completed in accordance with NG-NA-00711 requirements. (Note: none issued in 2 years)

3/30/99 CR 99-0510 documented RE 4597BA low flow alarm due to boron build-up on particulate filter (Important/Apparent Cause)

4/24/99 Begin Cycle 12 Mid-Cycle Outage

5/10/99 End Cycle 12 Mid-Cycle Outage

5/10/99 CR 99-0861 documented RE 4597AA sample lines full of water. (Important/Apparent Cause)

5/13/99 CR 99-0882 documented RE 4597BA low flow alarms (Routine/Apparent Cause)

5/23/99 CR 99-0928 documented increased frequency on RE 4597BA filter change outs

6/4/99 NRC, RC-2 Inspection Report States: For extent of condition, "The inspector's determined that the licensee's corrective actions were adequate by either correcting the condition or by demonstrating that the condition was acceptable until the next available opportunity to correct the situation...." Violation-Failure to ensure adequate material separation Violation-Failure to take prompt, effective correction actions NRC RC-2 Special inspection meeting held. IR 98-0021

- NRC, RC-2 Inspection Report States: Boric Acid Program was adequately documented, however a weakness in verification of materials subjected to Boric Acid that contributed to the problem of corroded nuts.

6/10/99 Per Engineering training Coordinator Boric Acid NG-EN-00324 was added to RSE qualification card in TSM-001 Rev. 5, Effective date 6/10/99

7/30/99 CTMT Rad Mod filters "white bird" sample sent to Southwest Research Institute for analysis

- RE4597Ba filter from 7/9/99 contained iron oxide granular particles: shows source is corrosion also some CL
- RE4597 filter from 7/9/99 had 3 darker spots; contain K & CL. "White bird" contained iron oxide.

7/30/99 CR 99-1300 issued to document several RE 4597BA filter changes

- Theory that magnaflux was source of red deposits
- Containment sump showed corrosion products
- Low activity led to belief of secondary leak
- We made the assumption that it wasn't present before outage, they must have done something to create condition"

9/23/99 CR 99-1300 Apparent Cause drafted detailing a plan for discovery more than an apparent cause

- 7/30/99 to 9/23/99 (ANS) CR 99-1300 Notes the performance of CTMT RAD Monitors has degraded due to repetitive low flow conditions and that iron oxide source was unknown.
- Answer to CR 99-1300 Notes that while exact source of the rust is not known, it developed about the same time as the plant startup in 5/10/99.

9/27/99 CR 99-1300 (Apparent Cause) documented exact source of the rust is not known and was closed without determination of cause

10/23/99 QA Manager issues corrective actions audit AR-99-CORAC-02

- QA determined performance of the management review was good
- QA determines root cause reports are thorough. Majority of root causes performed by dedicated team.
- AR-99-CORAC-02 QA concludes that the CAP was effective

10/28/99 PCAQ 96-0551 rejected by PCAQRB because: 1) Root Cause not performed; 2) Also requested that the Davis-Besse response to GL 88-05 for the evaluation of the significance of boric acid on the head

11/99	Davis-Besse Plant Issues List post CR 99-1300 (Nov. 1999) Action Plan to find cause of steam leak • Felt we should shut down to in order to find the leak, but we couldn't tell anyone where to go look. Plant Engineering Supervisor.
11/5/99	Sargent & Lundy memo re: Source of iron oxide found on RE 4597 filters and analyzed by SRI states steam leak most likely source "high in CTMT"
11/18/99	Lesson plan for D-B technical staff and managers, general continuing training TSM-IDE-I994 has boric acid training in it.
11/29/99	NRC issues letter to VP DBNPS for more information • NRC letter notes: "To date, all utilities have implemented VT-2 type visual examinations of their VHPs in compliance with ASME • NRC request confirmation that DBNPS of VHPs are included in BACC program
12/6/99	NRC "confirms" PWSCC not immediate safety concern in domestic PWR's and integrated program provides acceptable basis for evaluation.
12/6/99	RCS system engineer was not qualified to BA Program: He could only inspect the Reactor Head under the cognizant control of a qualified individual.
2/16/00	NG-NA-00702, Corrective Action Program, Rev 3, C-2
4/1/00	Begin 12 RFO
4/5/00	CR 00-0781 documented (discolored) boric acid on RX vessel flange studs (Routine/Apparent Cause) • CR 00-0781 noted during VT-2 pressure test exam of head, leakage from CRD structure blocked visual exam of head studs • In-service Testing Program request – if boric acid residues are detected on components, the leakage source and the areas of general corrosion shall be located • All resources funding going toward more reliable running or short outage. If support structure MOD could shorten outage it would be done Design Engineering Manager • We didn't approve the inspection openings due to too much money but we spent money to treat symptoms Design Engineering Manager
4/6/00	CR 00-0782 documented boric acid on RPV Head Flange (Routine/Apparent Cause) • CR 00-0782 "Leakage id Red/Brown Color" • CR 00-0782 Attached Corrosion control inspection checklist filled out by system engineer for head flange. Red/Brown deposits detailed inspection recommended • CR 00-0782 Categorized as Routine/apparent cause – recurring CAQ issue

- CR 00-0782 Operability determination states: "All control rod drive Mechanisms are operable" repair/replace
- Inspection of RPV flange shows boric acid leakage from "Mouse holes" 5 leaking flanges w/F10*, D10*, C11, F8, G9 (*worst) Inspection checklist from Procedure NG-EN-00324 initiated but not completed.
- More boric acid than expected System Engineer
- It was not unexpected to see boric acid Project Manager

4/12/00 "Cleaned" (mechanical means) boric acid found hard deposits.

- Crowbar cleaning of the head begins Contacting B&W to justify not removing all BA. 12RFO Outage Notes of RCS System Engineer
- "I do not recommend the use of water or steam to remove boron deposits at this time" RCS System Engineer

4/14/00 Dispositioned 5 leaking flanges. (F10, D10, C11, F8, & F9). States previous RCS System Engineer was involved in flange inspections

- CR 00-0782 Disposition states: CRD flange leakage was a small contributor to the overall unidentified leak rate of 0.3 GPM
- PCAQ 96-0551 from 11RFO still open Corrective actions not implemented for RPV Head inspection.

4/17/00 CR 00-1037 Issued to address affects of boron on the RPV Head

- CR 00-1037 Categorized: Routine/Apparent Cause Recurring event not identified by equipment trending.
- Boric acid accumulation on head and insulation
- Root Cause Report states 12RFO log states head decontamination complete
- Six attempts at cleaning System Engineer
- CR 00-1037 Mode 4 restraint is issued for the CR
- Observation on CR 00-1037: An as-found BACC checklist was not processed for the RPV Head inside the support structure

5/1/00 CR 00-1037 Disposition "No boric acid induced damage to the head surface was noted during the subsequent inspection"

- CR 00-1037 Remedial actions: "Accumulated boron deposited between the reactor head and the thermal insulation was removed during the cleaning process performed under WO-00-1846-00
- RCS System Engineer stated: Boric acid was not completely removed from RPV Head. "we cleaned 85% I would say. Everyone said we would clean it next outage."
- CR 00-1037 Event Description: Since the boron is evident only under the flange and not on the vertical surface, there is a high probability that 69 is a leaking CRD.
- NG-EN-00324 Rev. 2 Step 6.4.1.b Remove any boric acid that may inhibit a detailed inspection.
- NG-EN-00324 Rev. 2 step 6.5.7 Perform an evaluation to identify extent of damage
- CR 00-1037 Disposition references: CR-00-0995 and GL 97-01 states: "The letter requires licensee to maintain a program for ensuring a timely inspection of the CRDM and other closure head penetrations"

- CR 00-1037 In order to perform required inspections the nozzles as well as the penetrations must be free of boron
- CR 00-1037 CR discusses source of boron above the insulation as from CRDM (flange) leakage.

5/18/00 End 12 RFO

6/2/00 CR 01-1547 on CAC plenum pressure decreasing following 12RFO. Categorized: Routine/Apparent Cause Corrective Action – clean coils Cause attributed to boric acid CACs cleaned every 10 days until mid-cycle outage in 1999

6/29/00 QA issues CAP Audit AR-00-CORAC-01

- QA determines root cause evaluations and management involved on review boards are strengths (Site had dedicated group of 3-4 root cause members)
- AR-00-CORAC-01 QA notes that no adverse trends had been identified in over two years and no formal process for detecting generic problems, adverse quarterly trends and repetitive conditions exist.
- AR-00-CORAC-01 QA evaluates that remedial corrective actions are consistently effective
- AR-00-CORAC-01 QA noted 20 of 37 apparent cause evaluations had either inadequate corrective actions or inadequate cause evaluations
- AR-00-CORAC-01 QA determines that too many CRs (issues) are evaluated at an apparent level vs utilizing root cause techniques

8/14/00 Policy Manual for the Nuclear Power Station Nuclear Safety is described as being "paramount importance" which imposes rigorous requirements.

9/7/00 MOD 94-0025 for modifying service structure for improved inspection PRC (Project Review Committee) be deferred to RFO14 (2004)

9/22/00 Approved Root Cause Analysis Report CR 00-1584, Revision 1, titled Condition Report Program Implementation Deficiencies

11/10/00 Evidence of leakage and intent are still in DB-FF-00204 after rewrites and revision see 5-27-88

- Detection of boric acid on components "shall be noted VT-2 Evaluation Report.
- The guidance for boric acid and corrosion shall be followed, which refers to NG-EN-00324.

10/27/00 Effectiveness Review for CR 98-020 completed, documents RC-2 corrective actions are effective (CR 00-1037 and CR 00-0782 did not properly complete boric acid control paperwork nor was boric acid cleaned off head.

12/15/00 NOP-LP-2001, Condition Report Process, effective date 12/15/00

12/29/00 CR 00-4138 documents focus on reducing dose during CAC cleaning cause due to solids on fins, possibly from RCS leak. (CAQ – Basic Cause)

3/01	Disestablished Site Root Cause Team
3/29/01	CR 01-0890 documents RCS unidentified leakage rate varies by as much as 100% of value – data is not consistent.
4/23/01	Chemistry wrote CR 01-1110 to address increased frequency for RE 4597BA filter change-out due to low flow. • Boron crystals and low flow on Rad Monitor filters
4/30/01	NRC issues IN 2001-05. Through wall circumferential cracking
5/7/01	Davis-Besse received IN 2001-05 Log 1-4185 • NRC Staff concluded that PWR CRDM nozzle and weld cracking was not an immediate safety concern. • Axial cracks do not pose an immediate or near term safety concern
5/15/ 01	Corrective Action Program Reference Guide, Revision 9, effective date 5/15/01 – utilizing CATS
5/30/01	CR 01-1191 documents Outage Management team assigns Project Manager for nozzle inspect and repair • Design Engineering Manager states – 2001 was the year we learned so much about cracking, the industry and Davis-Besse • Design Engineering Manager states All 3 Oconee units and 1 ANO unit found cracked J groove welds around CRDM nozzles
6/15/01	Framatome issues 32-5013324-00 • 32-5013324-00 "Probability that CRDM leakage is undetected" issued by Framatome "a clean vessel head… reduces the likelihood of masking…" • 32-5013324-00 Nozzle masking is not a problem because reactor vessel heads are being regularly cleaned • 32-5013324-00 "The primary source of boron from leakage that could mask the presence of boron resulting from CRDM nozzle leakage is from the CRDM flange"
7/11/01	EPRI requested update to previous partial inspections RE: CRDM flange leakage
7/16/01	CR 01-1748 issued documenting CARB needs better standards. • CR 01-1747 notes CARB is not assessing or monitoring overall process
7/23/01	CR 00-1822 Chemistry initiates CR on RE 4597BA filter change-out frequency • Frequency for filter change-outs increasing to between 2-7 days • Boric acid crystals on particulate paper
7/25/01	CR 01-1857 Shift Engineer issued CR to track anomalies (spikes) in RCS unidentified leakage.

- "About every 7 to 10 days, unidentified leakage inputs to ~ 0.25 GPM for a day or 2 then return to average value"
- "RCS unidentified leakage ~0.125 to 0.145 GPM over the past few weeks"

8/3/01 Issued IEB 2001-01 on circumferential nozzle cracking

8/8/01 Condition Report 01-2028, Collective Significance Review of Late CR Evaluations or Corrective Actions

8/30/01 Condition Report 01-2253, Collective Significance Review of Corrective Actions Incomplete and Closed

8/30/01 Sent response to IEB No mention of limited nozzle inspections Serial #2731

10/3/01 Telecon told NRC 100% of head inspection but some of areas precluded due to flange leakage.

10/15/01 Containment WR Rad Monitor RE 2387 spiked above alert and high set-points.

10/17/01 Submit supplemental response to IEB 2001-01 to NRC Serial #2735

- Stated in Serial 2735 that RPV Head was mechanically cleaned in 1996 No Qualifier
- Serial 2735 Tied 10, 11, 12 RFOs to a "whole head inspection" per BACC pursuant to GL 88-05, 65/69, 50/69, 45/69 nozzles were reviewed respectfully

10/18/01 CR 01-2769 documents Containment WR Rad Monitor RE 2387 spiked above alert and high set-point for ~ 3 days. (CAQ – Apparent Cause)

10/20/01 RE 4597BA found to have abnormally dark brown discoloration on filter.

10/23/01 Davis-Besse Condition Report Process, Revision 1, effective date 10/23/01

10/25/01 CR 01-2862 Chemistry identified increasing trend in unidentified RCS leakage (Categorization CAQ - Basic Cause)

10/27/01 RE 459719A/BA found to have rust-colored boric acid crystals on filters

10/29/01 NRC sends a letter. Davis-Besse waits to provide additional information to justify deferring RVH inspections to April 02. A meeting is scheduled for NRC and DB staff on 10/24/01 in Rockville, Maryland.

10/30/01 Response to RAI (IEB 2001-01) transmitted to NRC Serial #2741

- Serial 2741 24/69 nozzles obscured by boric acid crystals "clearly attribute to CRDM flanges"

11/1/01 Davis-Besse transmitted risk assessment of CRDM nozzle cracks to NRC Submittal #2745

- "The core damage frequency risk from CRDM nozzle cracks can be categorized as small"

11/2/01 CR 01-2795 Temp Mods 01-18 and 01-19 done to remove Iodine filter cartridges on RE 4597AA/BA

- Iodine filter cartridge replaced with internal charcoal removed.

11/6/01 CR 01-2967, Condition Report Program, Implementation Deficiencies in Evaluation Documentation

11/12/01 CR 01-3025 documents Ops identified increase in RCS unidentified leakage (.192 GPM to .371 GPM)

11/17/01 CR 01-2862 performed containment walk-down. "No solid contributor to RCS leakage was identified"

11/28/01 Davis-Besse receives results of conference call conducted 11/15. Log 5879

- NRC states: "Davis-Besse is considered to have a high susceptibility to PWSCC at RPV Head penetration nozzles"
- The staff believes there is a more than reasonable likelihood that the Davis-Besse facility currently has cracking.
- Of the 7 B&W facilities 6 have performed inspections. All 6 have identified cracking in the VHP nozzles.

11/30/01 Provided supplemental info to the NRC, re: IEB 2001-01 Serial #2747

- Davis-Besse committed to:
  1. 100% visual of NDE inspections.
  2. Reduce RCS Tavg
  3. Availability of critical safety systems
  4. Dedicated operator
  5. Move outage to no later than 2/16/02
  6. Additional operator training

12/4/01 NRC issues a letter to Davis-Besse stating that the staff at Davis-Besse has provided sufficient information to justify operation until 2/16/02. Prior RAIs and commitments were part of the agreement. Log 5896.

- Davis-Besse justifies deferral of inspections recommended by 2001-01 based, in part, on the as found condition of the RPV Head penetrations during 10RFO 1996, 11RFO 1998, and 12RFO 2000

12/26/01 NQA issues AR-01-REGAF-01 evaluating corrective actions as satisfactory with element's marginal.

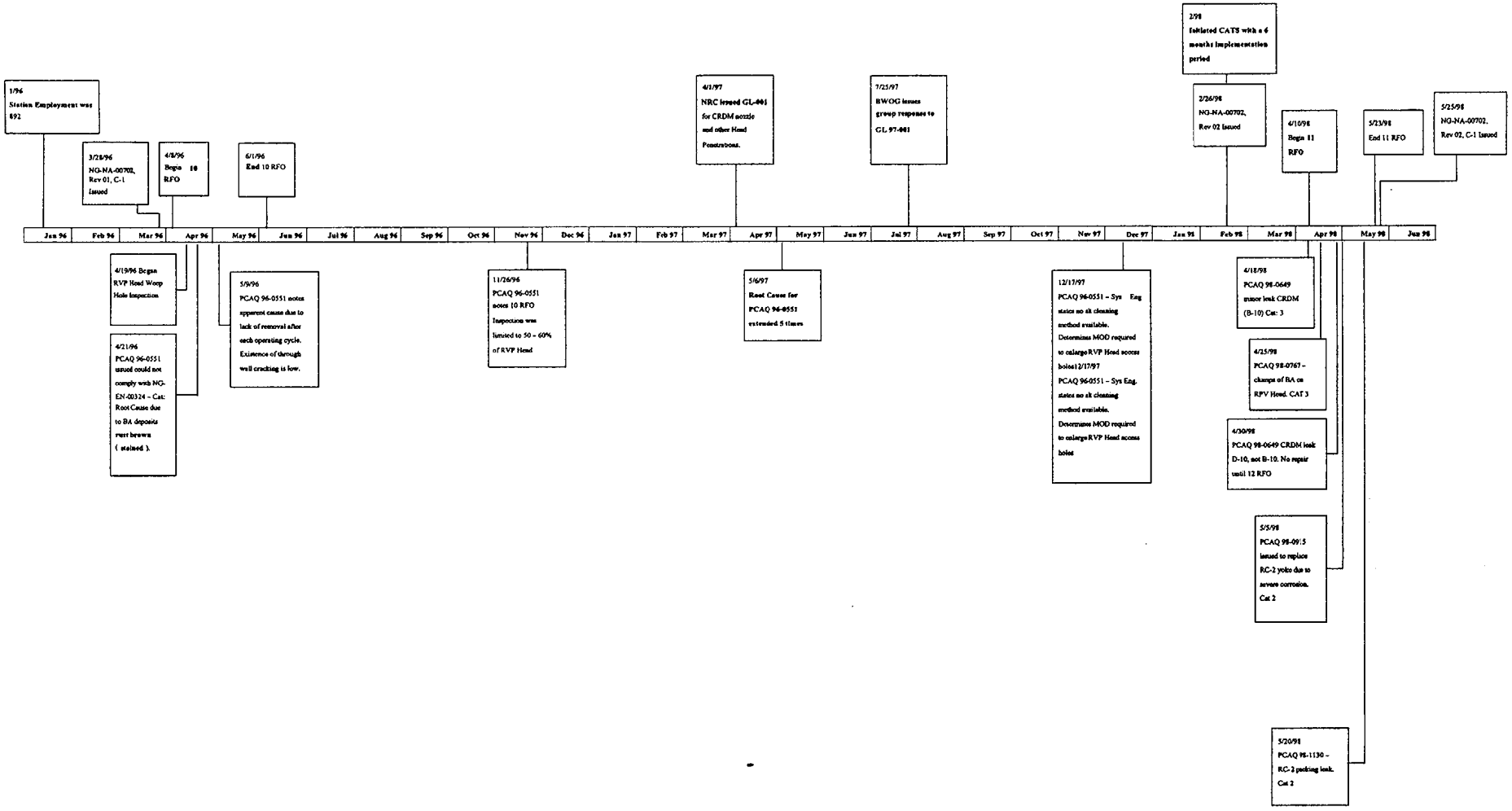
- NQA states the causes of CRs are being identified based on the educated guess of the evaluator.
- NQA rates the element of adequacy of CR analysis as marginal.
- NQA states evaluations for basic and root causes are marginal. Recommend that for all root and basic cause evaluations, use and documentation of formal analytical method should be requirement.

1/4/02 Approved Root Cause Analysis Report for CR 01-2967, titled Condition Report Analysis Deficiencies

2/14/02	Examination plans for CRDM nozzle inspections provided via Serial 2671
2/16/02	Begin 13 RFO
2/21/02	CR 02-00685 1" – 2" deep boric acid over 75% on RV flange & 3" – 4" hard-packed on rest of area was identified. • Assigned Apparent Cause evaluation. Repeat CAQ – should be SCAQ.
2/26/02	CR 02-00846 Work Control did video inspection of RPV • Assigned Apparent Cause evaluation report – CAQ Apparent Cause, repeat event • "More boron than expected"
2/27/02	CR-02-0891UT on nozzle 3 shows axial cracking in J-weld-through wall (potential leakage path) NDE-54-151-100-08
2/27/02	CR 02-0932 Found 30 degree circumferential crack on nozzles 1, 2, 3, 5 & 47
3/5/02	CR 02-1053 FTI machining nozzle #3 on RPV Head. • CRDM housing for RPV Head nozzle #3 rotated ~15 degrees.
3/8/02	CR 02-1128 Evaluated bottom-up UT data in area of Nozzle 3 and determined significant degradation of RX Vessel Head Pressure Boundary. • Quarantine of the RPV Head did not occur until mandated by external agencies.
6/13/02	CR 02-02584, Implementation of Corrective Action Program by Site Personnel

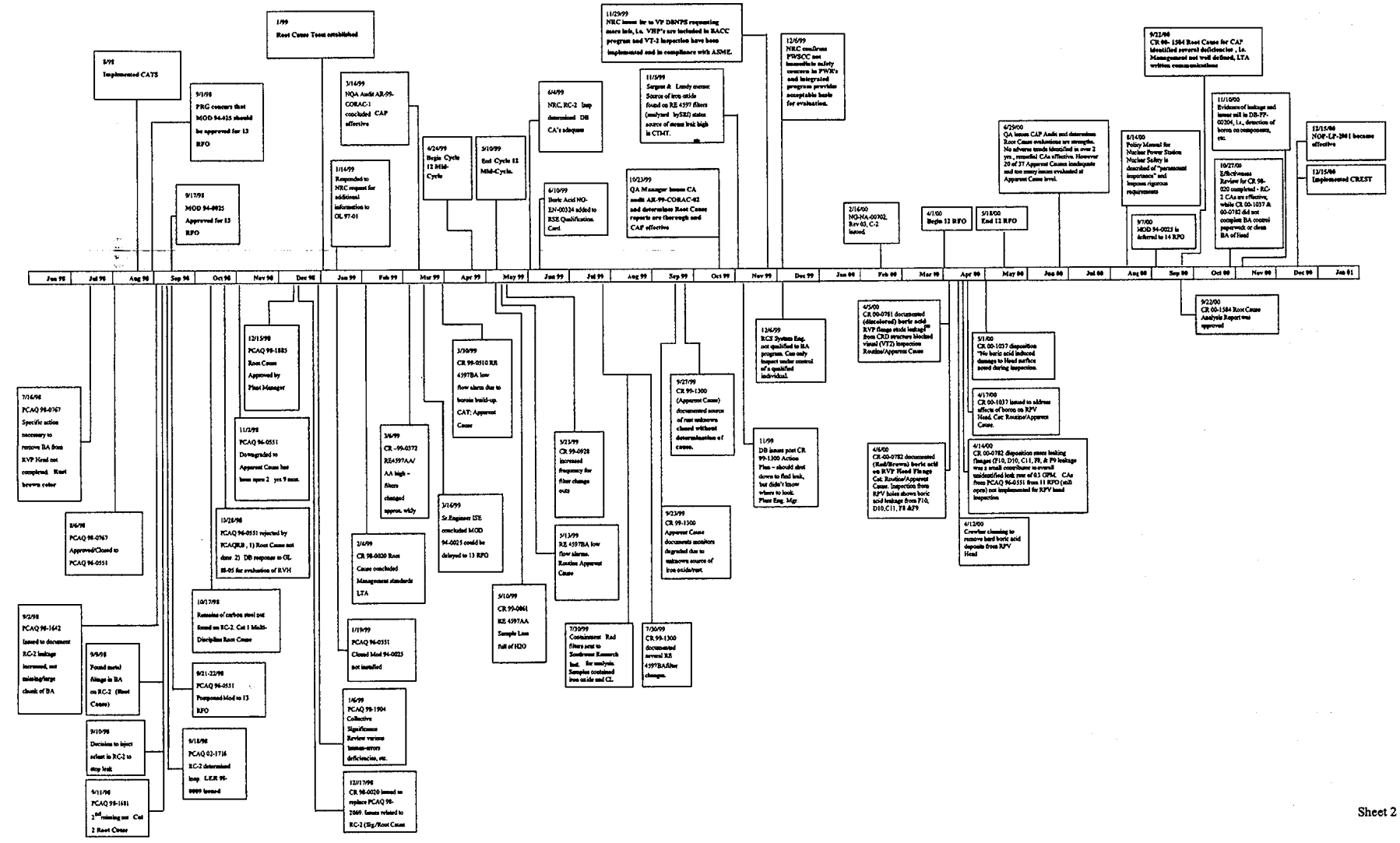
Attachment 3

CR 02-04884 Timeline of Events

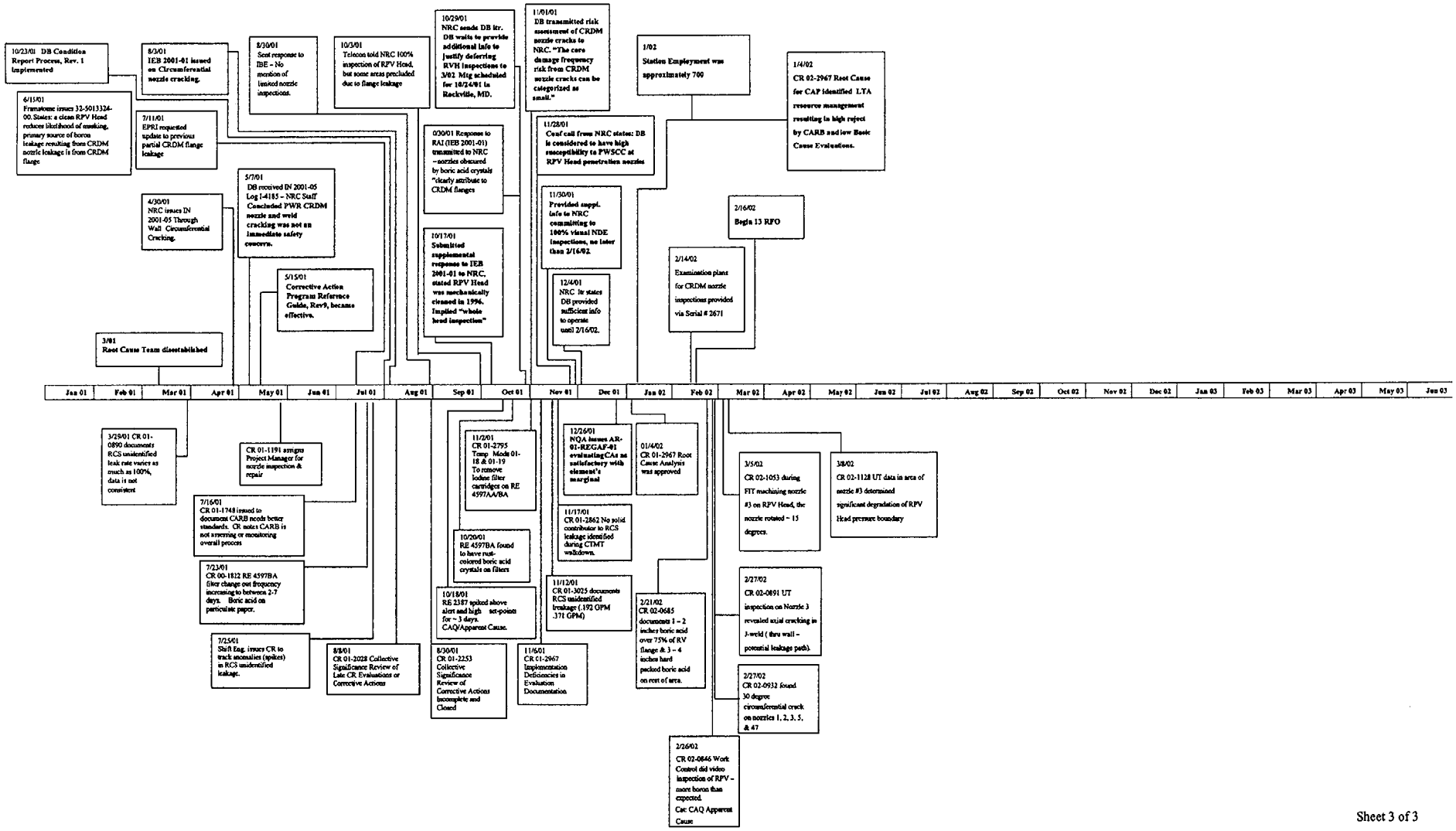


Attachment 3

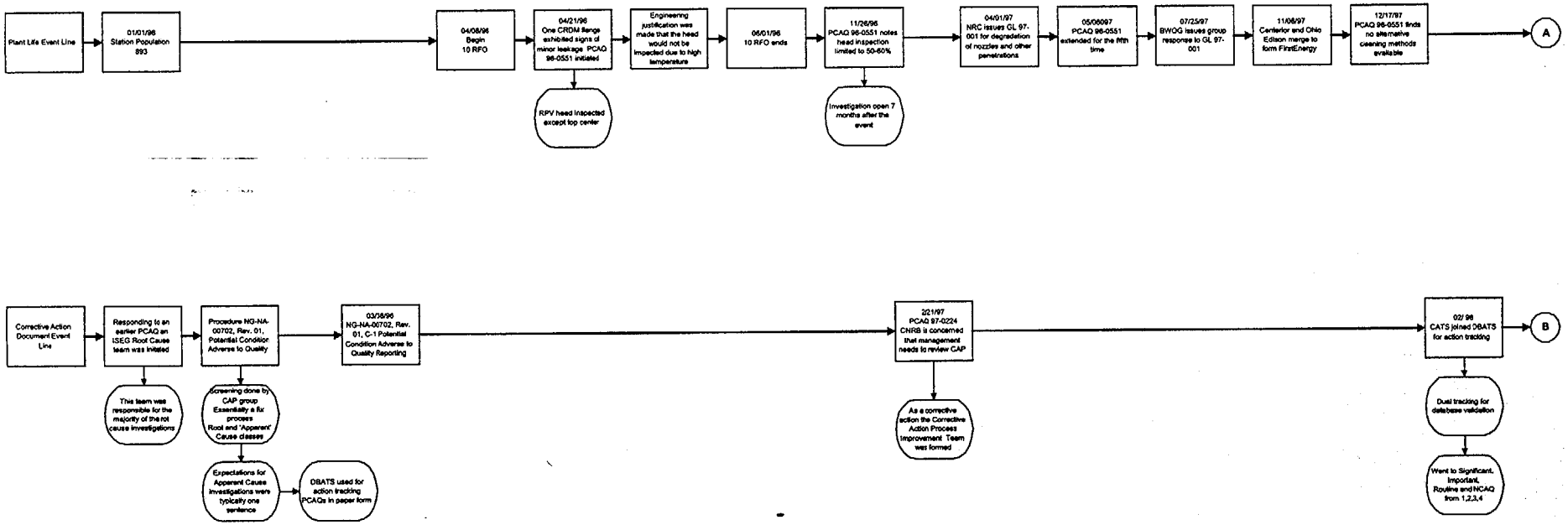
CR 02-04884 Timeline of Events



CR 02-04884 Timeline of Events

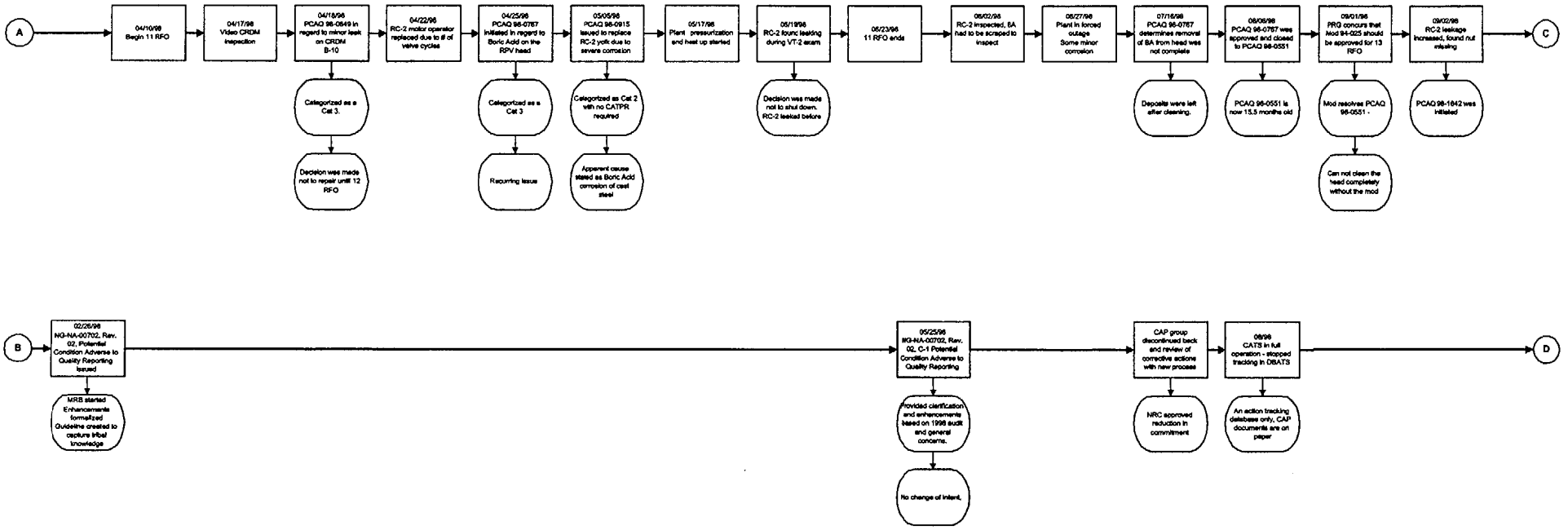


CR 02-04884 Ineffective Corrective Action Problem Resolution - Human Performance and Implementation



Bolded symbols indicate conditions of note, that were determined to have an impact on the robustness of the corrective action program

CR 02-04884 Ineffective Corrective Action Problem Resolution - Human Performance and Implementation



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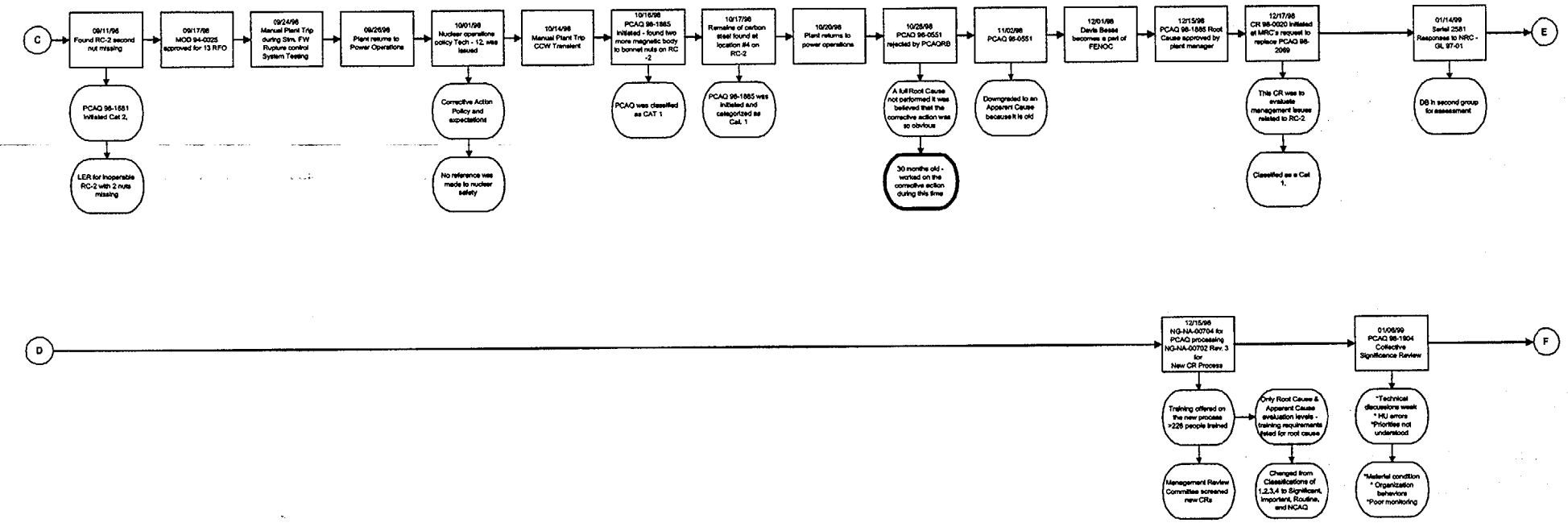

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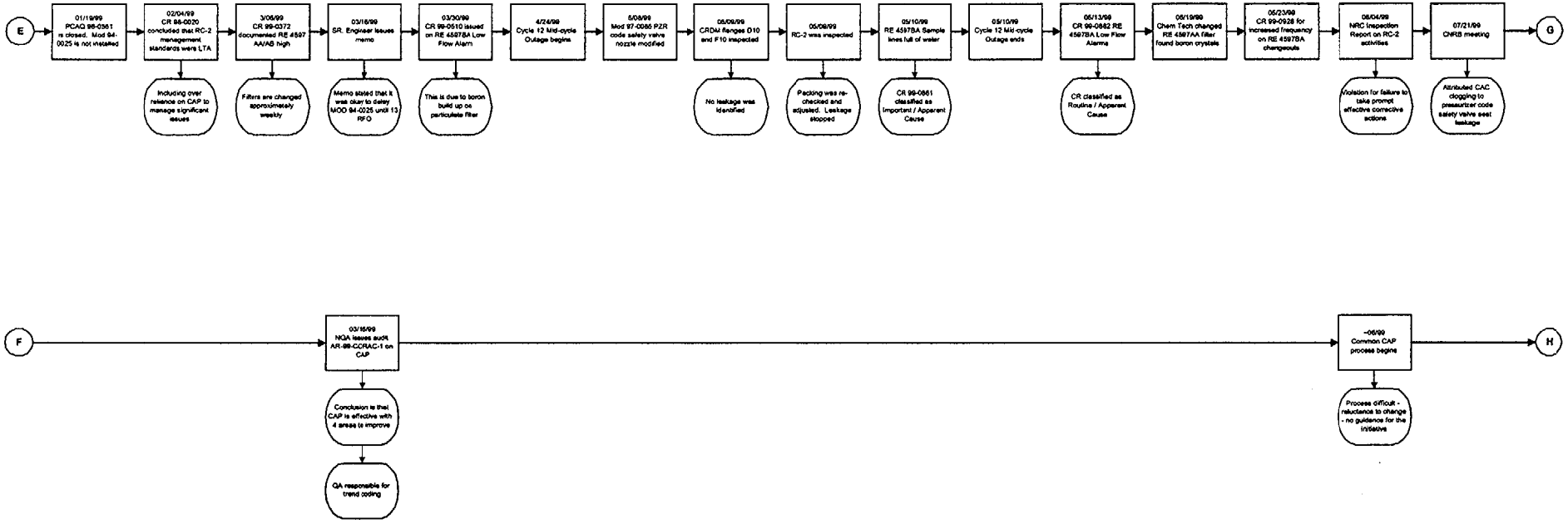

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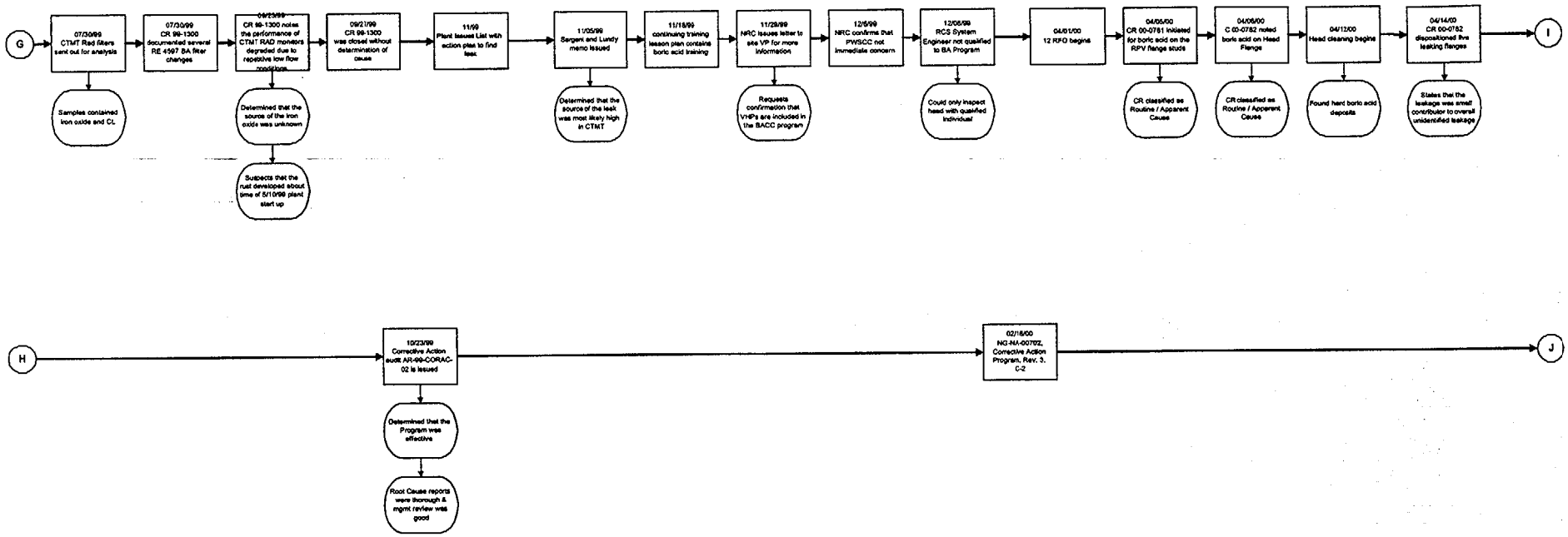

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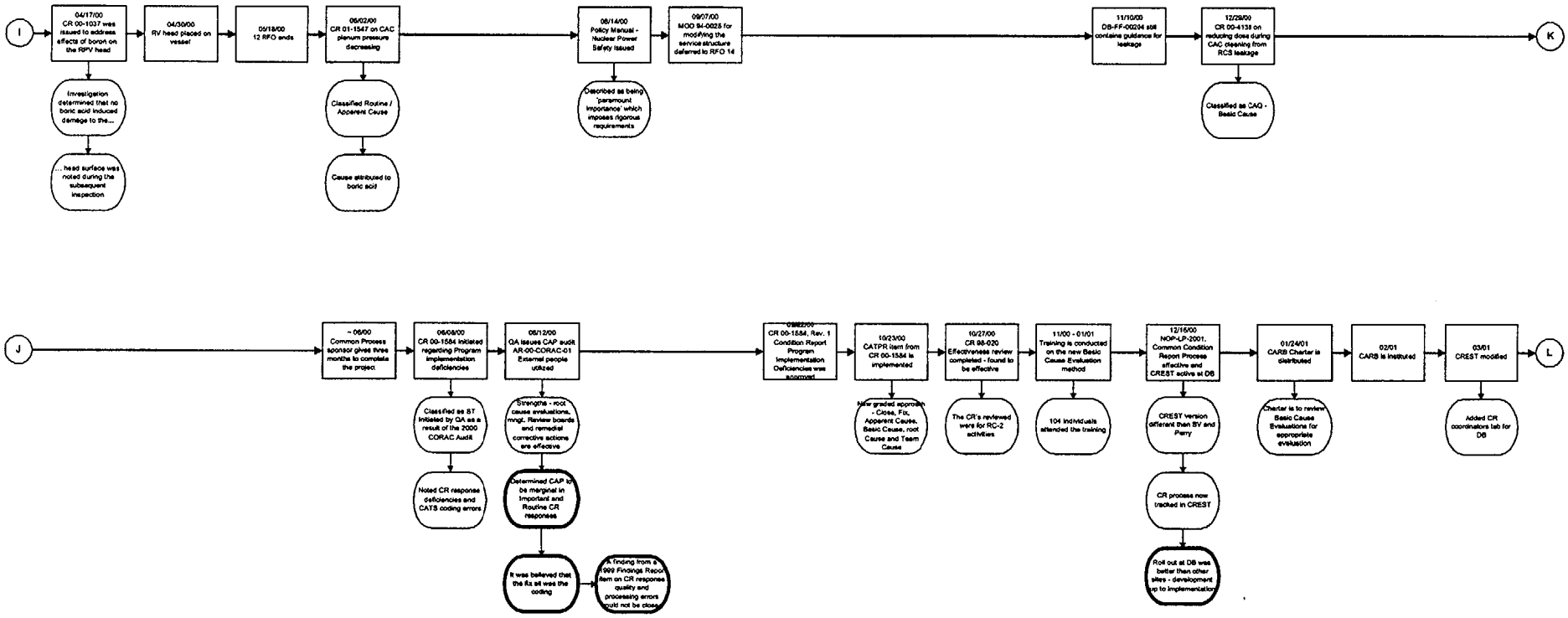

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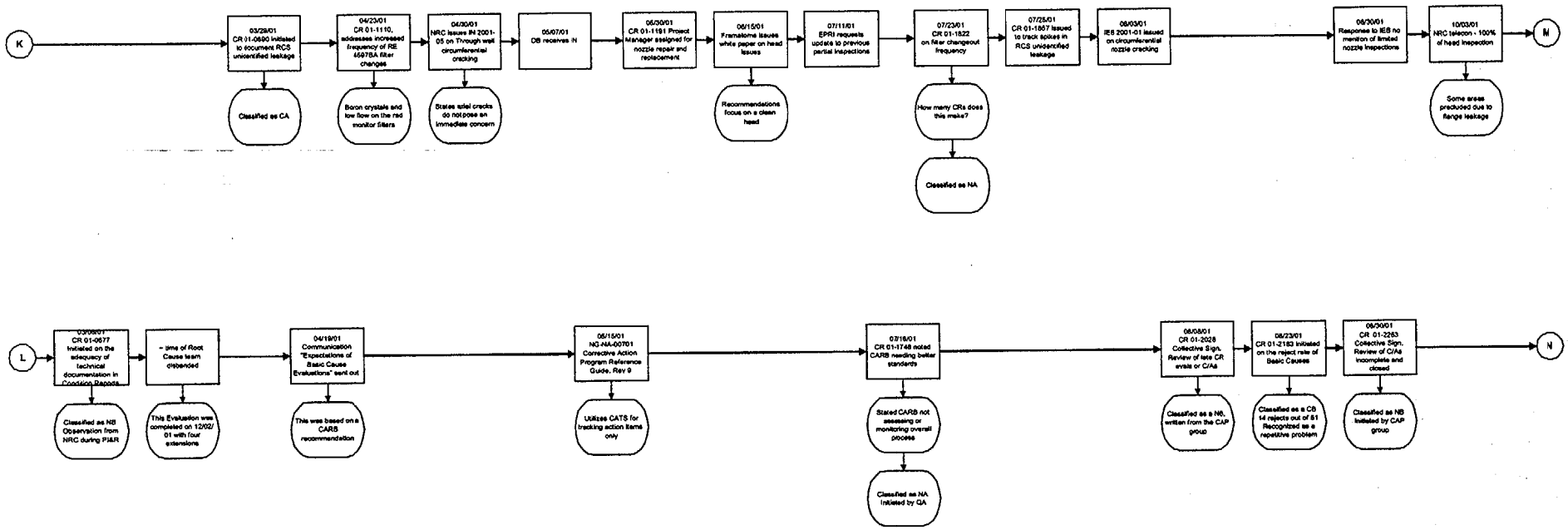
CR 02-04884 Ineffective Corrective Action Problem Resolution - Human Performance and Implementation



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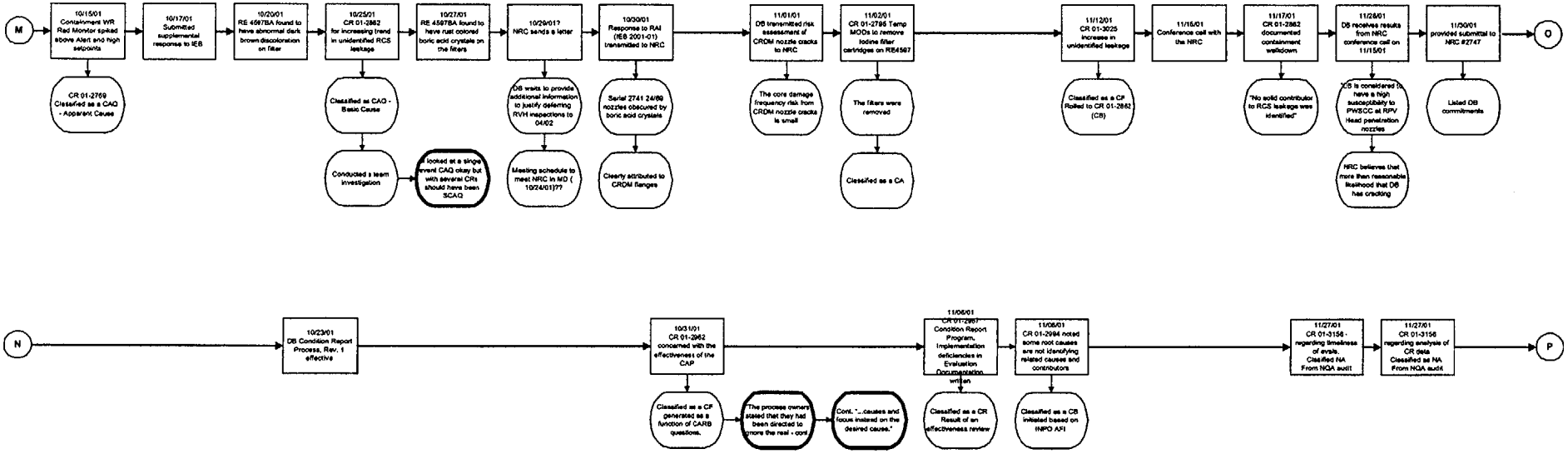

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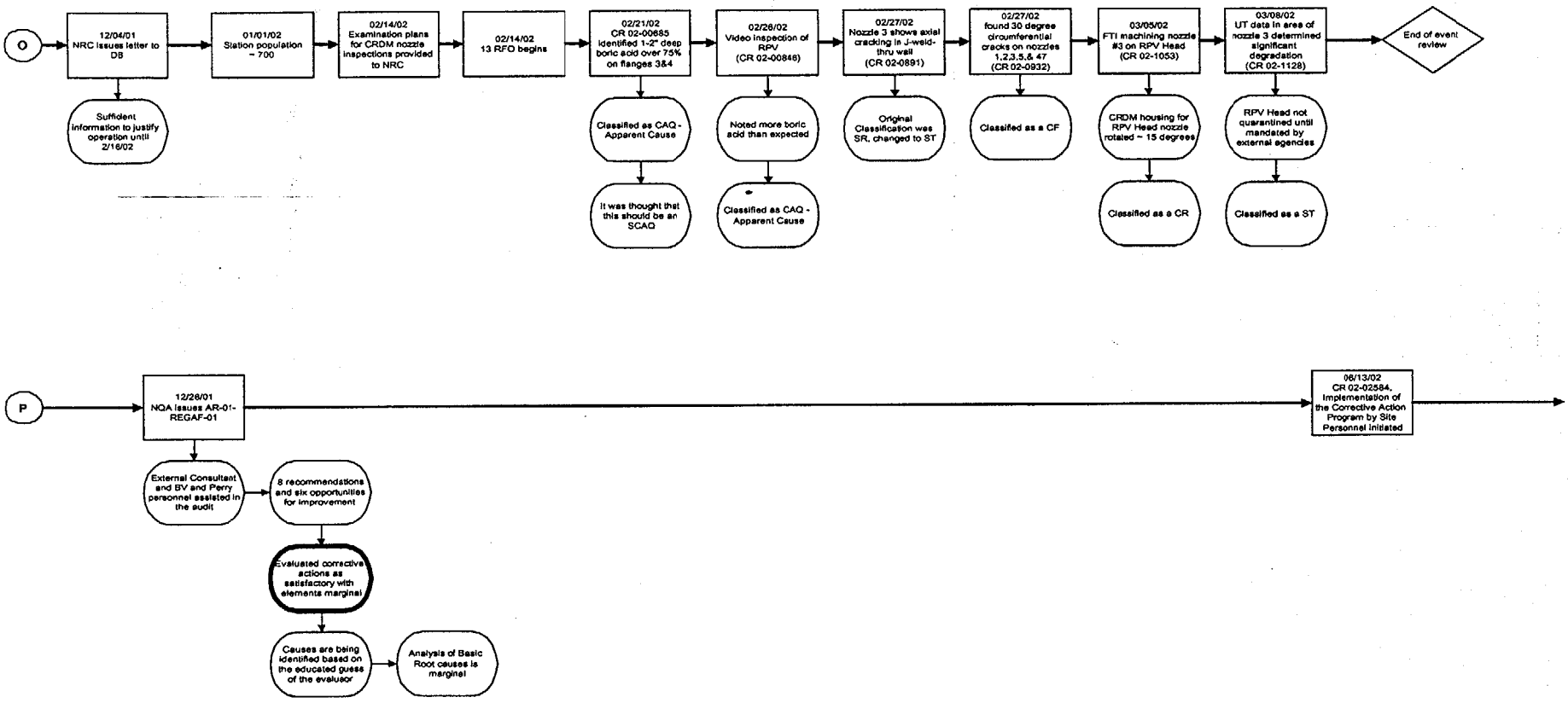

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Attachment 5
Barrier Analysis

Additional Immediate / Compensatory Measures for CAP Areas of Potential Weakness

Purpose: An extensive set of immediate/compensatory corrective actions was developed, and is being implemented, to respond to apparent and potential weaknesses in the Corrective Action Program (CAP) at Davis-Besse. In the initial phases of the CAP Focused Self-Assessment and Root Cause Evaluation, the Root Cause Evaluation Team reviewed data pertinent to the CAP, and performed a classical preliminary barrier analysis to identify actions pertinent to the various CAP functional areas and interfaces. These actions were then evaluated to define the positive contributions of each action and its criticality to the adequate functioning of the functional area.

Process: The Corrective Action Program (CAP) Program Review Report and CRs which were related to the CAP degradation problem statement were reviewed and discussed relative to potential significance and extent of condition. The CAP process was then segmented into traditional functional areas, and process barriers were correlated to each function area.

1. CR generation, threshold, timeliness, and content
   a) Originator Perception / Action *(A1b)*
   b) CREST Input *(A1a)*
   c) Supervisor Reception / Action *(A1c&d, A3b)*
   d) Supervisor Review *(A1b,A2a-c,A3a)*

2. Condition Report Significance Determination
   a) Originator Recommendation *(none)*
   b) Supervisor Recommendation and SRO Review *(B2a)*
   c) MRB Decision (with QA input on QA findings), including OE, Generic Implications/Extent of Conditions, Maintenance Rule, 10CFR21 *(B3a-b)*
   d) Owner Assignment *(none)*

3. CR Resolutions and Cause Analyses

	Evaluator	Reviewer	SMT (Root Causes)	CR Coordinator	Owner/Supvr	CARB	Performance Improvement
ST/SR	C1	C2a-c	None	C2a-d, C3a	C2a, C3a	C2	C1
CT/CR	C1	C2a-c	None	C2a-d, C3a	C2a, C3a	C2	C1
CB	C1	C2a-c	N/A	C2a-c,f,C3a	C2a, C3a	C2	C1
CA	C4a,b	C4c	N/A	C2c,e, C4	C4c	N/A	C4d
CF	N/A	N/A	N/A	C2c,e	*None*	N/A	C2e
CC	N/A	N/A	N/A	C2c,e	*None*	N/A	C2e

4. Corrective Action Implementation
   a) CAF Statement *(none)*
   b) Feedback and Documentation *(D1a)*
   c) CAF Closure *(D1a,b)*

5. Trending and Reporting
   a) CR Evaluation Cause Coding *(none)*
   b) Trend Report on Demand *(none)*
   c) Equipment and Material Trending *(none)*

6. CAP Oversight
   a) Audits *(none)*
   b) Performance Improvement Program Assessments *(C1,C2e,C4d,F1a)*
   c) Departmental Self-Assessments *(F2c)*
   d) CARB *(C2,F1c)*
   e) Senior Management Team *(none)*
   f) Managers/Supervisors *(C2a,C3a,F1b,d,F2a,b,c)*
   g) Workers *(C1,C4a,b,F1d)*
   h) INPO *(F2d)*
   i) USNRC *(none)*

7. CAP Infrastructure
   a) CAP Process Procedures and Guidelines *(G)*

8. Self-Assessment / Performance Observation / Operating Experience *(H)*

Table CAP Process Functional Areas and Barriers

Attachment 5
Barrier Analysis

Barrier Analysis:

A. Condition Report Generation, Threshold, Timeliness and Content

1. A CR was generated which stated that interviews with personnel indicated that there was a hesitancy to submit condition reports. The Barrier Analysis assumed that this could be an active condition and therefore, additional information from past SCWE surveys, alternative reporting methods (when information is releaseable), and interviews with a stratified, representative sample of personnel to identify the nature, extent and/or locus of the condition, would be required. While this information-gathering is occurring, the following actions will be taken to encourage personnel to report problems, as follows:
   a. Ensure that all personnel have ready access to condition report initiation forms. Some contractors, for example, may not have access to CREST. Therefore, a CREST alternative method of generating CRs, such as hard copies of the CR forms, should be readily available throughout the site with instructions for use and forwarding for supervisory review.
   b. Disseminate executive-level expectations from SVP and Directors to reinforce the necessity of identifying problems and documenting them in condition reports.
   c. Provide supervisors with training in assisting personnel to complete the forms and in following the process.
   d. Provide a CREST help line to supervisors that they may either use to answer any questions that arise or provide to their personnel.
2. Another potential condition is that supervisors are untimely in reviewing and forwarding condition reports. Potential reasons for this problem may include excessive workload, lack of clear management expectations regarding the requirement for prompt supervisory reviews, lack of knowledge of the CAP, or a lack of feedback regarding the existence of condition reports requiring their reviews. The following immediate / compensatory actions can improve supervisor CR processing performance:
   a. Provide executive-level expectation to reinforce management expectations regarding timely reviews until CAP procedures are revised to provide more detailed expectations regarding "timeliness."
   b. Task MRB and PI to monitor the content and timeliness of the CRs they review and provide specific, directed feedback to supervisor reviews are untimely.
   c. Provide CR Group Coordinators with monthly feedback that documents the elapsed time between CR initiation and completion of supervisory reviews so that they may work with managers and supervisors within their functional areas to resolve performance issues.
3. A lack of sufficient information in a CR or supervisory failure to identify conditions when an SRO review is required may result in untimely review for operability, reportability, configuration control, and plant status issues. Potential causes could include a lack of knowledge regarding the types of conditions of which the SRO must be informed, unawareness of the true significance of the condition due to insufficient detail in CRs, and/or a lack of knowledge of the CAP process. In the interim, the following compensatory actions can be taken:

a. Communicate clear management expectations that supervisors obtain first-hand information about the condition being reported to ensure that CR content is adequate for SRO review.
b. Provide training and decision aids to supervisors to ensure that they are able to determine which CRs must be forwarded for SRO review.

B. Condition Report Significance Determinations

No additional measures are indicated beyond those implemented. The following actions are currently implemented.

1. Originator Recommendation
   a. There are no restrictions and no actions required.
2. Supervisor Recommendation and Significance Determination
   a. OPS memo of 9/4/2002 stresses requirements for accuracy and timeliness.
3. MRB Categorization
   a. Manager Performance Assurance chairs MRB
   b. Director Support Services sponsors a pre-MRB CR screening
4. Owner
   a. There are no restrictions on owner review for regrading. No immediate or compensatory actions are required.

C. Condition Report Root Cause Analyses and Resolutions

Deficiencies in the independence, rigor and thoroughness of root cause analyses have been identified, resulting in the development and implementation of ineffective corrective actions in some cases. Graded levels of cause evaluation and the large number of people who become involved with the evaluation, review, and approval of CR cause evaluations highlight the need for knowledge and proficiency in performing cause analyses. It also highlights the need for self-critical thinking and questioning attitudes, including the application of peer checks to ensure that biases and ownership do not obscure potential causes and solutions. Any efforts to circumvent a peer check barrier subjects the CR owner to increased vulnerability for ineffective corrective actions. Actions to be implemented pending the development of an enhanced and more rigorous qualification and training program for evaluators and reviewers include:

1. An effective root cause analysis depends upon the amount and validity of the information gathered during an investigation and the application of formal, structured root cause analysis techniques by evaluators. Proficiency in cause evaluation techniques, although not quickly perishable, is maintained and enhanced through periodic application. To ensure that the personnel assigned to perform investigations and root cause analyses are appropriately qualified and proficient, the following interim actions were identified:
   a. Review incumbent root cause analysis personnel to determine the types of root cause analysis techniques in which they have been trained and the time elapsed since the training was completed or since they have successfully conducted a root cause evaluation.
   b. Retain as qualified only those root cause personnel who have either received training within the past two years or were previously trained and have conducted an acceptable root cause analysis within the past two years

c. Qualify personnel not meeting time/proficiency requirements on a case by case basis based upon equivalent demonstrated proficiency or provide additional remediation in the form of refresher training or a designated mentor.
d. Conduct initial root cause evaluator training as appropriate to reach necessary root cause trained populations.

2. Personnel who review and accept cause analyses can be expected to perform better if they are knowledgeable of the attributes of good cause analyses and are able to evaluate the products they are reviewing against the appropriate standards.
   a. Provide an overview of different root cause analysis techniques, their applicability, and their proper implementation to CARB, Managers (CR owners), and CR Group Coordinators (CARG) to ensure that CAP reviewers possess the necessary knowledge to perform effective reviews.
   b. Assign industry experienced mentors to observe review body functions and to provide critical assessment and feedback.
   c. Clarify and reinforce expectations for the expectations of departmental personnel (e.g. CR Coordinators) in the processing of CRs.
   d. Chair the CARB at the Director level and increase Manager level participation. (Implemented)
   e. Perform a closure review for quality of CRs that are not previously reviewed by an independent review body to ensure program adherence and to provide feedback to CR owners.
   f. Continue the Cause Analysis Review Group (CARG) to ensure quality of Basic Cause analyses and to provide mentoring feedback to evaluators through the CR Coordinators.
3. Condition report investigations require staff time and resources to be completed timely and multidisciplinary teams are often necessary to ensure that the scope of the issues investigated is sufficiently broad. Although CR owners and supervisors are not expected to be a designated cause analysis team member in an actual investigation, they are responsible for ensuring that sufficient resources are available to evaluators to conduct the investigations timely. They must understand the need for the evaluators to periodically work independently, in order to ensure that the investigation is objective and complete.
   a. Clarify and reinforce management expectations to supervisory personnel and CR owners regarding their roles and responsibilities with regard to investigations and root cause teams.
4. Quality and consistency of apparent cause evaluations may also be weak similar to identified deficiencies in root cause analyses. In order to buttress this component of the CAP, the following actions will be taken:
   a. Provide instruction in apparent cause evaluators.
   b. Identify and qualify personnel to be authorized to conduct apparent cause evaluations.
   c. Provide reviewers, owners and supervisors with an overview of the apparent cause evaluation process to ensure they understand the associated requirements.
   d. Perform a near real time concurrence review by experienced Performance Improvement personnel of all newly approved evaluations to monitor quality and procedural adherence.

Attachment 5
Barrier Analysis

D. Corrective Action Closure

Corrective Action closure involves completing the action as stated and documenting the action taken. This can be complicated by actions consolidated or rolled to other actions, and extensions to actions. Thus there are both accuracy and timeliness components. Timeliness attributes for the shutdown condition are adequately handled through licensed Operator controlled programs. General aging of non-plant critical actions will have only minor impacts on shutdown risk safety.

1. Integrity of action closure and program compliance are of more immediate concern and can be addressed by a CR closure review.
    a. Performance Improvement will perform administrative reviews of the SCAQs and CAQs in CREST that are ready for closure to determine if any additional actions are required and to provide feedback to the owners regarding necessary next steps to close them out.
        1) Develop scope and guidance for Performance Improvement CR Closure reviews
            a) Evaluate the need for NCAQ reviews and, if necessary, what the scope of those reviews should be.
            b) Clarify the scope of SCAQ and CAQ effectiveness reviews and develop implementation guidance.
    b. Provide guidance for Effectiveness Reviews for completed corrective actions to provide consistency and expectations.

E. Trending and Reporting

In addition to developing areas to trend and monitor that are specific to the outage, the relationship of the CAP to other equipment and materiel records systems, including the work order system, will be delineated to identify areas of overlap and gaps in the information maintained and reported. Equipment deficiency trending, although not part of the CREST process, is important to prevention of events and is being addressed in other processes. Trending and reporting is a process using historical data not only to identify repetitive events, but also to identify developing trends and precursors to more serious events. The shutdown plant condition has reduced much of the potential reactor core damage risk contribution from equipment operation/malfunction and personnel events. No immediate or compensatory actions were determined to be necessary.

F. CAP Oversight

CAP oversight has been ineffective in ensuring that CAP weaknesses are identified, analyzed and resolved timely. CR 02-04884 speaks directly to this condition. Opportunities for improvement have been missed. Immediate and compensatory measures and actions are largely duplicative of actions in primary functional areas.

1. Experienced personnel and other resources are limiting factors in improving programmatic performance.
    a. Assign additional CAP recovery experience personnel to Performance Improvement and departmental activities as required. (Ongoing)
    b. Senior management changes have been implemented to begin the process of realigning expectations and performance standards. (Complete. However additional changes will occur as may be appropriate.)

c. Membership of CARB upgraded to Plant Manager Chair and expectations for Manager participation. Senior Management Team review added for significant conditions. (Complete. Procedure revision will institutionalize.)
d. Provide training for key personnel. (Training for cause analysis is addressed in Cause Analysis functional area.)

2. Standards and expectations lead the implementation of program and procedure revisions. People will generally do the right things if the expectations are communicated and reinforced.
   a. Reinforce CAP performance expectations at routine meetings such as the MCTM. (ongoing)
   b. Meet with the supervisor population on regular intervals to discuss CAP problems, improvement actions, and supervisor involvement. (ongoing)
   c. Managers and supervisors sign on to core CAP principles and communicate these core CAP values to their respective organizations.
   d. Utilize INPO assistance to validate expectations and standards. (Scheduled)

G. CAP Infrastructure

CR 02-04885 speaks directly to the contribution of CAP infrastructure to the CAP degradation. Opportunities for improvement have been protracted. Immediate and compensatory measures and actions are largely duplicative of actions in primary functional areas. The Infrastructure Root Cause Team will evaluate this area and determine the need for infrastructure adjustments. Interim measures in infrastructure overlap with CAP Oversight issues:

1. Perform CAP benchmarking.
2. Complete interviews and/or surveys of personnel to identify trouble spots in the CAP. (CR Coordinators in CARG can be used as a window on CAP implementation issues.)

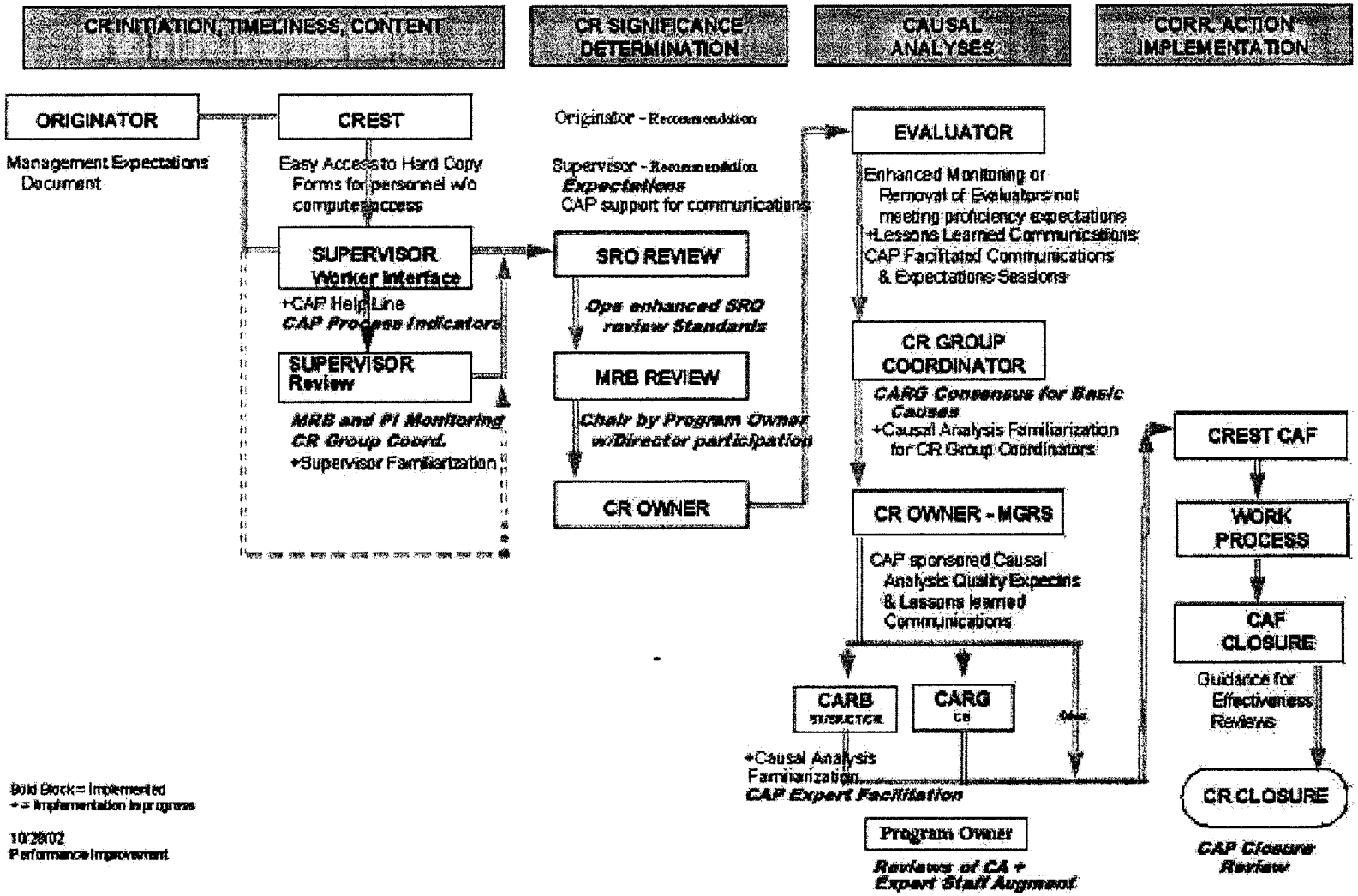
H. Self-Assessment/Performance Observation/Operating Experience

Lessons learned from operating experience, as documented in the CAP, are not being utilized effectively. To strengthen this area, the following compensatory actions are planned:

1. Implement OE/EOC reviews for all Basic Cause evaluations.
2. Train personnel in OE expectations and revised process (when revision is implemented).

Corrective Action Process

Significant Immediate & Compensatory Measures Flowchart



Organization and Program Interface Chart Stream Analysis

The CR 02-04884 Corrective Action Program Root Cause utilized $PII_@$ analysis to evaluated the effectiveness of organizational and programmatic attributes relative to the station's implementation of the Corrective Action Program.

This analysis was performed using the $PII_@$ Stream Analysis using the "Organizational and Programmatic Diagnostic Chart" and the "Executive Management Failure Mode Chart". All pertinent available data (Condition Reports, procedures, reference materials, interviews, etc.) applicable to the organization (or process) is compiled, analyzed and then compared against the two Failure Mode Charts.

Organizational &Programmatic Diagnostic Investigation Chart

The O&P Diagnostic Chart includes five major categories, which are then divided into sub-categories or Failure Modes for the purpose of determining the effectiveness of an organization. As designed within O&P Diagnostic charting methodology, for an organization (or process) area to be considered effective (or a strength), that organization (or process) area must not include deficiencies in more than three of the following five major categories analyzed. The areas were evaluated with the results depicted in Attachment 7 and 8.

In the event the analysis process should reveal a progression of Failure Modes in two or more of the major categories on the O&P Diagnostic Chart, the cause for the condition or event is then determined using the Executive Management Failure Mode Chart.

Executive Management Failure Mode Chart

The Executive Management Failure Mode Chart includes six major categories, with sub-categories of various Failure Modes. As designed within Executive Management Failure Mode charting methodology, for an organizational area to be considered effective (or a strength), that organizational area must not include deficiencies in more than three of the following five major categories analyzed. The areas were evaluated with the results depicted in Attachment 7 and 8.

When the analysis process discovers any deficiencies (Failure Modes), applicable to the organization or process, the Failure Modes are then further analyzed to determine cause (s) of the Failure Mode(s), by asking the question "Why" (i.e., "Why Staircase") until the Root Cause(s) is determined.

These Failure Mode Charts are depicted in Attachments 7 and 8.

Analysis Results

The team re-evaluated the 110 issues described in the CR problem statements that had been previously binned using Affinity Analysis technique. The result of this "super-binning" revealed that the majority of the CR problem statements was a "Expectation Violation" the failure to follow established procedures and regulatory requirements in the Management Expectation Error branch of the Executive Management Failure Mode Chart.

The team took this problem statement through the PII Organizational and Programatic Deficiencies Diagnostic Chart. The team found specific clusters of the CR problem statements to following Organizational and Programatic Deficiencies:

Programmatic Deficiencies
P1, Insufficient Detail
P2, Inadequate Scope
P3, Excessive Implementation Requirements

Organization to Program Interface Deficiencies
OP1, Lack of Commitment to Program Implementation
OP2, Inadequate Program Monitoring or Management
OP3, Lack of Program Evaluation Process
OP4, Lack of Organizational authority for Program Implementation

The results from this analysis led the team to analyze the problem statements with Executive Management Failure Mode Chart. The team found specific clusters of the CR problem statements to the following categories of Management Ineffectiveness or Errors:

Control Errors
C1, Inadequate performance Monitoring and Training
C3, Inadequate Root and Common Cause Analysis
C5, Inadequate Adjustment
C6, Inadequate Actuation
C7, Inadequate Scope of Control
C8, Inadequate Organizational Development

Management Expectation Errors
M1, Vague or Unclear Expectations
M2, Inconsistent Expectations
M3, Confusing Expectations
M4, Expectation Violations

These results were re-analyzed for common cause. The largest number of failure modes identified was in the "control errors". The control error failure mode was analyzed and it was concluded that a majority of the control errors (such as inadequate cause analysis, inadequate corrective action determination and inadequate corrective action implementation) were directly influenced by improper implementation of corrective action program elements (such as trending and low CR categorization as discussed in CR 02-00891).

The primary error category Management Expectations (vague, unclear, inconsistent expectations and expectations violations caused by inadequate enforcement). Other categories that were noteworthy were programmatic deficiencies (insufficient detail, easily followed), and Organization to Program Interface (Lack of commitment to program implementation).

Further analysis is described in Section 3.1.7 and 3.1.8 of the report.

Organizational and Programmatic Diagnostic Chart

The following are the primary conclusions/review areas from the Organizational and Programmatic (O&P) Failure Modes analysis, which were determined and are applicable to the CR 02-04884 Corrective Action Program Root Cause. The actual O&P Diagnostic Chart used to perform this analysis is included within this attachment. In addition to identifying Corrective Action Program Deficiencies, the large number of issues led the evaluation to the Management Ineffectiveness or Errors Failure Mode Chart, Attachment 8.

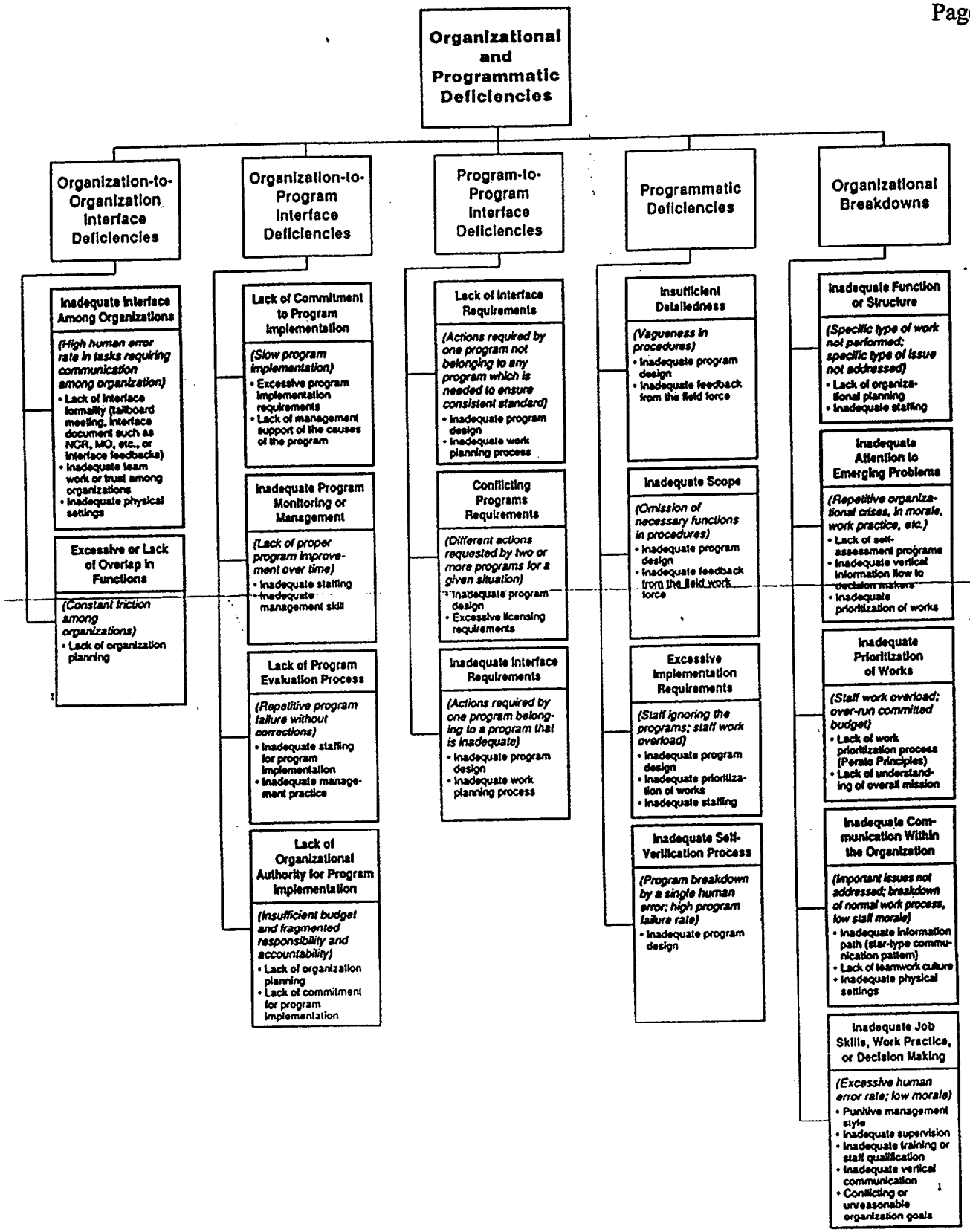
Organization to Program Interface Deficiencies

OP-1 Lack of Commitment to Program Implementation
OP-2 Inadequate Program Monitoring or Management
OP-3 Lack of Program Evaluation Process
OP-4 Lack of Organizational Authority for Program Implementation

Programmatic Deficiencies

P-1 Insufficient Detail
P-2 Inadequate Scope
P-3 Excessive Implementation Requirements

Organizational and Programmatic Diagnostic Chart



Management Ineffectiveness or Errors Failure Mode Chart

The large number of issues led the evaluation to consider influences described in the Management Ineffectiveness or Errors Failure Mode Chart. The following are the primary conclusions/review areas from the Management Ineffectiveness or Errors Failure Modes analysis, which were determined to be applicable to the CR 02-04884 Corrective Action Program Root Cause. In addition, the actual Management Ineffectiveness or Errors Failure Mode Chart used to perform this analysis is included within this attachment.

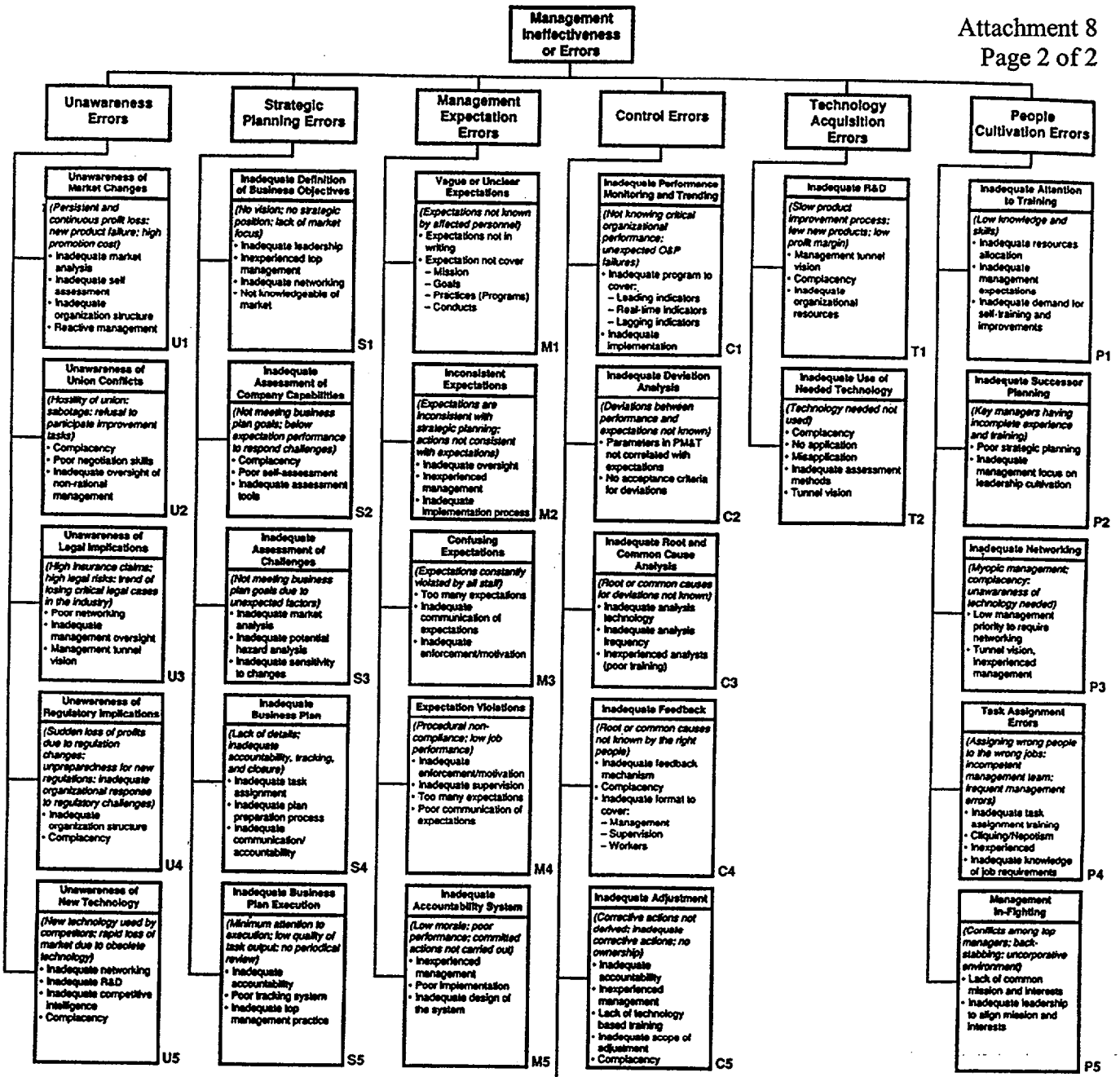
Management Expectation Errors

M-1 Vague or Unclear Expectations
M-2 Inconsistent Expectations
M-3 Confusing Expectations
M-4 Expectation Violations

Control Errors

C-1 Inadequate Performance Monitoring and Trending
C-3 Inadequate Root and Common Cause Analysis
C-5 Inadequate Adjustment
C-6 Inadequate Actuation
C-7 Inadequate Scope of Control
C-8 Inadequate Organization Development

Executive Management Failure Mode Chart



EXECUTIVE MANAGEMENT FAILURE MODE CHART

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: BCH1		Interview notes: BCH2	
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**							0		0
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16	The CREST process is harder but the CREST computer interface is easier			0
1a 7		yes	19	3						
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.							0		0
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3	Should not put requirements in the Guideline - only stuff to help. Requirements should be in NOP			0
2a 9		yes	12	5						
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.							0		0
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3		0	May want to eliminate basic causes	
3a 12		yes	11	7						

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: BCH1	Interview notes: BCH2
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						0	0
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0	Don't really see PI s or trend data	We missed the boat on the analysis of PI s - we are not looking at the right things. PI shouldn't analyze numbers - only section managers should analyze their respective PI s. We are missing repeat events - but we are getting better.
4a 7		yes	10	9				
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval						No correct answer	No correct answer
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4	Due dates are overpowering - too many CR s to resolve	Did not prioritize CATPRs - little accountability for important items.
5a 11		no	9	10				
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.						0	0
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3	CR process is too much of an action tracking system - should focus on CAQs or SCAQs - the process is run by due dates	In 2001, INPO, NRC, QA said CAP was "good" - then had the head event - now CAP is all messed up. Doesn't make sense.
6a 11		no	4	15				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: BCH1	Interview notes: BCH2
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						0	0
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	The CAP is less consistent than in the past - must balance working relationship	Need to restore PI to being responsible for entire system - quality control and closeout as it used to be under PCAQ. This needs to be done at least until the station can show that they can make CAP work.
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						We try to fix it.	Root cause and basic cause analysis are good - apparent cause is not as good.
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11	No falsification	No evidence of falsification.
8a 8		no	10	11				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: BCH1	Interview notes: BCH2
							0	0
9 7	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.	B	2	15	8		We dropped some important things to make it simpe - lost effectiveness. Management doesn't understand how hard it is to make the CR process work	Management has been standing on a slippery slope - the troop push back when they feel that they need more support. Management may want to actually draft a CR to see how hard it is.
9a 9	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	yes	14	6			CR s should not be an action tracking system - should differentiate between CAQs and minor issues.	Initiation is not a problem - but some workers are burried under a pile of CRs
10 12	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**	C	3	10	9			
	Additional Comments Section						Management rotation has been a big factor - nobody saw the whole picture. There was no continuity. Nobody stayed around long enough to see the whole issue. Staff reductions in the 1990s caused a lack of people to make improvements. Everyone was workin	The 3 site VPs don't agree on FENOC common processes. The Directors want it their way and don't support the common processes. Need to get rid of basic causes. They were a good idea but executed poorly. They are not done well enough to get CATPR. It i

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: BCH3	Interview notes: BCH4
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						0	0
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16	trending has improved	0
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.						The Guideline has too much duplication - needs to be more concise. They keep changing things in CREST - an example is th emode restraint list. The site can't get needed trend reports. Apparent cause coding needs to be improved. They need to turn the c	0
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3	Most people do not use the NOP. Should not have the trend code guide in multiple places - too confusing. People using root cause trend codes for apparent causes and vice versa.	0
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.						0	0
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3	Basic cause is a lite root cause.	Root causes may be declining in quality since the RCA Group was disbanded.
3a 12		yes	11	7				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: BCH3	Interview notes: BCH4	
4 18	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.	B	6	14	4	0	CARG uses PI s well.	Need to do better	
4a 7	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	yes	10	9			Does not use PI s - each department has its own PI s that are used to manage resources. E.g. the DBAR.		0
5 16	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval	C	1	3	9	4	Need to temper workload with importance. Need to prioritize better. It is hard to pick out the plums.		0
5a 11	The timeliness of corrective actions has improved over the past 2 years. Yes-No	no	9	10			Too many CRs today - backlog is one year - 800 CRs pending. People are "extension happy" - managers re telling them to just close them - don't spend the time asking for an extension, spend the time to close the CR or take action. Need to lay out the pla	Do not allow corrective actions to be rolled up and combined into other CRs - this is just a way of delaying actions by transfering to CRs with later due dates.	0
6 14	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.	C	3	9	10	3	Good formulation of CAFs in general. Change management is a big issue. It is not well done. Examples are the 50.59 process and SAP. This is a BIG DEAL.		0
6a 11	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	no	4	15			Falling down in implementation - losing something in the translation.		0

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Interview Comments compiled by question Question number	ANS	Answer Analysis A	B	C	D	Interview notes: BCH3	Interview notes: BCH4	
Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						PI was "load shedding" their responsibilities. The Root Cause Group was a consistent way of ensuring effective root cause determination. Managers did not like because they could not control the outcome.	PI is doing too much.	
7 11 The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	CARG gas been a good step for improvement.		0
7a 11	no	7	12			definite improvement - no longer losing CRs to PCRs		0
Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**								
8 13 The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11	Still have lots of room for improvement.		0
8a 8	no	10	11					

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Interview Comments compiled by question Question number		Answer Analysis ANS	A	B	C	D	Interview notes: BCH3	Interview notes: BCH4
	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.						0	0
9 7	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	B	2	15	8		Now seeing lots of frustration by management. The shear volume of CRs is an overwhelming issue. Managers are bottlenecks.	0
9a 9		yes	14	6				
	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**						CR coordinators have a full time job - may need more than one to keep up.	0
10 12		C	3	10	9			
	Additional Comments Section						Additional Comments/Notes: Time pressure and resource limits are really trying the organization right now. Falling further behind. Concerned that nobody is looking at the "big picture" - just plowing through CRs. This was the same issue that got them	Additional Comments/Notes: CARB needs someone to validate that process requirements are met before CRs go to CARB. This is causing backlog problems. Extent of condition is not well understand by many people - extent of condition analyses are often of

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Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: JCH1	Interview notes: JTS1
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						Ensure all levels of the organization (e.g. trench's) receives training for actilties they are expected to perform.	Follow procedure w/rigor, can't proceduralize how to think.
1 17		D	2	0	5	16		
	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)						Answered from a personnal perspective. The individual had less CAP repsonsibilites in past programs. This may or may not be due to his organization having primary/designated folks to handle most CAP stuff.	Improved data base.
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.						The individual has had little to no involvement with the processes beyond initiation.	Always room for improvement, but, basically adequate.
2 20		B	3	10	7	3		
	The Guideline is more effective than the process used 2 years ago. Yes-No						Ditto - has never really needed the guide for initiation. Feels CREST is pretty intuitive for this aspect.	Better than PCAQR, but no change in the last two years
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.						Has no opinion here due to as stated earlier, he has had no involvement with this aspect.	Advocate of a dedicated root cause group to lead teams, mentor basic cause analysts. CARB has 50%reject rate, but Basic causes were the worst CARB is high, Apparent Causes are binned, trended and corrected.
3 18		C	0	3	15	3		
	Cause determinations have improved over the past 2 years. Yes-No						Ditto	Although reject rate is currently high, 2 years ago, cause determinations were rarely on target.
3a 12		yes	11	7				

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Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: JCH1	Interview notes: JTS1
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						Has not personnaly seen a case where trending/indicators have actually monitored - made a determination - and corrected things. If they did, we wouldn't be in today's mess. This opinion goes beyond the realm of CAP. Thinks this is the case across the b	Rolling up masks problems, monitor performance by sections.
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0	They have never shown him much. Trending is missing the boat. (e.g. results of QC inspections are not captured and trended anywherel	0
4a 7		yes	10	9				
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval						Has no real fell or response due to lack of process involvement. But does believe that due dates have no place if things are well managed/prioritized, and adequate resources are available to address the jump-ups.	There was no timeliness issue before the plant shutdown, recent performance issues are due to the large generation rate. Meaningful to track backlog by size and average age of issues.
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4	Don't know	Timeliness has recently degraded because of large backlog of issues associated with shutdown.
5a 11		no	9	10				
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.						What we are living today is an example.	CAs are inappropriate if the Cause evaluation was poor
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3	Don't know	No change
6a 11		no	4	15				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: JCH1	Interview notes: JTS1
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						It just makes common sense. However, it seems like Performance Improvement is being held accountable for everything, including spoonfeeding the process.	Senior Management didn't hold directors accountable, 2000 QA audit findings that station departments are not accepting ownership. The departments consider the CAP as an additional administrative burden. Last NRC problem identification and resolution ins
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	Don't know. However, it does seem like we are always trashing that which is almost working, or not being implemented well, instead of just merely fine-tuning it. This too, applies to all things, not just the CAP stuff.	Difficult to measure since March, prior to March no change from two years prior.
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						This has always been the case, as the sqeaky wheel/high visibility stuff always seems to get better attention.	There is heavy reliance on review.
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11	Don't know.	The end product is much better. However, there are instances where actions were not implemented.
8a 8		no	10	11				

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Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: JCH1	Interview notes: JTS1
9 7	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.	B	2	15	8		Under estimation of resources likely comes from a lack of mangement's knowledge of the process and requirments. Possibly training could help, but even then infrequent use/implementation of the process by them, themselves will prevent an adequate understa	0
9a 9	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	yes	14	6			Probably not. Frequent management changes, including reshuffles,has contributed to a general lack of familiarity with what they are in charge of.	0
10 12	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**	C	3	10	9		The individual is a willing participant, and has been with regards to initiation, and feels that in general there are no Safety Concious Work Environment concerns. Even though past/current involvement has been limited to initiation, he would be willing t	0
	Additional Comments Section						Additional Comments/Notes: 1) Not anti-computer, but prefers the old paper systems due to a belief that there was less chance for errors. 2) Would like to know why QC is not better utilized - they are not required to complete FOC's, not utilized for focus	Additional Comments/Notes:

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Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: JTS2	Interview notes: JTS3
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						The FENOC NOP detail is not as good as the previous station procedure.	The CR process can be easily learned. However, problems exist with cause analysis, for some engineers, cause analysis is a best guess at best.
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16		0 0
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.							0 Simplify the procedure and rewrite it as a stand alone procedure.
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3		0 The Guideline imposed additional requirements making the procedure more complex.
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.							0 Supports a Root Cause Group. CARB is the last line of defense to catch problems, Basic causes are poor, a small group should do root cause. We don't step back and study the analysis, we have been comfortable to bin issues as process and training. We sta
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3		
3a 12		yes	11	7			However, the delay in taking basic causes to CARG is an impediment to effective, timely feedback as a learning tool.	can't judge.

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: JTS2	Interview notes: JTS3	
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						Present indicators are designed for senior managers. We need plant section indicators.	Root Cause Evaluation Quality PI should distinguish between deficiencies in the quality of the cause analysis and administrative deficiencies. Also, the formula used in the Program & Process Error Rate PI should be more definitive.	
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0	Combined action reporting system (CARS) is a valuable supplement to the present Pis.		0
4a 7		yes	10	9					
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval						Use timeliness expectations as stated. The current system has higher expectations for supervisor review and comments. This assists the SRO who now has better information to review.	The default time requirements cause premature closeout of tasks that reduces the quality of evaluations.	
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4	Not improved because of the increased volume of CRs generated during shutdown.		0
5a 11		no	9	10					
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.						CAs from basic and root causes are effective, those from apparent causes are not. Difficult to benchmark to others, McGuire was recommended by INPO but the plant had major equipment reliability problems. I expect that the analysis for a Basic cause is	Actions generally not very good, they avoid the human element and usually go for procedure and process actions.	
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3		0 No Change	
6a 11		no	4	15					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: JTS2	Interview notes: JTS3
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.							0 "Smeared Ownership" is no ownership, PI should be the owner. However, they should not be responsible for poor performance in other departments. Departments should be responsible for implementation with PI oversight.
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	The CAP is in overload because of the high volume. The issue is staffing, the CR load does not match available staffing. For example, there were 54 CRs last year concerning the diesel generators. One person was responsible for all of these, some of whi	Moved backwards in eliminating feedback to the originator. Also, the PCAQR review board had added quality.
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**							0 CARB has added little value to CRs. Example of not hitting the mark on corrective actions is a safety tagging root cause.
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11		0 0
8a 8		no	10	11				

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Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: JTS2	Interview notes: JTS3
								0 Process didn't have management support. Management could influence and water down root cause analysis.
9 7	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.	B	2	15	8		The big picture is on balancing the number of CRs with a group's resources, we are doing more basic and root cause analysis	Currently, strong management support, but underestimate resources.
9a 9	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	yes	14	6			It is sometimes difficult to understand why a persons been assigned a particular CR.	There is no feedback. People are afraid of CRs because of resource and time issues.
10 12	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**	C	3	10	9			
	Additional Comments Section						Additional Comments/Notes:	Additional Comments/Notes:

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: JTS4	Interview notes: JTS5
1 17	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**	D	2	0	5	16	It is difficult to find information in the tutorial, NOP and procedure guideline. Need to reformat.	People should go through an apprenticeship training period with a mentor to learn the corrective action process and the cause analysis process.
1a 7	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	yes	19	3			0	0
2 20	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.	B	3	10	7	3	It would be helpful to have a guide to assist going through the e-screens of CREST	Guidance missing on some issues: The process to request a downgrade is not developed.
2a 9	The Guideline is more effective than the process used 2 years ago. Yes-No	yes	12	5			0	0
3 18	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.	C	0	3	15	3	A dedicated root cause group would offer better analysis. Categorization is too high, there are too many root cause analysis assigned. The team approach for root causes is best, they should not be assigned to individuals. Basic causes have gotten bette	We tend to try and force people to do cause analysis who don't have the ability or skills. Also, the previous corrective action program had the concept of corrective actions to prevent recurrence (CATPR). The current program does not, and because a Basi
3a 12	Cause determinations have improved over the past 2 years. Yes-No	yes	11	7			0	0

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: JTS4	Interview notes: JTS5
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						PIs are not telling us a lot. However, reporting the self-identification rate is important.	I don't see personal value in current PIs.
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0		0
4a 7		yes	10	9				0
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval							0 Timeliness requirements should be based on significance, we need the flexibility to make prudent business decisions.
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4		0 The increased generation rate during the shutdown has caused the situation to degrade.
5a 11		no	9	10				
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.						Volume of CRs adversely affects quality.	The type of cause analysis selected implies the confidence level that the corrective action will prevent recurrence. A Basic cause analysis is not as deep as a root cause analysis, it does not question as far beyond the first "why." The expected output
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3	Difficult to judge personally.	Does not require CATPR
6a 11		no	4	15				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: JTS4	Interview notes: JTS5
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.							0 PI should own program, PI should assist users as needed.
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	The Corrective Action Process is more effective because of CREST.	The station had enjoyed the former organization assisting in maintaining the quality of CRs and analysis. Support was cut back for economic reasons as station resources were decreased. "The work flew over the cubical walls" as the old CAP support organi
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						Problem is getting acceptance by the owner of corrective actions when assigned by the evaluator. The owner frequently disagrees with the action assigned and elevates the issue to management.	0
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11		0 We wouldn't need CARG if all were ok.
8a 8		no	10	11				

CR -02-04884 Root Cause Interview Questions and Answers

Interview Comments compiled by question		Answer Analysis					Interview notes:	Interview notes:
Question number		ANS	A	B	C	D	JTS4	JTS5
	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.						Problem is inadequate resources, even with out the additional requirements resulting from the shutdown.	Recent previous experience with resource allocation, although assigned a team root cause analysis, the issue was downgraded to "CB" because of lack of support from all three sites.
9	7	B		2	15	8		
	Management support for the corrective action process is better now than it was 2 years ago. Yes-No							0 It's improved from choice C in question 9 above.
9a	9	yes		14	6			
	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**						An Originator should not be assigned to answer their own CR. This discourages future participation in the process.	0
10	12	C		3	10	9		
	Additional Comments Section						Additional Comments/Notes: The method of tying the corrective action to a work order needs improvement. CREST allows only one work order to a corrective action. So, multiple CA must be created and tracked if actions involve multiple work orders.	Additional Comments/Notes:

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: K1	Interview notes: K2	
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						Root Cause training is good. CREST trianing offered a two hour optional course. CREST is not easy and not infallible.		0
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16	Overall	Better than having hard copies.	
1a 7		yes	19	3					
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.						The guideline is not written to follow the CREST process.	Would be nice to have in print.	
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3	On line vs. paper not searchable	CREST is becoming more unstable	
2a 9		yes	12	5					
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.						Between C and D. Would not say rarely on target.	Individual management style	
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3	People dependent	More scrutiny	
3a 12		yes	11	7					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes:	K1	Interview notes:	K2
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						Doesn't se the trending			0
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0		0		0
4a 7		yes	10	9						
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval						If the dates are adhered to they would be timely.		With some management	
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4		0 The volume is a concern		
5a 11		no	9	10						
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.						Pockets of inconsistencies, some good, some not so good		For right now	
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3	Pockets of inconsistencies, some good, some not so good		Dilution is a concern	
6a 11		no	4	15						

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: K1	Interview notes: K2	
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						Hard to answer, the PI group should be administering with more involvement		0
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1		0	0
7a 11		no	7	12					
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						What is CARG?	there is some venting taking place in the process.	
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11		0	0
8a 8		no	10	11					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: K1	Interview notes: K2
	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.						0	0
9 7	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	B	2	15	8		0	0
9a 9		yes	14	6				
	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**						Most people want to do the right thing.	0
10 12		C	3	10	9			

Additional Comments Section

Additional Comments/Notes: Interview K1

Additional Comments/Notes: K2

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: K3	Interview notes: K4
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						What type of training, different issues for the different areas, CREST, Apparent Cause, Purpose	The real problem is the decision for SCAQ or NCAQ.
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16		0 0
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.						Functional	None of the above.
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3		0 He uses to determine the rules for today.
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.						Situational, person dependent	D For the human performance issues. C for the hardware issues.
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3	Situaltional	People don't understand. "We don't recognize what we don't know."
3a 12		yes	11	7				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: K3	Interview notes: K4
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						Built the PI's for the unit	Management doesn't do anything with the Performance Indicators that they get.
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0	Unitimately copmes down to management setting the expectations	As a function of trying to do better.
4a 7		yes	10	9				
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval							0 Doesn't like the default function. Verything has the same priority.
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4		0 In terms of having shorter time frames.
5a 11		no	9	10				
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.							0 for the most part it is the same as it has been.
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3		0 Not that it has declined, it is the ability to come up with the corrective actions. The problems here are human performance issues and the station personal are not good at identifying human performance corrective actions.
6a 11		no	4	15				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: K3	Interview notes: K4
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.							0 But the departments have to implement properly.
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1		0 It is more effective as a function of everything being contained in CREST.
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**							0 Still tend to jump to how are we going to fix.
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11		0 The implementation has changed but the complexities in deciding what to do has not.
8a 8		no	10	11				

CR -02-04884 Root Cause Interview Questions and Answers

Interview Comments compiled by question Question number	Answer Analysis ANS	A	B	C	D	Interview notes: K3	Interview notes: K4
9 7 Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.	B	2	15	8			0 Viewed as another duty being piled on vs. planning the priorities.
9a 9 Management support for the corrective action process is better now than it was 2 years ago. Yes-No	yes	14	6				0 Because of the focus.
10 12 Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**	C	3	10	9		Varies with the 'demographic'	C
Additional Comments Section						Additional Comments/Notes: K3	Additional Comments/Notes: K4

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: PDS1	Interview notes: WH20B
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**						Need classroom/computer lab training. Users need to be able to go thru the actual process in the presence of a trainer.	(Possible Observation) Personnel who initiate CRs need more training. Trend codes are not consistently applied or understood by most personnel.
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16	Believes training for PCAQs was better.	0
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.						NOP should be stand-alone (no guides!). CAP classified as general use meaning don't have to have it in hand (so they don't) and make mistakes because of it. Supports user checklists! His solution to the resultant girth of the NOP would be an umbrella N	(Possible Observation) Too many CRs are written that provide no value added.
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3	Not a good comparison. PCAQ/CATS was a much simpler system, easier to use but CREST is much more powerful.	0
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.						Subject does not review many cause analyses. Stated that just like 50.59 reviews practice makes perfect so need a smaller number of reviewers.	(Possible Observation) The boomerang effect on CR initiation is real.
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3	0	0
3a 12		yes	11	7				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: PDS1	Interview notes: WH20B	
4 18	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.	B	6	14	4	0	Some PIs are not meaningful. Are the number of audit findings changing due to decline in performance, # of audits or change in QA stds.	(Possible Observation) There is a new document control system, but it is not being used. Lew is a big offender (published his expectations as a memo.) The CARG Charter should also be in the system.	
4a 7	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	yes	10	9					0
5 16	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval	C	1	3	9	4	Due dates need more individual work load recognition/input. Many times you have due dates clustered for no apparent reason.	(Possible Observation)CR processing timeliness can be improved by providing the necessary resources; people and money.	
5a 11	The timeliness of corrective actions has improved over the past 2 years. Yes-No	no	9	10			Subject does not think that timeliness has been a problem. Seemed to be separating 891 findings from an overall rosy perception.		0
6 14	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.	C	3	9	10	3	DB programs are generally weak and owners like it that way. CA's don't work because owners are not open to critique/change, and noone forces them to make effective changes.		0
6a 11	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	no	4	15					0

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: PDS1	Interview notes: WH20B	
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						Can only have 1 owner (or none). The role of the director is to force Dept Mgr compliance.		0
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	Only marginally better because NRC and QA have beat them up. Subject does not really think that implementation is all that bad.		0
7a 11		no	7	12					
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						Generally perceives CA's to be good, but admits having no hard data to justify. Interviewer questioned whether subject would know good vs bad CA's other than late CA's.		0
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11		0	0
8a 8		no	10	11					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: PDS1	Interview notes: WH20B
9 7	Which one of the following statements best describes (In your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.	B	2	15	8		Some mgr/supv (who are not new) still do not value CAP and procedure adherence.	0
9a 9	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	yes	14	6			Mgmt has been much better with positive strokes for those who raise concerns.	0
10 12	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**	C	3	10	9		Professionals generally better than crafts. DB used to have forms posted so people could easily submit CRs. They've stopped doing it.	0
	Additional Comments Section						Additional Comments/Notes: 16 yr employee. NOP one of the first common processes with lots of pressure to minimizeits size and restrictions. Big battle over Q-commitments. Weakness in the system is that if the procedure reviewer doesn't identify that	Additional Comments/Notes: * Interviewee believes problem can be solved only through allocation of more resources; people and money. **Interviewee believes proper answer is between B & C.

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: WH21B	Interview notes: WH22B
	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**							0 (Potential Observation) The Guideline is liked and accepted by most personnel
1 17	The CREST system is more efficient than the CATs system (used 2 years ago). Yes-No (check your answer)	D	2	0	5	16	0	0
1a 7		yes	19	3				
	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.							0 (Potential Observation) Personnel believe that the discipline associated with RVH was unfair and misplaced. Management was "moved around in Fenoc." Workers were fired for doing their jobs as ordered by management.
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3	0	0
2a 9		yes	12	5				
	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.							0 (Potential Observation) Understanding of trend coding is a significant weakness in process. Sees little value in assigning trend codes at the front end of the process.
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3	0	0
3a 12		yes	11	7				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: WH21B	Interview notes: WH22B	
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						Performance Indicators should reflect what you are doing well. Be positive rather than negative. Decide what the attributes for success are and measure them.		0
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0		0	0
4a 7		yes	10	9				0	0
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval								
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4		0	0
5a 11		no	9	10				0	0
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.								
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3		0	0
6a 11		no	4	15					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: WH21B	Interview notes: WH22B
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						0	0
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	0	0
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						0	0
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11	0	0
8a 8		no	10	11				

CR -02-04884 Root Cause Interview Questions and Answers

Interview Comments compiled by question Question number	Answer Analysis ANS	A	B	C	D	Interview notes: WH21B	Interview notes: WH22B
Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.						0	0
9 7 Management support for the corrective action process is better now than it was 2 years ago. Yes-No	B	2	15	8		0	0
9a 9	yes	14	6			0	0
Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**							
10 12	C	3	10	9			

Additional Comments Section

Additional Comments/Notes:

Additional Comments/Notes: *INTERVIEWEE IS A CONTRACTOR. HAS ONLY BEEN AT DAVIS-BESSE FOR 3 MONTHS

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: WH33C	Interview notes: WH7A
1 17	1. Do you feel that additional training is required for Davis-Besse employees to initiate and process Condition Reports? A. Not necessary as the CREST system provides an on-line tutorial and includes all procedural references. B. The existing written procedures clearly provide sufficient guidance. C. Both A and B provide all the guidance needed to satisfactorily initiate and process a Condition Report. **D. In addition to existing procedures and the CREST on-line tutorial, classroom or CBT training should be provided each employee proportional to the individuals level of involvement in the program.**	D	2	0	5	16	Performance Improvement has not provided the station with a user friendly corrective action process implementation document that accurately defines how the process shall be accomplished.	(Potential Observation) The P.I. Department is doing tasks that the Guideline does not authorize them to do (validating the inputs to MRB)
							0	0
1a 7	The Davis-Besse Condition Report Process Programmatic Guideline is: A. A stand-alone document that provides all the necessary information required for initiating and processing Condition Reports B. An adequate document but should be better formatted to make it more user-friendly. C. Insufficient as it does not include the tribal knowledge needed to properly initiate and process a Condition Report. D. Inadequate, as it does not provide clear and concise guidance for initiating and processing a Condition Report.	yes	19	3			Performance Improvement has no stand alone document that clearly and comprehensively sets forth the functions and responsibilites of the P.I. Organization and the roles of its assigned personnel in carrying out these functions and responsibilities.	(Potential Observation) When the root cause investigation team members were sent back to their home departments, their skills declined because of other tasking..
2 20	The Guideline is more effective than the process used 2 years ago. Yes-No	B	3	10	7	3		
							0	0
2a 9	Some people at Davis Besse have stated that the Condition Report cause determinations are not always on target. Which one of the following statements best describes your opinion on this issue? (Score choices separately for apparent / basic / root causes). A. The cause determinations are on target. B. The cause determinations are pretty good but sometimes a couple of cause determinations are incorrect. **C. The cause determinations are on target the majority of the time.** D. The cause determinations are rarely on target. E. The CARB, CARG and MRB are the people who catch and fix the weaknesses.	yes	12	5			Performance Improvement has not effectively communicated to its interfacing Station organizations and Station line management their Corrective Action Program implementation responsibilites.	(Potential Observation) The Engineering Dept. did not budget for root cause tasking.
3 18	Cause determinations have improved over the past 2 years. Yes-No	C	0	3	15	3		
							0	0
3a 12		yes	11	7				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	A	B	C	D	Interview notes: WH33C	Interview notes: WH7A	
	How are we doing with our performance indicators / trending? A. The Performance Indicators are not monitoring the right things. **B. Some of the Performance Indicators are effective but significant improvements are still required.** C. Most of the performance indicators are monitoring the right things. D. No further changes in Performance Indicators are required.						(Potential Observation)Lack of resources (personnel and funding) has been a major contributing factor to poor implementation of the CAP by responsible organizations. For instance, proper corrective actions to correct root causes were not implemented beca		0
4 18	The performance indicators are better measures of plant performance / trends than those used 2 years ago. Yes-No	B	6	14	4	0		0	0
4a 7		yes	10	9					0
	How do you think the overall timeliness of the corrective action process can best be improved? A. Set more stringent mandatory time periods to perform each step in the process B. Eliminate default time periods to perform steps in the process and have MRB set the completion times based on the MRB members' evaluation of the problem. **C. Have the corrective action owner/s recommend time periods to perform steps for CARB approval** D. Have the corrective action owner/s recommend time periods to perform each step subject to PI organization approval						(Potential Observation)Management in Condition owning organizations have changed proper corrective actions to actions correcting only symptoms because of production focus and/or resource restraints.		
5 16	The timeliness of corrective actions has improved over the past 2 years. Yes-No	C	1	3	9	4		0	0
5a 11		no	9	10					0
	How do you perceive the corrective action process has served Davis Besse in preventing problems? A. Generally served the plant well except for preventing the Reactor Pressure Head Vessel degradation B. Generally within industry standards however there are some problems that extend to many levels of the process that need to be fixed. **C. Below industry standards with many examples of programmatic failures embedded throughout the process.** D. The program is severely dysfunctional and should be substantially revised.								
6 14	The prevention of plant problems through the use of the Corrective Action Program has improved over the past 2 years. Yes-No	C	3	9	10	3		0	0
6a 11		no	4	15					

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	ANS	Answer Analysis A	B	C	D	Interview notes: WH33C	Interview notes: WH7A
	Which one of the following statements best describes (in your opinion) the role of Performance Improvement in the corrective action process? A. PI should be responsible for all aspects of the corrective action process including proper implementation. PI should accept a greater sense of ownership for the entire process. **B. PI should be responsible for the corrective action process including administration, performance metrics and process validity/integrity. The Davis Besse Departments (groups) should accept greater responsibility for implementation of the process as it applies to their respective areas.** C. PI should only be responsible for administering the corrective action process. The Departments (groups) should be responsible for all other aspects of the corrective action process. D. PI should not be responsible for the corrective action process. The Departments should be responsible for administering and implementing the process without the need for PI support.						0	0
7 11	The Corrective Action Process is more effective in its present Davis-Besse organization than where it was 2 years ago. Yes-No	B	2	13	7	1	0	0
7a 11		no	7	12				
	Which one of the following statements best describes (in your opinion) the assignment of corrective actions at Davis Besse TODAY? A. Corrective actions are often determined without any regard for real causes resulting in repetitive problem conditions that go uncorrected for long periods of time. B. Corrective actions initially determined by the condition owner are often ineffective but the CARB, CARG and MRB will generally catch and fix most problems in this area before implementation. C. Corrective actions are generally effective for higher significance level CRs (CAQs and SCAQs) but often miss the mark for lower level significance CRs. **D. Corrective actions generally take care of most problems but may occasionally miss a significant issue such as the boric acid deposits on the reactor vessel head.**						0	0
8 13	The corrective actions generally solve problems better now than 2 years ago. Yes-No	D	4	1	7	11	0	0
8a 8		no	10	11				

CR -02-04884 Root Cause Interview Questions and Answers

Question number	Interview Comments compiled by question	Answer Analysis ANS	A	B	C	D	Interview notes: WH33C	Interview notes: WH7A
	Which one of the following statements best describes (in your opinion) the Davis Besse management support for the corrective action process TODAY. A. Management strongly supports the corrective action process and allocates required resources to achieve success. **B. Management generally supports the corrective action process but sometimes under-estimates the resources needed to achieve success.** C. Management wants the corrective action process to be successful but routinely does not provide the required amount of resources to achieve success.						0	0
9 7	Management support for the corrective action process is better now than it was 2 years ago. Yes-No	B	2	15	8		0	0
9a 9		yes	14	6			0	0
	Which one of the following statements best describes the average workers' support for the corrective action process today? A. Most workers strongly support the corrective action process and are not inhibited in their participation. B. Most workers generally support the corrective action process but occasionally do not to spend the time required to achieve success. **C. Most workers want the corrective action process to be successful but routinely cannot spend the time required to achieve success.**							
10 12		C	3	10	9			

Additional Comments Section

Additional Comments/Notes:

Additional Comments/Notes: * As far as the general worker in the plant, "A" is true. D is true for those evaluators who are limited by available time to accomplish their evaluations satisfactorily.

Davis-Besse Corrective Action Guideline Analysis of Deficiencies

A review of the Davis-Besse Condition Report Process Programmatic Guideline was performed and the process charted as part of the CR 02-04884 Root Cause investigation. As a result of the review and charting process, it has been determined the current Condition Report Process contains sufficient information to initiate and successfully process a Condition Report; however not all information contained in the document, is presented clear and/or concise chronological order. As such, it should be expected that an individual who is not "totally" familiar with the process would experience difficulty using the guideline, as a stand alone document, to take a condition report from initiation though final closure.

The following are just some examples of confusing or deficient steps contained within the subject guideline:

4.1.12	All Condition Reports originated as a result of a Quality Assessment Audit in accordance with NG-NA-00701, Audits and Surveillances, shall be categorized based on their significance. All Condition Reports that document an Audit Finding shall be categorized as either SCAQ or CAQ.
4.2.7.6	Contact the designated personnel in the affected organization(s) to perform the Reportability Review, in accordance with NG-NS-00807, Regulatory Reports, the Operability/Functionality Evaluation in accordance with NG-DB-00018, Operability Determinations, or the Immediate Investigation as determined by Management. Specify the required due date(s) for each activity and document the notifications(s) and due date(s) on the CR.
4.3.1	When required, the assigned individual shall perform and document an SRO Requested Evaluation in accordance with procedures designated in step 4.2.7.6. to support/refute the Operability Determination or determine Functionality.
4.2.2	The MRB may also assign: • Generic Implications evaluation requirements, if any (The MRB shall specify the scope of this assignment.)
4.4.6	The individual approving and/or extending Condition Report evaluation due dates shall ensure that the risks associated with the extension are understood, analyzed and documented and that the

4.4.6 (Continued)

new due dates are communicated to the designated CR evaluator and the site CR Process Administrator, and documented in the CREST system

4.5.6.16 a. The evaluator is responsible for determining the actions to satisfactorily correct the problem. The Corrective Actions should describe all actions necessary to completely implement the fix, not just your department's part. Think of what needs to be done to correct the process, not just what you need to do (e.g. Complete the procedure change vs. initiating a PCR, implementing the fix vs. initiating the Work Order).

4.5.6.15.g **IF** the unimplemented Corrective Action could negatively affect the outcome of subsequent operational or procedural evolutions, **THEN** the Corrective Action Owner shall provide notification to the organizations responsible for the evolution. Compensatory Measures may be implemented to reduce the impact of Corrective Actions that are not complete.

Attachment 4: CONDITION REPORT EVALUATION METHODS (Page 2 of 4)
Apparent Cause Evaluation - Evaluation Code "A": One or more individuals perform an evaluation of a condition based upon probability, judgement, and experience. Limited investigation or formal analysis techniques may be replaced with subjective evaluation of the condition to determine the Apparent Cause(s) of the condition. The individual(s) will document their evaluation and actions on the Cause Analysis form in the CREST system. Actions developed under this method will address the identified causes and are expected to reduce risk/consequences of a recurrence. They are not expected to provide a minimum level of assurance that the condition will not recur.

Attachment 8: APPARENT CAUSE AND BASIC CAUSE (Page 1 of 11)
Apparent Cause Investigation Guidance
The apparent cause is an estimate of the cause(s) based upon probability, judgement, and experience. Individuals performing an apparent cause level of cause determination require no training or analytical techniques. Therefore this Evaluation Method should be limited to relatively insignificant issues where there is little consequence to not using a rigorous cause analysis method because

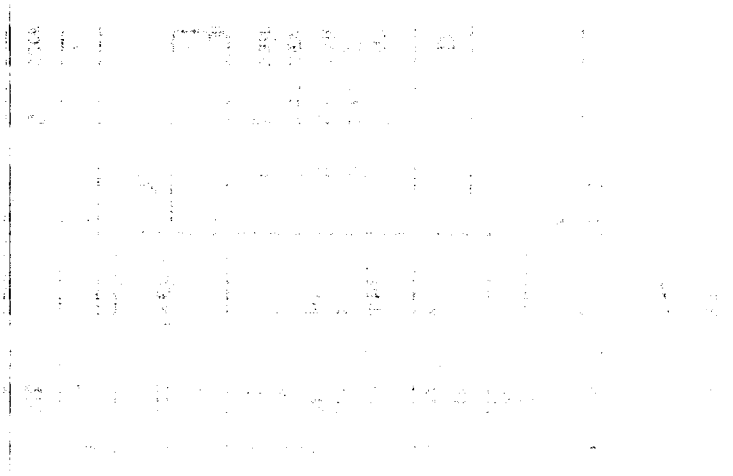
Attachment 8 (Continued)

there is little consequence to a recurrence. The completion of an apparent cause investigation should take about 2-4 hours. Assigning CATPR at this level is improper due to the level of investigation being performed. CATPR should be limited to use with root cause/basic cause level investigations. CATPR means the problem cause was identified at the lowest level possible and if the Preventive Actions identified are implemented the probability and/or risks of a recurrence have been significantly reduced. This is especially desirable with risk significant Maintenance Rule Functional Failures where repeat failures are unacceptable.

Attachment 15 PERFORMING AN EFFECTIVENESS REVIEW (Page 1 of 6)

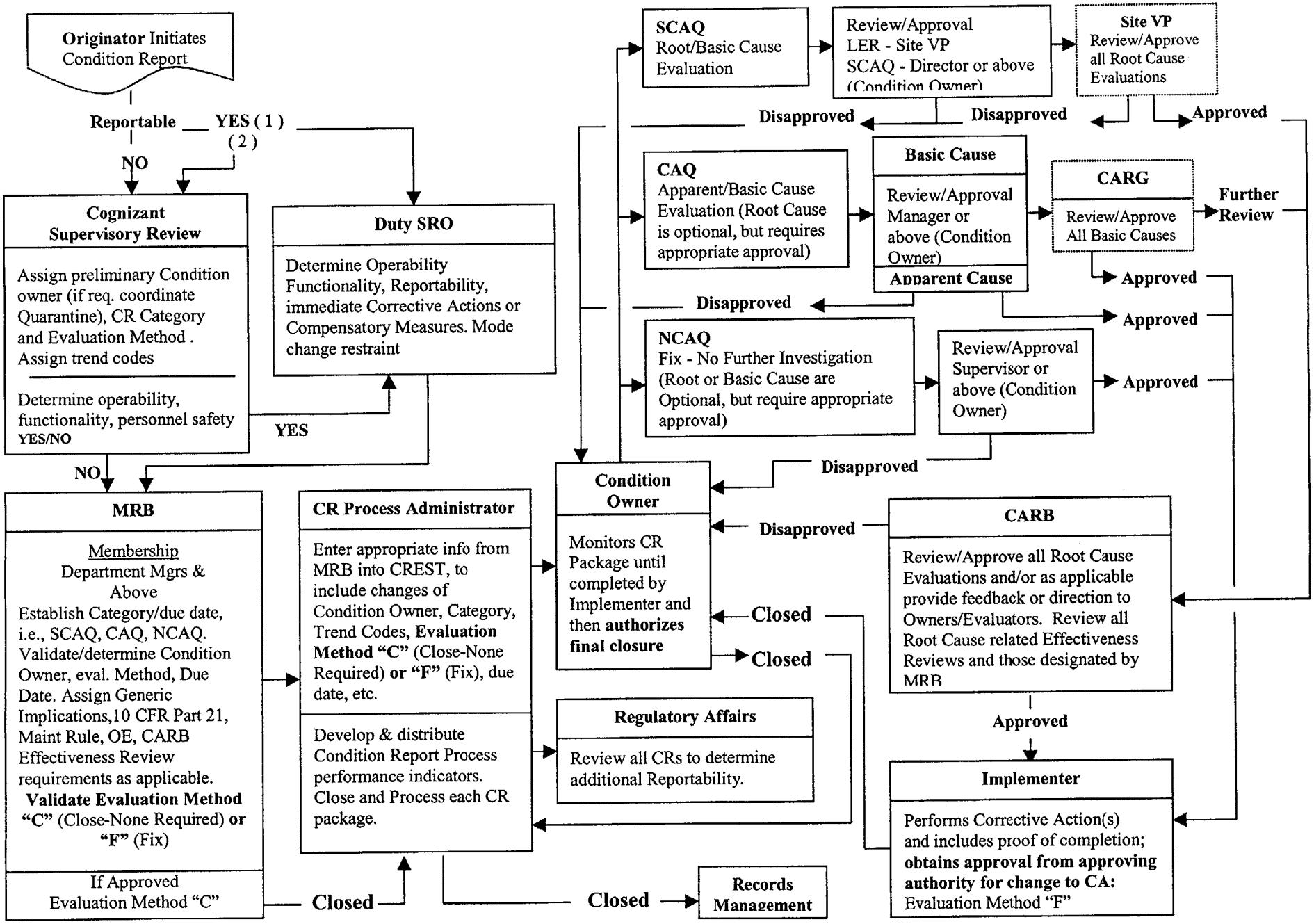
3.0 Limitations

3.1 This attachment is not a procedure. All actions do not need to be per formed or performed in the sequence listed. The actions should be based on the specific conditions encountered during the review.



Davis-Besse Corrective Action Guideline Analysis - Flow Chart

Attachment 11 - Page 1 of 1



Attachment 12

Collective Significance Analysis

A collective significance analysis was conducted to determine if there were generic trends or patterns among the various condition reports and CAP PR issues. The collective significance review was a systematic evaluation of the generic problem categories determined in the affinity analysis correlated with the functional barriers that had been degraded. The collective significance review identified the presence of generic issues that spanned across activities, behaviors, organizations and condition reports. The result of the collective significance review is a generic problem description and overall assessment of the impact and significance of these generic conditions. With 203 issues in the CAP Issues Matrix, it was highly likely that many issues would affect other issues. Each functional barrier area was then analyzed using collective significance techniques to determine major themes and issues within the area.
Within each functional barrier area, the CAP Issues Matrix was sorted by affinity analysis category to determine potentially generic issues. The CAP Issues Matrix "functional barrier" and "affinity category" fields were correlated by filtering techniques to obtain trends and issue patterns. These correlations were further refined if other secondary patterns appeared that appeared to group issues together into common themes or generic problem areas.

12.1 Condition Report Initiation Issues:

The willingness and ability to initiate condition reports is a necessary criterion for the corrective action program. If station personnel are unwilling or unable to report adverse conditions, the station will not be able to adequately correct conditions adverse to quality as required under 10CFR50 Appendix B Criterion XVI.
There were 8 specific issues identified for analysis in the CAP Issues Matrix:

1. **Hesitancy to originate condition reports (3 issues)**
2. **Lack of Threshold Guidance or Direction (5 issues)**

Hesitancy to Originate Condition Reports: This issue was reported in the following CR.

- 02-03672 (ST) hesitancy to report conditions due to fear of retaliation, concern over being assigned corrective actions, or just a general reluctance to take the time to write a condition report.

Several individuals expressed concern during interviews that some station personnel perceived that condition report originators could be assigned responsibility for corrective actions when those actions may have not properly belonged to them. They added that this "boomerang" perception was not a true representation of the facts and that few originators were assigned corrective actions as a means of retribution for reporting a problem. A review of 71 condition reports included in CR-02-04884 did not provide any justification for arriving at a conclusion that CRs were being inappropriately assigned to initiators. However, embedded distrust of management fueling this perception, could

deter some individuals from originating CRs. The management distrust issue is being directly addressed on a station-wide basis as part of the Human Performance Improvement Plan and measured by the Safety Conscious Work Environment (SCWE) measurement surveys.

A SCWE survey, completed in July 2002, identified a significant site-wide SCWE issue, of which reluctance to write CRs for fear of retaliation was only one part. The SCWE survey clearly indicated broad-based problems involving:

(1) Loss of employee confidence in the overall effectiveness of the CR process to properly evaluate and correct problems,

(2) Loss of employee confidence in the Ombudsman process as an alternate means to address and correct problems, and

(3) Loss of employee confidence in management to support their raising of concerns, and preventing retaliation and the resulting chilling effects.

In response to the broad-based findings of the SCWE survey, FENOC management has already accepted its ~~failure~~ past shortcomings in this regard, and has implemented an equally broad-based action plan to identify and correct the root cause. FENOC has also expressed its intention to extend its SCWE corrective actions corporate-wide, not just at Davis Besse.

Some specific highlights from the SCWE action plan accomplished to date include:

- FENOC has created a full-time SCWE Project Manager to implement its action plan at all three FENOC nuclear sites.
- The essential elements of a SCWE were incorporated into the Case Study presentation to all DB employees, emphasizing management's past failings and its commitment to correct those failings.
- FENOC officers, directors, and managers completed a 4-hour SCWE work shop on 10/8, and all DB supervisors (including contractors) are completing the same training during work shops completing on 11/8.
- Management has publicized its SCWE Action Plan and the SCWE management training in the OnLine newsletter, and will continue to publicize progress on completion of key Action Plan elements.
- The COO is routinely emphasizing SCWE principles during his 4Cs meetings.
- The newly developed SCWE Review Team, established to detect and prevent retaliation against employees raising safety concerns, held its first meeting on 10/30.

CR 02-03672 will be fully answered by the SCWE team. However, the actions noted above have been aggressively implemented and are expected to significantly improve the SCWE environment. SCWE will not be further evaluated under this condition report.

Lack of Threshold Guidance or Direction: This issue was reported in the following CRs.

- 02-03868 (NF) the work procedure process causes some CAQs not to be documented in CRs
- 02-05928 (CA) stated that condition reports were not prepared because other reporting systems were used to capture potential conditions adverse to quality.

Examples of interfacing reporting systems included:

- Work Orders
- Failed Surveillance Tests
- Deficiency Reports
- Engineering Work Requests
- Lubrication Monitoring, Troubleshooting Program
- Fix-it-Now Program, and
- Management Observation Program.

A review of some of the above programs and the evaluation response of 02-05928 validated that the use of any database will have an inherent potential concern that personnel may inadvertently record conditions adverse to quality without a follow through in generating a CR. The expectations at Davis Besse as stated in NOP-LP-2001 (*Condition Report Process*) and the *Davis Besse Condition Report Process Guideline* are not listed clearly in a single location. After a review of the procedures, and interviews with CR coordinators and Performance Improvement personnel, the understanding of the present perception at Davis Besse is:

- ***All*** SCAQs and CAQs ***shall*** be reported using condition reports
- ***All*** NCAQs ***should*** be reported if they meet the criteria of the Davis Besse Condition Report Process Guideline Attachment 3 (some NCAQs may get reported in bypass systems as an alternative to CRs under certain circumstances)
- ***Any*** NCAQs ***may*** be reported if the originator desires to raise the issue to station management.

This perception implies two thresholds for reporting:

- It is ***always correct*** to initiate a CR if the originator believes that the condition should be reported to management.
- It is ***incorrect*** NOT to initiate a CR if the condition meets the thresholds of an SCAQ, CAQ or NCAQ as specified in Attachment 3 of the Davis Besse Condition Report Process Guideline.

The threshold for determining if a condition is an SCAQ, CAQ or NCAQ is listed in Attachment 3 of the *Davis Besse Condition Report Process Guideline.* Each classification level is generally defined and specific examples are provided to facilitate an objective determination. However, it is not possible to eliminate all subjectivity from the classification decision. If a person identifying a condition does not understand or recall the expectation of originating a condition report, then it is possible that the condition may go unreported in the CREST system. The origination threshold requirements are not consistently clearly stated in the procedures and communicated to individuals. Processes which document and resolve conditions adverse to quality (e.g. work orders) at levels where CRs are generally not required, require guidance and monitoring to ensure that CRs are generated when required. Individual awareness of CR thresholds can be improved through:

- Site-wide training on the clarification of the expectations for all personnel.
- Clarifications into General Employee Training (GET)
- Requirements entered into each **authorized** action tracking system that states that CRs are to be prepared if the identified problem is an SCAQ, CAQ or NCAQ that meets the threshold of Attachment 3 of the *Davis Besse Condition Report Process Guideline.*

12.2 Condition Report Significance Determination Issues:

The determination of significance establishes the degree of management attention and priority that the condition report and associated corrective actions will receive. There are three levels of significance:

- Significant Conditions Adverse to Quality (SCAQs) – require root cause analysis and corrective actions to prevent recurrence of the condition as well as prompt and timely correction of the condition.
- Conditions Adverse to Quality (CAQs) – require prompt and timely correction of the condition.
- Conditions Not Adverse to Quality (NCAQs) – considered as enhancements that are within the discretion of management to implement.

The significance determination process and criteria is described in NOP-LP-2001 (*Condition Report Process*) and the *Davis Besse Condition Report Process Guideline.* Timeliness of classification is commensurate with the risk (probability-consequence) associated with the condition.
Low Categorization of Conditions was identified as a root cause of the reactor vessel head corrosion condition (in CR-02-00891) and as a significant condition adverse to quality in the CAP PR Review.
Analysis of the CAP Issues Matrix showed 18 specific issues in three primary categories of screening issue inadequacies:

1. **Low categorization of conditions (4 issues)**
2. **Lack of timeless in classification (7 issues)**
3. **Inadequate procedural direction and guidance (7 issues)**

Low Categorization of Conditions: Several condition reports stated that many condition reports were screened and classified at a lower level than was appropriate. This issue was reported in the following CRs.

- 02-03534 (SR) personnel not trained to conduct screening CRs
- 02-03535 (CB) not taking correct actions in screening, generic implication reviews, adverse trends not elevated
- 02-03676 (NA) adverse trends not identified
- 02-04292 (ST) improper categorization

The noted condition reports, CR-02-00891 and CAP PR Report provided information that CRs were under-classified prior to the current shutdown. Interview comments validated this issue. A number of personnel interviewed indicated that historically, many adverse conditions were classified at a lower significance level prior to the discovery of the RPV head corrosion when compared to the classification of the same or similar conditions since March of 2002. An independent review of the classification of CR significance level was conducted to evaluate current practices and the effect of compensatory measures on the classification process. All (117) year 2002 CRs classified as significant (76% of which had been initiated since August 1) were reviewed. The review noted that the CR descriptions do not always clearly represent the condition adverse to quality, making it difficult to understand the true importance and consequence without additional unwritten or tribal knowledge. Also, although classified conservatively, a third party review of this significant CR population (without the benefit of MRB discussion) concluded that as high as 40% could have been adequately evaluated at a level not

requiring a root cause. The current dual classification process (significance – level of evaluation) was originally designed to recognize the significance of the event or issue and then assign the appropriate resource to the resolution. The level of resources was determined by the amount of learning to be gained from completing the designated level of investigation. This allows that an incident can be recognized for the level of significance while understanding that there may not be much to be gained from a full-scope root cause evaluation. The conclusion is that the classification of significant event is currently conservative, however the tendency to lean towards higher level evaluations may overtask the resources available to address the most significant issue in a timely manner if diverted to lower risk issues.

Additionally, a 10% sample of year 2002 Conditions Not Adverse to Quality – Apparent Cause (code "NA") CRs were reviewed. 97% were determined to be appropriately classified. The remaining 3% were borderline as classified in following the guidance in Attachment 3 of the Davis Besse Condition Reporting Process Programmatic Guideline. Similar to significant CRs, the quality of the condition description by the originator/supervisor was not good to support appropriate classification. Additionally roughly half did not appear, without additional anecdotal or tribal knowledge, to warrant an Apparent Cause level evaluation. The challenge again is that evaluation resources needs to address the level of cause evaluations selected may unnecessarily divert attention or limited resource from higher significance or priority evaluations and tasks. This analysis supported a conclusion that the past practice of under-classifying adverse conditions has been reversed. Currently, over-classification occurs more often. This practice may represent an inefficient use of resources but has no direct adverse impact on safety.

The classification of CR's into three significance categories and six cause analysis categories creates 18 combinations. Coincidentally Corrective Actions are divided into five type categories. A classification scheme assists station personnel in understanding the significance of conditions and their corrective actions, and allocating resources for their resolution or implementation. For example, both an "N" classification as a Condition NOT Adverse to Quality (NCAQs) or the corrective action type "enhancement" connote a low level of importance and reduced priority for action. The reduced attention to some NCAQ concerns (e.g. CAP audit findings) has historically contributed to a lower critical thinking threshold even when causal analysis is specified to elevate the attention of the condition. Similarly, use of enhancement actions to correct significant concerns can undermine the importance and priority of these actions. Resources expended in implementing a complex and multi-tiered CR and CAF classification system are more time consuming and distract from the identification and resolution of more significant issues. Restart implementation of actions to avoid application of cause analysis resources to lower benefit-return conditions will free resources currently expended in classification management and simplify both execution and oversight.

Lack of Timeless in Classification: All conditions must be classified within a reasonable period that is commensurate with risk. Conditions that are important to safety must be classified more rapidly than conditions that are simply enhancement actions. Davis Besse does not specify mandatory minimum deadlines for significance determination. Condition reports listing timeliness as a problem in classification screening are:

- 02-03049 (CA) timeliness of supervisory reviews and operability determinations
- 02-03671 (CB) timeliness of screening

Another FENOC nuclear site specifies a maximum screening period of two days as a preventive measure to keep any condition report from not being screened in a timely manner. Proposed corrective actions under CR-02-04885 recommend incorporating this two-day screening requirement into Davis Besse procedures. This change, if adopted, will align the three nuclear sites into a common requirement and should prevent a backlog of condition reports.

Procedural Direction – Not Sufficient to Ensure Adequate Guidance: The following condition reports were analyzed to determine common themes and issues.

- 02-03535 (CB) procedural improvements for screening in areas of timeliness, categorization, consistency, generic implication reviews, MRB review process improvements
- 02-03671 (CB) management expectations and SRO notifications
- 02-03676 (NA) adverse trends are SCAQs

There were a number of recommended procedure changes to correct the identified problems. A common theme in the changes was to add new requirements, review processes, specific guidance or better define management expectations and standards. The underlying theme appeared to be the recommendation for an increasing level of procedural details and requirements in an effort to add or clarify expectations for corrective actions.

Interview responses indicated that in the past, significance level categorization was a problem because of production over safety pressure. The MRB would frequently establish significance levels that were frequently one level lower than similar decisions made today. The attitude of "production over safety" was one of the root causes in CR-02-00891 and was generally corroborated by the interviewees.

12.3 Causal Evaluation Issues:

The primary purpose of cause analysis is to provide insights into the formulation of effective corrective actions and comprehensive trending of adverse conditions. Causal evaluation is conducted at three levels at Davis Besse:

- Root cause evaluation to determine corrective actions that will prevent recurrence.

- Basic cause evaluations are similar to root cause evaluations but require less rigor, documentation and resources.
- Apparent cause evaluation to determine causes and corrective actions that are based on readily available data.

Assignment of causal assessment level is determined by the Management Review Board (MRB) based on procedural guidance and significance determination. While some flexibility in the assignment of causal analysis techniques is allowed by procedure, the technique assigned is essentially commensurate with the significance of the condition. This decision is essentially a resource loading value-added judgement made by management although there are some procedural restrictions (e.g. an apparent cause determination is not allowed for an SCAQ).

Less than adequate cause determinations were identified as a root cause of the reactor vessel head corrosion condition (in CR-02-00891) and as a significant condition adverse to quality the CAP PR Review.

There were 31 specific issues in three generic areas that identified in the CAP issues matrix:

1. **Causal analysis was not accurate (25 issues)**
2. **Personnel conducting causal analysis did not have adequate training (5 issues)**
3. **Management expectations for causal analysis were not clear (1 issue)**

Causal Analysis was not Accurate: The following condition reports were analyzed to determine common themes and issues.

- 01-01850 (NA), 02-02715 (CA), 02-03673 (ST), 02-03920 (CF), 02-04292 (ST), Root cause analysis was not accurate
- 02-02715 (CA), 02-03673 (ST), 02-04292 (ST), 02-05341 (CA) Basic cause analysis was not accurate
- 02-03163 (CA)Apparent cause determination was not accurate
- 02-03862 (CA), 02-04941 (CA)Failure to follow causal determination procedures
- 02-06300 (CF) Rollover of CRs into new CRs causes loss of causal analysis accuracy

Comments from interviews indicated that there were two primary barriers to success. Time and schedule pressures limited the amount of effort that personnel were able to apply to cause determination. Several interviewees stated that personnel did not have enough time to conduct quality cause assessments. No judgment could be made regarding whether individual organization or self-management skills are lacking. The second issue was management pressure was applied to shape the outcome of cause investigations in order that the causal factors fit with the predetermined corrective actions. Several interviewees stated that a degree of quality and independence was lost when the dedicated root cause analysis group in the Quality Programs Organization was disbanded and cause analysis became a line activity[1].

Personnel Conducting Causal Analysis did not have Adequate Training: The following condition reports were analyzed to determine common themes and issues.

- 02-03534 (SR), 02-03831 (CB) Personnel have not received required training
- 02-03534 (SR), 02-03831 (CB) Training has not been adequately defined

[1] Note: Davis Besse involved the CAP mentors, a Departmental Root Cause Group dedicated for all site root cause investigations.

Training is an essential prerequisite for success. In the past, training has been offered and conducted for many station personnel in the area of root cause analysis. Many station personnel have been certified to use approved root cause analysis techniques such as TapRoot©, Kepner-Tregoe (K-T) or MORT.
However, the conditions reported above state that this training has produced the knowledge, skill and abilities needed to conduct causal analysis in an adequate number of staff personnel. This problem statement was applied to apparent cause, basic cause and root cause analysts in the referenced condition reports.
Few of the interviewees perceived that causal factor analysis training was a key barrier to performance at Davis Besse. Most thought that training had been offered and the real problem was that:

- Many of the formerly trained personnel had been moved to positions where they no longer conducted causal analysis as part of their jobs, and
- Documentation of training received was lax and did not accurately reflect the true state of root cause knowledge.

In addition, it was reported that the training offered did not always match the training needed to achieve a working level of the knowledge, skills and ability (KSA) needed to properly perform the tasks inherent in causal analysis. For example, some interviewees stated that a course in formal root cause analysis does not provide the information required to successfully complete an apparent cause or (perhaps even) a basic cause determination.
The recommended corrective action was to conduct a systems approach to training (SAT) based analysis of training needs in the CAP PR Report. A needs analysis of CAP training requirements was reported to be conducted within two years but the results of this needs analysis have not been translated into a comprehensive training program.
Management Expectations for Causal Analysis were not Clear: The following condition reports stated that management expectations were not clearly established for causal analysis standards.

- 02-02715 (CA), 02-06300 (CF) management expectations for causal analysis were not clear

The misalignment of standards between the Performance Improvement Group and the oversight activities (NQA and the CAP Program Review Team) has been significant causal factor in the area of inaccurate causal analysis. There are numerous examples of NQA audits where the inaccurate causal analysis has been identified as a CAQ or SCAQ. Most of the root causes listed in CR-02-00891 that applied directly to the corrective action process had all been previously identified by NQA.
The causal determination is influenced by the technique used, the experience and qualifications of the analyst and the cause vs. effect mental model adopted by the analysts. The previous corrective actions have been to include more detail in the procedures for the causal analysis process and provide additional training to analysts. The crux of this problem is that oversight reviews have generally used a compliance-based assessment process where Performance Improvement has used a performance-based approach to correct audit findings. Oversight reviews have often reported findings as a small number of inaccurate analyses without also stating the sample size and the number of correct analyses, or without stating the reason(s) why the cause determined was incorrect. For example, an effectiveness review of CR2000-1584 that was

documented in CR01-2967 identified several specific problems with causal determinations. The CR did not indicated what percentage of the CRs reviewed in the sample that had correct cause determinations.

12.4 Corrective Action Implementation Issues:

10CFR50 Appendix B Criterion XVI requires corrective actions to be formulated (determined) and implemented (acted upon) to correct conditions adverse to quality. Additionally, corrective actions must prevent recurrence of significant conditions adverse to quality. Conditions adverse to quality must be corrected in a timely manner with timeliness based on the risk significance of the problem condition (NRC Generic Letter 91-18). Management may also require other standards for timeliness and effectiveness based on prudent management principles.

The condition report CR-02-00891 identified the following area as a root cause of the reactor vessel head corrosion problem:

> *Less than Adequate Corrective Actions - Corrective actions assigned and implemented from 1996 to 2002 were not effective and failed to find and fix the leaks that caused extensive damage to the RPV head.*

There ~~following~~ were 25 specific issues in three categories that were identified in the CAP Issues Matrix regarding corrective action implementation:

1. **Ineffectively formulated (13 issues)**
2. **Ineffectively implemented (5 issues)**
3. **Not Implemented in a timely manner (1 issue)**

Corrective Actions Ineffectively Formulated: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-04292 (ST), 02-06505 (SR)corrective actions coded as enhancements instead of remedial or preventive – inappropriate classification of corrective actions
- 02-03674 (ST), 02-06809 (CB) ineffective for preventing recurrence – not based on root causes

If corrective actions are not effectively formulated, they will not correct the problem. If the corrective actions were designed to prevent recurrence, but were not based upon the underlying causal factors, the adverse condition will reoccur. This will cause the adverse conditions to continue to occur if the failure mode has not been corrected.

Corrective Actions Ineffectively Implemented: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-04292 (ST), Corrective actions not implemented effectively
- 02-03497 (ST) Business plan issues not implemented
- 02-03674 (ST) Corrective actions closed or changed without being completed

The Business Plan is a management tool to organize, prioritize and systematically plan the work for the future. The adverse condition reported was that the plan was not being implemented; that too many planned projects were not completed. The original concern focussed on the delay of business plan improvement projects that, if implemented, could have possibly corrected the underlying causal factors associated with the reactor vessel head corrosion problem. One example of this problem was the deferral of a CREST improvement project due to financial constraints.

Closure of corrective actions without actually completing the corrective action was also identified as an issue. The concern was that corrective actions could be changed or

closed without actually performing the action as originally specified and approved by management.

Corrective Actions not Implemented in a Timely Manner: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03497 (ST), 02-03674 (ST), 02-04716 (SR) Corrective actions delayed without good reason
- 02-05390 (CA) Corrective actions rolled over into new CRs causing a delay in implementation

Corrective action "rollovers" are allowed in the condition reporting system. Corrective actions may be consolidated into another condition report (or "rolled over") when consolidation of corrective actions or problem statements is appropriate. The new condition report must be the same or higher level of significance. However, there are no procedural restrictions regarding a change in the original due date of the corrective action. In some cases, the new due date may exceed the original due date without receiving an official extension. The expressed concern is that this process may be used to circumvent the extension process.

In addition, the rolling over of condition reports often creates confusion. Even if the corrective action is migrated verbatim into the new CR, the context of the issue may be lost of modified. During the analysis of this condition report, numerous examples were identified of secondary and tertiary rollovers. These layered conditions made it very difficult to track the corrective actions to closure.

Condition report rollovers should not allow approved corrective actions (CAFs) to migrate from the original CR to a new or different CR. These CAFs should be retained in the original CRs until they are completed and closed. This ensures that the original condition report remains in tact and no loss of information or context occurs.

Interview comments indicated that the implementation of corrective actions was sometimes compromised due to production pressures. For example, CRs would be closed out at the end of an outage without actually completing the action based the requirement and pressure to restart the plant on time. Actions coded for "enhancement" would be deferred from outage to outage due to time pressure or budget requirements. Interview comments also indicated that the pressure to get back on line was the key driving force prior to February 2002. These comments were consistent with the CR-02-00891 root cause of "production over safety".

12.5 Oversight and Program Ownership Issues:

Program oversight is conducted at a number of organizational levels. Performance Improvement conducts self-assessments on a periodic basis. Audits and surveillances are conducted by the Nuclear Quality Assurance (NQA) Organization on a semi-annual schedule INPO and NRC perform external oversight functions.

Corrective action *program* ownership has been moved to the line organization with the transition to the CATs system in 1998. The individuals who perform most of the activities that support the corrective action process no longer work under Performance Improvement. *Process* ownership of corrective actions is retained within the Performance Improvement group.

There were 26 specific issues in four generic areas that were identified in the CAP issues matrix regarding oversight and program ownership:

1. **Ineffective corrective actions not identified by CARB (9 issues)**
2. **Lack of timely implementation and large backlog of issues pending before CARB (5 issues)**
3. **Procedural requirements for oversight activities not properly captured (5 issues)**
4. **Trending and performance indicators do not support oversight of CAP (7 issues)**

Ineffective Corrective Actions not Identified by CARB: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03270 ineffective corrective actions are being approved by CARB
- 02-03674 an audit of CAFs should be performed by an oversight group

Although CARB has been very active in reviewing corrective actions for effectiveness, the CAP PR review stated that CARB approved CAFs continued to be implemented ineffectively. The recommendation from the CAP PR Report was to establish an external review of completed CAFs as a compensatory measure until consistent compliance was achieved.

Lack of Timely Implementation and Large Backlog of Issues Pending before CARB: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-02715 (CA), 02-03288 (NA), 02-03525 (CA) there is a large backlog of CRs pending for CARB review and CARB is untimely in reviewing the backlog
- 02-03270 (CA) untimely generation of CAFs – enforce timeliness standards for closeout reviews

The CAP PR Report stated that the large backlog of condition reports for CARB review was impeding prompt corrective action. Lack of timeliness of corrective actions was generally a concern. The backlog has been caused by the large volume of conditions reports that have been originated as a result of the shutdown and the 0350 restart process.

Procedural Requirements for Oversight Activities not Properly Captured: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03675 (CB) Provide procedural guidance to perform corrective action effectiveness reviews
- 02-03497 (ST), 02-03674 (ST) Develop guidance for verification of CAFs and require NQA to verify all evaluations and CAFs

Less than adequate corrective actions were one of the root causes of CR-02-00891. This problem was repeated in the CAP PR Report. The CAP PR Report recommended that additional barriers be erected to verify that oversight activities (NQA) focus on corrective action implementation and effectiveness. Corrective actions for these issues were addressed in CR-02-04885.

Trending and performance indicators do not support oversight of CA: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

1. 02-03676 (NA) the current trending and performance indicator metrics are ineffective and labor intensive – they should be computer-automated and turned into real-time indicators.
2. 02-03817 (NA), 02-4211 (NB), 02-05017 (CA) Current CAP performance indicators do not measure the right things – select better performance indicators for the station management.

Performance indicators are a management tool to ensure that the corrective action process is functioning as designed and required. The CAP PR Review stated that major improvement is needed in this area. Interview comments indicated that people were generally satisfied with performance indicators and did not believe that significant improvement were necessary. This disparity reflects a more general disparity over the standards and expectations between the oversight groups (NQA, CAP PR) and current implementers of corrective action process.

One of the contributing causes in CR-02-00891 was listed as:

> *Corrective Action Procedure – The Corrective Action Procedure has provisions that do not reflect state-of-the-art practice in the industry, which may have allowed less than adequate corrective actions.*

Performance indicators should be benchmarked with other utilities and improved. Development of performance indicators that clearly show the performance of the corrective action process is a key to proper management feedback.

12.6 Infrastructure and Supporting Processes Issues:

Infrastructure is the largest single category (81 individual issues) on the CAP Issues Matrix. The infrastructure and supporting processes consist of the procedures (NOP-LP-2001 (*Condition Report Process*), the *Davis Besse Condition Report Process Guideline, The Root Cause Analysis Guideline,* along with the CREST software. Many of the identified issues were specific recommendations for procedural changes that were covered under CR-02-04885.

1. **Develop and implement an action plan to correct noted problems in CAP (1 issue): 02-03497**
2. **Not complying with existing procedures (4 issues): 02-03831, 02-04716, 02-06418**
3. **CARB is not meeting often enough (3 issues): 02-03525**
4. **Move all outstanding CATs CRsS into CREST and close CATs (1 issue): 02-03405, 02-03820**
5. **Integrate work order and CR processes (5 issues): 02-04742**
6. **Incorporating a formal training program into the CAP program (18 issues): 02-03497, 02-03525, 02-03534, 02-03673, 02-03674, 02-03831**
7. **Restore funds for CREST improvement project (3 issues): 02-03818**
8. **Develop trending and performance indicators (2 issues): 02-03525, 02-05460**
9. **Management expectations should be clarified and communicated (5 issues): 02-03389, 02-03535, 02-03754, 02-05958, 02-06809**
10. Other - 37 specific recommendations for procedure changes – 14 of which are not covered under condition report CR-02-04885: 02-03525, 02-03867, 02-03869, 02-03871, 02-03872, 02-03872, 02-03873, 02-03874, 02-04716, 02-05342, 02-05436

Many infrastructure issues were previously captured under other headings. They were listed as "infrastructure" because they required a procedural change to be made. Many of the issues were developed from the CAP PR Review action recommendations.

Develop and Implement an Action Plan to Correct Noted Problems in CAP: The following condition report was analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03497 (ST) A condition report recommended an integrated action plan be developed to improve the CAP program.

This integrated plan will be developed as an outcome of this condition report. This action plan is also required under the Management and Human Performance Improvement Plan.

Not complying with existing procedures: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03831 (CB) Root and Basic cause analysts are not qualified
- 02-04716 (SR) Failure to obtain required reviews and response to other non-compliance problems
- 02-06418 (CF) Failure to input trend codes to CRs

In each case, the existing procedure stated a requirement that was not being followed. These issues are analyzed under previous sections. Procedural changes will be made to address these issues. Corrective actions to change the safety culture work environment will enhance procedural compliance.

CARB is not Meeting Often Enough: The following condition report was analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03525 (CA) CARB needs to meet more often to reduce the backlog of CRs that must be dispositioned.

The CR generation rate has increased substantially as a result of the various oversight activities and program compliance reviews. The backlog of CRs pending CARB approval is very large and still growing. However, the corrective action for CARB to meet more often to reduce the backlog does not need to be required by a procedure.

Move all Outstanding CATs CRS into CREST and close CATs: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03405 (CF), 02-03820 (NA) close the old CATs CRs to CREST

Both the CATs and CREST computerized tracking systems are presently approved systems. CATs is no longer accepting new condition reports but there remain a small number of CRs (7 as of 11/5/02) that have not be closed. There is a transition plan to convert all CATs-tracked CRs to CREST by the end of the year.

Integrate Work Order and CR Processes: The following condition report was analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-04742 (NA) recommends that the work order process and condition report process become integrated in the future

Work orders may capture and document conditions adverse to quality without automatically generating a condition report. The recommendation from the CAP PR

Report was to consider automating the work order system so that generation of a CR is automatic. Most work orders meet the threshold for condition reporting. If the site intends to use the CR process as a single point of entry for all adverse conditions, this recommendation has merit to prevent bypassing the condition report system. However, successful integration will have to wait on the SAP transition plan. Integration will require a powerful relational database software that is flexible, user-friendly and highly capable. Integration of the work order system and the condition reporting system was not practical under the legacy software systems that have been used at Davis Besse.
Incorporating a Formal Training Program into the CAP Program: ***The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:***

- 02-03497 little training has been completed – training will improve the CAP process
- 02-03525 members of CARG do not have root cause training but are used to evaluate basic cause analysis
- 02-03534, 02-03673, 02-03674 training requirements for CAP are not determined, use SAT methods to determine training requirements – conduct a needs analysis
- 02-03831 root and basic cause evaluators are not trained periodically

The lack of knowledge, skill and ability to successfully implement the CAP process has been analyzed under section 3.1.2.3. These issues require that training is proceduralized to institutionalize the requirement.
The training and qualification of personnel involved in the corrective action process has been informally managed. Although training has been provided in the past, there has been no formally managed effort to define training and qualification requirements, ensure training has been matched to the needs, and maintain training or qualification records. While neither NRC nor INPO require a systems approach to training (SAT) development effort for this program, the FENOC expectation is that all training that supports corrective actions should be developed and implemented by SAT. This may be an abbreviated needs analysis rather than a full-scope job and task analysis if the job scope warrants.
Restore Funds for CREST Improvement Project: The following condition report was analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03818 (NA) CREST funding should be restored in order to allow the CREST improvement project to be implemented.

Adequate funding should be made available to support any corrective action software upgrades that are determined to be necessary as a result of the CAP Improvement Plan. CREST funding was eliminated because the new SAP software system will be implemented ~~very shortly~~and management desires CAP to be involved. CREST ~~will~~ is planned to be replaced by a SAP-based application. Funding for the SAP corrective action software is approved and the transition plan is ~~being implemented~~underway. Changes to CREST that support restart should be accomplished. Others should be coordinated with the SAP implementation when targeted.
Develop improved trending and performance indicators: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03525 (CA) develop performance indicators for the CARB

- 02-05460 (CA) prevent rolling too many individual unrelated issues into a single CR to prevent problems with assignment of trend codes.

The CAP PR Report recommended developing PIs that measure CARB performance metrics, such as timeliness, reject rate, quality of reviews and CR backlog. The CAP Improvement Plan will include development of performance indicators that address the key metrics of the organization.

Including multiple unrelated issues into a single condition report prevents proper cause coding. The various conditions should relate to each other as a general problem statement and should be capable of assigning a cause code. Long lists of unrelated inspection items are currently discouraged by the Guideline procedure are have been rejected by CARB. This expectation needs to be enforced without inflicting an undue chilling effect on the originator.

Management Expectations Should be Clarified and Communicated: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03389 (CB) expectations for the management of Q commitments unclear
- 02-03535 (CB) roles and responsibilities are unclear for corrective actions
- 02-03754 (SR) management expectations for the use of guidelines and formal procedures needs to be clarified and communicated
- 02-05958 (NA), 02-06809 (CB) management expectations regarding use of the condition report process to correct CAQs must be clarified and communicated – also includes the lessons top be learned from CR-02-00891

Many Davis Besse employees stated that management expectations were not clear in regards to numerous areas. ~~Some~~ Several Directors stated their expectations ~~that~~ sometimes directly conflicted with other Directors. Alignment of vision, goals and resources was a major problem because the individual worker was placed in the role of having to decide which set of expectations should be followed.

One example of this expectations misalignment was the management of Davis Besse Q commitments. Q commitments are unique to Davis Besse and are not used by other FENOC sites to manage regulatory commitments. Many Q commitments were clearly out of date or were being implemented by procedures that were no longer in effect. CR-02-04885 contains a complete analysis of the Q commitments that were incorrectly listed in the TERMs database and applied to the corrective action process. CR-02-07808 reported this problem on a station-wide basis.

The CAP PR Report ~~authors~~ objected to using the *Condition Report Guideline* to provide procedural requirements for the condition report process. The CAP PR Report stated that only a properly controlled procedure (such as NOP-LP-2001) could be used to provide direction for quality processes. The past expectation at Davis Besse had been that the Guideline was adequate to provide procedural direction and other Guidelines exits throughout the organization. The recommended action is to provide a sub-tiered procedure that will be Davis-Besse specific to provide the guidance that is unique to Davis Besse.

The CAP PR Report also stated that management expectations regarding the use of the condition reporting process to correct conditions adverse to quality must be clearly communicated. They stated that an example of this problem was the lessons learned from CR-02-00891 were still not communicated to the site personnel. This problem was later resolved when case study training was held for all hands, and by issuing an expectations memorandum from the Vice President and Directors with followup comments to Supervisors.

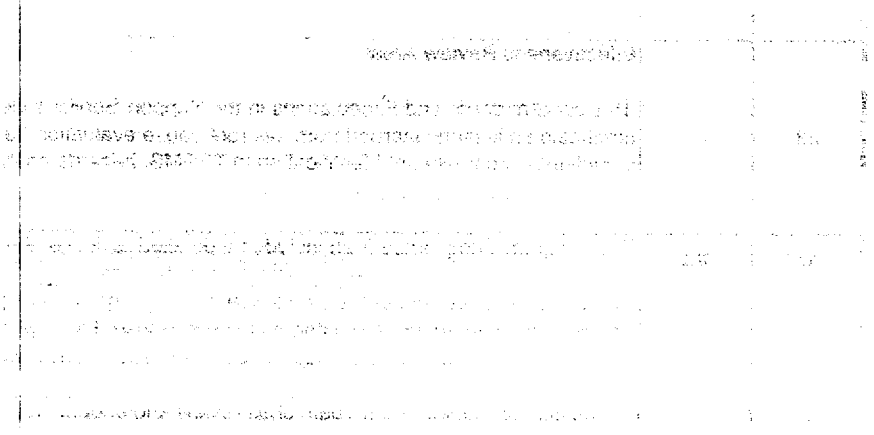
Other - 33 specific recommendations for procedure changes – 14 of which are not covered under condition report CR-02-04885: The following condition reports were analyzed to determine common themes and issues from the CAP Issues Matrix:

- 02-03525 (CA), 02-03867 (CF), 02-03869 (NF), 02-03871 (CF), 02-03872 (NF), 02-03873 (NF), 02-03874 (NF), 02-04716 (SR), 02-05342 (CF), 02-05436 (CA)

The issues on these condition reports have been previously discussed in this analysis. These issues were stated under the category of "procedure" or "other" in order to flag the Team to consider them for procedural corrective actions. No analysis is required because they have been analyzed in other sections of this report.

This page is provided for place keeping.

Attachment 13,
"Corrective Actions Referenced from CR 02-00891",
is available separately as an MS Excel© spreadsheet for review purposes
as part of Attachment 1, "CAP Issues Matrix", Tab 2



0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
3		Review Boric Acid Corrosion Control Program for procedural compliance and training of BACC Inspectors. Refer to CA 02-00891-60, -61, -66, -67, 68, -70.		
15		Coordinate the determination of if Davis-Besse should issue Operating Experience Reports according to NG-NA-305, step 6.7.3. for the issues evaluated by the root cause. For the issues determined to need Operating Experience Reports issued, ensure a CAF is generated for the action (or ensure an Operating Experience Report was issued).		
19	RA	Include in the case study the missed opportunities to recognize RPV Head corrosion from Operating Experience evaluations.	Post-Restart	
22	PR	Develop and implement a program for increased presence of management in the field both during outages and during normal operations to improve management oversight. Formalization of this program is intended to look for degraded conditions, open opportunities for coaching, and enforcement of management expectations. This Management Field Observation Program with weekly schedules is to be similar to the programs established at Perry and Beaver Valley.	Restart 0350	RC1, CC1
23		Effectiveness Review Area: Review ISI/IST Program for procedural/program compliance related to identification/resolution of boric acid issues and training of VT-2 Inspectors on boric acid issues. Refer to CA 02-00891-20, -23, 60, -61, 66, -67, 69.		
24	PR	Follow-up training will be held over the next 12 months to reinforce technical standards and problem solving skills. This will be required of appropriate management and technical staff.	Post-Restart	RC1
25		Effectiveness Review Area: Review Standards and Expectations in the Quality Assessment Department with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, adequacy of audits/surveillances, oversight of DB Departments activities, safety focus). Refer to CA 02-00891-32, -72, -109, 46, -104, 75, -109.		
27		Augment engineering staff to shore up technical capability and improve engineering rigor and standards.		
28		Effectiveness Review Area: Review Standards and Expectations in the Work Management Department with emphasis on lessons learned from this root cause evaluation (i.e., procedure compliance, hazards analysis, safety focus). Refer to CA 02-00891-46, -48, -104, -83, -62, -75, -110.		
33		Effectiveness Review Area: Review Standards and Expectations in the Support Services Department with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, commitment identification in TERMS, hazards analysis, safety focus). Refer to CA 02-00891-35, -46, -48, -62, -75, -83, -104, -111.		
34	EA	The Program Compliance Plan includes a detailed review of the Operating Experience program. Review and implement changes.	Post-Restart	
36		Perform an assessment of the Corrective Action program. The purpose of the Self-Assessment is to ensure the categorization of issues, thoroughness of investigation, and that initiation of Condition Reports occurs in accordance with programmatic requirements and management expectations.	Restart 0350	
40		b. The Senior Management Team shall review and endorse all root causes. Revise the CAP Guideline to include this SMT review.		

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
41	PR	Assess the Safety Conscious Work Environment of Davis-Besse based on criteria and attributes derived from NRC policy and guidance, develop recommended actions and implement the action plan to address any adverse conditions identified by the assessment.	Restart 0350	RC1
42	RA	a. The Management and Human Performance Excellence Plan also has the following relevant actions: 1. Extensive changes have been made in the officers, directors, and managers responsible for Davis-Besse, including establishment and appointment of a new Chief Operating Officer Exercutive Vice President, and Vicesident of Oversight; changes in the site Vice President; and changes in each of the directors. These new individuals bring outside experience and high safety standards.	Restart 0350	RC1
43		Review Standards and Expectations in the Technical Services/Nuclear Engineering Department with emphasis on lessons learned from this root cause evaluation (procedure compliance, operational/decision-making, hazards analysis, safety focus). Refer to CA 02-00891-46, -48, -62, -75, -83, -112.		
44	PR	a. The Management and Human Performance Excellence Plan also has the following relevant actions: 2. Management will ensure standards of excellence are communicated, and monitoring will ensure these standards are upheld at all levels. This entails management behaviors, first line supervisor behaviors, and individual worker behaviors. These standards will not only focus on behaviors, but also on the expectations for manager involvement in station activities.	Restart 0350	RC2
45	PR	a. The Management and Human Performance Excellence Plan also has the following relevant actions: 3. A Management Monitoring Process will be implemented to monitor and trend the performance of specific management oversight activities taken on an individual basis. This will demonstrate the level of involvement and nuclear safety focus of individual managers.	Restart 0350	RC1, RC2, CC1
46	RA	4. Case Study training will be given, which will consist of a review of the timeline of the event with site personnel to ensure all personnel understand how the event happened, what barriers broke down, missed opportunities, lessons learned, and what needs to be different in the future. Testing will be required.	Restart 0350	
47	PR	a. The Program Compliance Plan includes a detailed review of the Corrective Action Program by outside consultants. The Program Compliance Review includes a detailed latent issues review of the CAP. Complete program review and implement changes as approved by the DB Senior Management Team.	Restart 0350	CC1, CC2
48	RA	a. Ensure that the case study training of this and other events includes emphasis on the need to find and address the causes of adverse conditions as it relates to 10CFR50, Appendix B Criterion XVI, "Corrective Action" and the potential consequences of failures to do so.	Restart 0350	
49	PR	The Corrective Action Review Board (CARB), which reviews select corrective action document evaluations, will be used to enforce higher standards for cause evaluations and effective corrective action. This board will be chaired by the Plant Manager or another director level individual. Revise the CARB charter to indicate that the Plant Manager or a Director level individual shall be the Chairman of the CARB.	Restart 0350	RC1, CC1, CC1
50	PR	Review and revise, as necessary, the criteria for CR categorization of repeat equipment failures to ensure they are appropriately categorized and utilized by station personal. These criteria should be sufficient to elevate repeat Condition Adverse to Quality (CAQ) failure CRs to a Significant Condition Adverse to Quality (SCAQ) categorization, which requires utilizing of a higher evaluation method. Repeat conditions are to be treated as SCAQs	Restart 0350	CC1
51	PR	Review open existing long-standing/recurring issues for potential nuclear safety-related concerns and initiate SCAQ CRs for each issue identified. If any SCAQ issues are discovered, use root cause evaluation techniques to obtain resolution of the issues	Post-Restart	CC1

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
52	PR	a. Require the use of formal cause determination techniques for root and basic cause evaluations to ensure analytical rigor is applied to the analysis (i.e., revise CAP Guideline). A tiered approach to the number and type of techniques applied should be considered.	Restart 0350	CC1
53	PR	Define and implement training requirements necessary for cause evaluations, especially for equipment analysis.	Post-Restart	CC1
54	PR	c. Provide/proceduralize periodic independent reviews and self assessments of apparent cause evaluations, and recommend changes as appropriate, to provide assurance of the quality of these evaluations.	Post-Restart	CC1
55	PR	a. Improve the CAP Guideline guidance on reviews of the effectiveness of corrective actions with focus on verifying that causes have been fixed, and provide training on the revised guidance.		
56		b. Revise the CAP Guideline to require the use of the Safety Precedence Sequence (Step 6 of Root Cause Analyses Reference Guide/ Attachment 13 of D-B Condition Report Process Guideline) for root cause and basic cause analyses. This step shall require the Safety Precedence Sequence for each corrective action.		
57	PR	a. Develop and implement a site wide equipment trending program. This program should define what is to be trended periodically (e.g. vendor, failure mode, failure mechanism, environmental, material issues). Additional clarification Programmatically define guidance to establish and define areas for trending. Examples could include: component failures by vendor, performance criteria, and component type. Guidance should define how to document trends and develop conclusions. The value of trends should also be programmatically assessed to ensure trends are providing the station with meaningful information for improvement. Note: CAFs should not be closed to open work orders to protect trending information (such as age of open CAF).	Post-Restart	CC1
58	PR	Revise the trending program to require performance of trending of issues that occur only during outages. (e.g. boric acid found on reactor head in 10RFO, 11RFO and 12RFO) to provide management with an understanding of on-going outage related issues.	Post-Restart	CC1
59	PR	a. Develop and implement the FENOC Hierarchy of Documents for Davis-Besse to ensure consistent policies and standards for analyses of safety issues, similar to other FENOC plants. The following items are to be considered from the MORT section on lack of hazard analysis: 1. Establish policy for the use of external information that is specific enough for the user to understand the following expectations: o When to seek the information o Where to seek the information o How to determine the validity of the information o When and how to obtain review / approval of its use o How to maintain tracking of the information for future updating and use. o When to incorporate the information into existing station procedures. 2. Establish policy for internal operating experience information that will establish the connection between the information and the applicable process or program. The information should be considered for inclusion into	Restart 0350	RC1

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
60		a. Provide training to applicable personnel (BACC Inspectors and ISI/IST VT-2 Inspectors) and managers on the need to remove boric acid from components, to inspect for signs of corrosion, and to perform inspections for signs of boric acid in component internals. This training shall consider periodic refresher training and revision to the JFG for new BACC Inspectors and ISI/IST VT-2 Inspectors.		
61		b. Reinforce standards and expectations for procedure compliance and the need for work practice rigor with BACC Inspectors and ISI/IST VT-2 Inspectors.		
62	PR	a. Establish the FENOC operational/decision-making process at Davis-Besse including hazard analyses As it relates to the hazard analysis the following is to be addressed: 1. Establish policy that provides the expectations for performing hazard analysis, including: -Definition of acceptable risk - When to perform hazard analysis. The concept of not only performing hazard analysis after the decision to make a change to the facility has been made but also performing analysis at the point of initiation for requesting a change (before the request is made). - Method for performing hazard analysis not addressed in 10CFR50.59, including both probability and consequence. - Qualification requirements for preparer and reviewers of hazard analysis (outside 10CFR50.59) (Consider issuance of a FENOC policy.) 2. Establish the necessary guidelines or other implementing instruction for performing the hazard analysis addressed in the policy. The guidelines should provide examples of conditions/issues that warrant entry into	Restart 0350	RC1
63	EA	a. Review, benchmark and revise the NOP and Corrective Action Program Guideline against industry standards.	Restart 0350	RC2, CC2
64	OT	Review the Management Monitoring Process/Standards and Effectiveness in monitoring and trending the performance of involvement/oversight activities and emphasis on nuclear safety by Managers. Refer to CA 02-00891-45.	Post-Restart	
66		a. Provide training to personnel who perform ISI/IST and BACC inspections on the BACC Procedure and ASME Code IAW-5250, Item b requirements, with emphasis on the need to inspect areas that are or have been covered with boric acid and find them source of the leak and areas of corrosion. This training shall consider periodic refresher training and revision to the JFG for new BACC Inspectors and ISI/IST VT-2 Inspectors.		
67		a. Provide training to the BACC Coordinator, ISI/IST and BACC Inspectors to ensure they are aware of his responsibilities. Consider development of a BACC Coordinator JFG. This training shall consider periodic refresher training and revision to the JFG for new BACC Inspectors and ISI/IST VT-2 Inspectors.		
68		a. Establish a Boric Acid Nuclear Operating Procedure for FENOC PWRs. The BACC Program Manual (NG-EN-00324) lists the CRDM nozzles as one of the probable locations of leakage.		
69		b. Complete the Program Compliance Plan detailed review of the ISI/IST Program by outside consultants and implement changes as necessary.		
71		a. Review the Corrective Action Program Guideline to identify whether it contains appropriate provisions for ensuring the timely resolution of conditions, and revise the Program as appropriate.	Restart 0350	
74	EA	a. Management incentives should be realigned to place more reward for safety and same operation of the station when the management positions reside at the station (e.g. Site VP and below). The distribution should be consistent among all site positions.	Post-Restart	RC1

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
75	EA	a. Establish a FENOC-level policy emphasizing the station industrial and nuclear safety philosophy. The policy should be incorporated into procedures, guidelines, job descriptions and performance evaluations, as appropriate. Policies and procedures should include both management and worker responsibility in providing a safe work environment, personal protective equipment, training (including SCWE attributes) and working safely. [Note: The recommendation of the Team does not advocate a particular form that the policy may take, and in fact, the old `policy book' could be eliminated in favor of an approach that is better connected with the Business Plan.]	Post-Restart	RC1, RC2, CC1
77		Effectiveness Review Area: Review the Corrective Action Program for: 1) CARB effectiveness; 2) CR categorization/evaluation level determination; and 3) equipment failure analysis.	Post-Restart	
78	EA	Provide periodic assessments of the CR categorization and CR evaluation methods assigned to determine if the site is categorizing conditions appropriately. Minimal numbers of basic and root causes could be indicators of inappropriate standards. Develop Performance Indicators to trend data.	Post-Restart	CC1
79		2. Management will ensure standards of excellence are communicated, and monitoring will ensure these standards are upheld at all levels. This entails management behaviors, first line supervisor behaviors, and individual worker behaviors. These standards will not only focus on behaviors, but also on the expectations for manager involvement in station activities.		
80	EA	Evaluate and revise, as necessary, the CAP NOP/Guideline to perform generic implication reviews for all basic cause evaluations.	Restart 0350	CC1
81	EA	Develop and implement a formal systematic approach for collective significance reviews.	Post-Restart	CC1
82	EA	Define and implement training on evaluation (basic and apparent cause evaluation) techniques associated with equipment problem analysis to heighten expertise in this analysis area.	Post-Restart	CC1, CC1
83	PR	Establish the FENOC decision-making process at Davis-Besse including hazards analyses As it relates to the hazard analysis the following is to be addressed: 1. Review station processes and procedures to determine if entry into hazard analysis (including decision-making) is required. 2. Update processes and procedures determined to require performance of hazard analysis to reference the applicable policy/guidelines for implementation. The guideline should provide examples of issues that warrant entry into hazards analysis.	Restart 0350	RC1
84		Assess the number of personnel that should be qualified and utilized to perform root cause analysis (e.g. a broad number of people [infrequent application], or a small-dedicated group [frequent application], or a combination of the two). Implement the recommendation from assessment. Provide justification for why the course chosen will improve the effectiveness of root causes.		
85	EA	Provide specific training (such as root cause training, effectiveness reviews) for CARB members.	Post-Restart	CC1, CC1
86		Strengthen and expand the procedural guidance for utilization of quarantine for station events. Training and expectations for this tool should be administered to station personnel.		
87		1. Provide independence of effectiveness reviews. 2. Consider applying effectiveness reviews to basic cause evaluations.		

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
89		Review the CR 02-00891 management root cause and determine if the Program Compliance Plan adequately addresses the issues identified in the report and revise station programs to meet industry high standards of performance to support same and reliable operation. Document the findings and implement actions identified.		
95	OT	The FENOC COO determined that 4-C's (Compliments, Communications, Concerns, and Assessment) meetings are part of the change to reinforce the site safety culture. Formalize the meetings to meet on a periodic basis for set period of time to allow personnel to discuss safety issues.	Restart 0350	RC1
96		Perform periodic Safety Conscious Work Environment Survey and Assessments (Effectiveness Reviews) based on criteria and attributes derived from NRC policy and guidance. Review survey results and take actions where necessary to reinforce the site safety		RC1
97	OT	Effectiveness Review Area: Review the Equipment Trending Program with emphasis on identifying repeat issues for elevating CR categorization/evaluation level or initiation of CRs when adverse trends are identified. Refer to CA 02-00891-50, -57, -58.	Post-Restart	CC1
98		Effectiveness Review Area: Review the Policies and Standards for analysis of safety issues (the FENOC Hierarchy of Documents for Davis-Besse to ensure consistent policies and standards for analyses of safety issues, similar to other FENOC plants), including external information and internal operating experience. Refer to CA 02-00891-59.		
99	PR	Develop and implement apparent cause training. (Suggestion is a one or two day problem solving class.) Obtain upper management approval of curriculum. Perform training for all personnel that perform apparent cause evaluations. (Personnel that have completed root cause training should be exempted.)	Post-Restart	CC1
101	EA	1. Provide root cause evaluation teams with a formal charter of expectations.	Post-Restart	CC1
102		Effectiveness Review Area: Review Standards and Expectations in the Plant (Station) Department with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, operational/decision-making, hazards analysis, safety focus). Refer CA 02-00891-46, -48, -62, -75, -76, -83, -104.		
103	EA	Revise the Morning Management Communications and Teamwork Meeting agenda to regularly discuss procedural compliance at the MCTM meetings.	Post-Restart	CC1
104	PR	Conduct Case Study training to reinforce standards and expectations for procedure compliance and the need for work-practice rigor and the potential consequence of a failure to do so.	Post-Restart	
105	OT	Root Cause: Less than Adequate Nuclear Safety Focus- A production focus established by management, combined with taking minimum actions to meet regulatory requirements, resulted in acceptance of degraded conditions on the RPV head and other components affected by boric acid. (Root Cause 6.1.1) Corrective Action: Complete an evaluation of the current Directors and Managers to ensure adequate alignment with emphasis on 1) Safety, 2) People, and 3) Reliability prior to restart.	Restart 0350	RC2
108	PR	Rebaseline Standards and Expectations in the Plant/Station Department and issue policies/handbook stating the standards/expectations with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, operational/decision-making, hazards analysis, safety focus).	Restart 0350	RC2
109	PR	Rebaseline Standards and Expectations in the Quality Assessment Department and issue policies/handbook stating the standards/expectations with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, adequacy of audits/surveillances, oversight of DB Departments activities, safety focus).	Restart 0350	RC2

0891 CAF #	Type	Description	Restart Action Plan Classification	Cause #
110	PR	Rebaseline Standards and Expectations in the Work Management Department and issue policies/handbook stating the standards/expectations with emphasis on lessons learned from this root cause evaluation (i.e., procedure compliance, hazards analysis, safety focus).	Restart 0350	RC2
111	PR	Rebaseline Standards and Expectations in the Support Services Department and issue policies/handbook stating the standards/expectations with emphasis on lessons learned from this root cause evaluation (ie, procedure compliance, commitment identification in TERMS, hazards analysis, safety focus).	Restart 0350	RC2
112	PR	Rebaseline Standards and Expectations in the Technical Services/Nuclear Engineering Department and issue policies/handbook stating the standards/expectations with emphasis on lessons learned from this root cause evaluation (i.e., procedure compliance, operational/decision-making, hazards analysis, safety focus). Also, clarify technical staff expectations to ensure that degraded conditions in systems are promptly identified, evaluated, corrected and prevented from recurring.	Restart 0350	RC2
115		Revise the CAP to not permit closing MODE restraint Corrective Actions to Work Orders, but close the MODE restraints Corrective Action when the work is complete.		
116		Conduct a historical Alloy 600 review. The review should include documents associated with the CRDM nozzles. Summarize the results in a FENOC-level program document. Potential items for consideration include: * The 1994 EPRI Workshop Report.		

Enclosure 5

Root Cause Analysis of Engineering Assessment Capabilities

FirstEnergy, DAVIS-BESSE NUCLEAR POWER STATION

Root Cause Analysis Report

Assessment of Engineering Capabilities

CR 2002-07525, Dated 10-05-2002

REPORT DATE: 1-03-2003

Prepared by: David T. Woodfin Jr

Approved by: _____
Director, Nuclear Engineering Department

Nuclear Engineering Department

Problem Statement

Description of reason for investigation

During it's review of the Management and Human Performance Root Causes of the Reactor Pressure Vessel Head degradation, the NRC questioned how the shortcomings in the engineering support of proper resolution of issues surrounding the event were going to be addressed in the Performance Improvement Plan. At the debrief by the NRC team on 10/04/02, Senior Management acknowledged that weaknesses in Engineering had been an area of concern and actions had been taken, even before the head degradation had been found. It was agreed that an assessment of current Engineering capabilities would be formally documented, and that the actions taken in response to identified weaknesses would be assessed to ensure their adequacy for plant restart. This commitment was documented in Condition Report (CR) 02-07525, "Assessment Of Engineering Capability", initiated on October 10, 2002 and is the subject of this report.

The investigation and resolution of this condition report also addresses conditions described in CRs 02-02434, 02-03668, 02-07813, and 02-08199.

CR 02-02434 documents the following conditions:

NQA has completed a review of a select number of historical condition reports linked to the present degradation of the Reactor Pressure Vessel head. A common theme in this review was a marginal engineering analysis of concerns and issues. This conclusion has been forwarded to the current 'management issues root cause team' associated with the degraded reactor head. Until their conclusions are finalized, immediate action to ensure interim engineering outputs are technically correct, that sound scientific methodology is applied and that all activities reflect professional engineering standards and ownership must be taken. It should be clarified that this condition report is applicable to all engineering sections, even though many of the issues identified are traceable to system engineering. Additionally, weaknesses were identified at varied levels of management, indicating that rigor must be equally applied to reviews and approvals as well as the origination level.

Some examples include:

PCAQR 94-0295: System engineering concluded that an inspection did not need to be performed based upon it not being perceived as a regulatory requirement and that current inspection methodologies were not reliable. This did not provide a scientific basis for excluding an inspection.

PCAQR 96-0551: Engineering management expressed a different viewpoint from the subject matter expert relative to the potential concerns for the reactor vessel head. No technical justification was provided for this different viewpoint. Additionally, the deficiency was related to programmatic non-compliance. The results should have been either obtaining compliance or a program revision. Neither occurred. Prior to the PCAQR closing, Generic Letter 97-01 was issued, which could not be fully complied with relative to boric acid on the head, yet no engineering level represented this compliance or safety issue in championing a need for a modification at various PRC meetings. Contrarily, curves were presented indicating that there

was minimal immediate concern. However these curves were not based on a bare head baseline inspection.

Prior to the closure of PCAQR 96-0551, PCAQR 98-0767 was issued again identifying boric acid on the head. This report identified boric acid as red-brown rust in color. The boric acid corrosion program stipulated at that time that red-brown boric acid could be indication of corrosion. This boric acid was dispositioned as merely old boric acid without doing an inspection under all of the boric acid to determine if corrosion was occurring. Programmatic compliance to the Boric Acid Program was not applied with rigor.

During the 1998 and 2000 outages, ISI examination of the reactor vessel flange studs and nuts were examined for boric acid degradation as boric acid deposits were found on these components. This boric acid clearly came from the weep holes of the support structure, and the bolts and nuts were subjected to the same environmental conditions as the reactor head, yet the standards were not applied to the ASME pressure vessel as they were to the studs and nuts.

Condition Report 1999-1300 was issued to determine the source of iron oxide deposits in containment. While these were not identified, analysis indicated the source to be a steam leak, and chemical analysis pointed towards the primary reactor coolant system. Rigor was not applied in locating the source of corrosion within containment.

Condition Report 2000-1037 was issued to have an evaluation of the reactor vessel head performed. This was clearly not performed. Documentation of work performed, including as found and as left conditions, was also marginal to ineffective. Documentation of the results that was performed was not clear. Effective documentation is foundational to engineering analysis and the ability of management to make sound decisions. As engineering personnel were directing this particular evolution, it is difficult to understand the lack of precise documentation and the low standard in this instance. Additionally, the condition of the head could not have allowed a comprehensive evaluation of the nozzles per GL 97-01, and non-compliance to requirements of the boric acid corrosion program was evident as well.

The aforementioned are being forwarded to the root cause team to determine what management and human performance issues influenced these behaviors. Independent evaluation of these same factors will also be assessed by NQA.

CR 02-03668 identified the following condition:

The following deficiency has been identified as part of the System Assessment portion (Latent Issue Review of Reactor Coolant System) of the Building Block Review and requires consideration for the need to be completed prior to restart. In accordance with the Latent Issues Review (LIR) Process, IP-A-003, Revision 3, Section 5.1.4(b), "All external system leaks are to be evaluated."

The LIR of the RCS has identified that a history of persistent leakage exists at the casing-to-cover joint for Reactor Coolant Pumps (RCP) 1-1, 1-2, 2-1, and 2-2.

This condition was first identified in 1996 (10RFO) where leakage was observed to have occurred past the outer gasket on RCP's 1-1 and 1-2. During 11RFO inner gasket leakage was documented for all four pumps by procedure OP-06900. Inner gasket leakage was again observed in 12RFO at three of the pump locations, additionally, boric acid was identified past the outer gasket on RCP 1-1. During 13RFO inner gasket leakage was observed on two pumps. Testing of the other two pumps was not performed.

Failure to adequately address this chronic leakage issue in a timely manner is contrary to FENOC Engineering Principles and Expectations # 3.

Corrective Action (CA) # 6 of this CR states that the CA is rolled over to CR 02-07525 for resolution and assigns the following action:

The identified problem was the failure to adequately address the chronic/persistent leakage of the reactor coolant pumps casing-to-cover gaskets.

The cause was determined to be the low expectations and standards and a general willingness to accept RCS leakage by engineering.

Issues of this nature, (failure to adequately address problems) have been discussed and will be resolved per resolution of CR 02-07525. It has been agreed that in the future, an assessment of current Engineering capabilities would be formally documented, and that the actions taken in response to identified weaknesses would be assessed to ensure their adequacy for plant restart. This is further reinforced by the adoption of FENOC Engineering Principles and Expectations.

CR 02-07813 identified the following conditions:

The long term and ongoing mandatory work-hour schedules, typically involving 60+ hours per week and 12+ hour days, are adverse to the safety and well being of employees.

The consequences of this work environment degrading fitness-for-duty while performing safety-related activities can be translated into affecting the health and safety of the public.

This is a significant condition that may be reducing the quality of work and further degrading employee confidence and respect in the management team. Ultimately, these work-hour policies will influence decisions by our top (and prospective) talent regarding their interest in being employed at Davis-Besse and may jeopardize the viability and integrity of the Davis-Besse team needed for restart.

Among the employees, this is a significant area of discontent and continues to degrade the employee-management relationship that is already damaged and publicly criticized. Evidence shows that production considerations continue to override employee health and personal priorities. Criteria and commitment to ensure a healthy balance of work and home are lacking. Employees are burned-out, exploited, less efficient, and not being treated with the respect that is deserved. Davis-Besse should aspire to a better-than-minimal treatment of the workforce, as this is key to unifying a loyal organization geared for restart. Our goals are set high for plant standards; they should be set equally high for treatment of the employees that run it.

The following observations are offered in contribution to the above statements:

1. TS/TRM HOUR LIMITS: Policy of complying with Technical Specification (TS) 6.2.3 and Technical Requirements Manual 5.2.3 FACILITY STAFF OVERTIME hour limits appears to be superficial in that approvals to exceed those limits are readily approved for numerous employees, sometimes repeatedly and for extended periods. The TS uses wording such as "without routine heavy use of overtime" and "Routine deviation from the above guidelines shall not be authorized." The TRM adds detail regarding hour limits and wording such as "on a temporary basis." The primary consideration for approval of exceeding these hour limits seems to be the task at hand, not the fitness or well being of the employee. As implemented at Davis-Besse, the existence of these limits appears to be merely an inconvenience, since I am not aware of tangible criteria being applied for the disapproval of such requests. Why is our treatment of licensed operating limits for equipment operation treated more rigorously

than licensed limits for humans? Furthermore, a conservative interpretation of these requirements would involve only an infrequent approach to the hour limits, as suggested by the wording in both the TS and TRM. Continuously hitting or exceeding the defined limits over an extended period is a conflict with the intent.

2. HOUR LIMIT APPLICABILITY: Often with respect to hour limits, arguments are aired that certain individuals are not performing "safety-related functions" and thus are not bound by these protective criteria. Since a complete definition of safety-related functions - and to whom it applies - does not exist to my knowledge, such arguments are non-conservative at best. The TS lists, as examples, senior reactor operators, reactor operators, auxiliary operators, health physicists, and key maintenance personnel. The TRM uses terms such as Facility Staff and Operating Personnel, which are not clearly defined. If a task is so important that its performance is critical and has required an employee to exceed the already generous hour limits, then often the task can be construed as safety-related in some manner. This perspective should be considered whether the individual is operating or maintaining equipment, checking calculations, drafting drawings, evaluating condition reports, or writing procedures, any of which could have adverse safety consequences if performed in error. Certainly there are many other activities on site that can affect nuclear safety.
3. SHIFT COVERAGE WITH PERSONNEL SHORTAGE: Increased reliance on 24/7 "shift coverage" and minimum manning expectations is compounding the above concerns. Some organizations are spread too thin to be provide effective coverage. Volatile schedules that frequently change and shift from day to night coverage are reducing efficiency and challenging personnel effectiveness. This coverage also necessitates "acting" supervisors, outage manager appointments and similar roles, further removing employees from the priority tasks they are assigned. With frequent supervisor unavailability and loss of teamwork imposed by 24/7 coverage, a sense of chaos is being generated rather than increased productivity. This chaos is evident in missed deadlines, communication gaps, duplicated efforts, and lack of responsiveness. These factors further contribute to challenging the quality of work at Davis-Besse and can be more counter-productive than a standard schedule.
4. DURATION OF AGGRESSIVE SCHEDULE: Many employees have been working extended hours even beyond the duration of this outage as part of the accelerated preparation for 13RFO. The excessive impact on the families and personal lives of our valuable employees has been recognized verbally, but kind words do not relieve the stresses and chronic nature of these expectations.
5. SLEEP DEPRIVATION: Recognizing that the average Davis-Besse employee is working long-term 12 to 13 hour days, in addition to a typical 1 hr total commute time, there is already zero margin for personal responsibilities unless an individual short-cuts their sleep. Since some personal life responsibilities beyond requisite sleep and basic hygiene are unavoidable and important, the current long-term work schedule is enforcing a pattern of sleep deprivation, affecting the health and potentially endangering the lives of our "valued employees". Short-term extended hours can be reasonably accommodated into most employee schedules with minor impact, but cannot be reasonably accommodated for months on end with clear evidence that several more months are still ahead.

6. CAR ACCIDENTS: Fatigue-related car accidents are an obvious high-risk potential consequence of this environment. Such events have already occurred with Davis-Besse employees on less aggressive schedules. I have witnessed, understandably, employees struggling with fatigue while at work, and worry about their safety on the road.
7. EXCESSIVE LENGTH WORKDAYS: Considering that even longer workdays (14-16 hrs +) are occurring on occasion and approved by management, the probability of adverse consequences, whether personal or work activity related, is increased further. The influence on work quality, decision-making ability, and generation of new latent issues may be difficult to quantify, but are obviously negative in consequence. The ability to meet any kind of personal obligations is taken completely from employee discretion.
8. LACK OF HUMAN PERFORMANCE INITIATIVES: I am not aware of any Human Performance initiatives designed to address employee fatigue, both caused by and adversely affecting the aggressive recovery efforts underway. This fatigue could manifest itself physically and/or emotionally. The associated effects on morale, ranging from apathy to anger, are quite observable, even if many employees are not openly expressing their concerns out of fear of retaliation.

My goal in writing this CR is to communicate safety, health, and efficiency concerns, caused by work schedule, that constitute adverse effects on our employees, the safe operation of this facility, and the successful restart of Davis-Besse. These are issues widely discussed at the employee level, but acknowledgement by management and necessary corrective actions seem to be lacking.

CR 02-08199 identified the following condition:

During the NRC debrief for the System Assurance and Design Capability Inspection, Bruce Bartlett [Lead NRC Inspector] made the following statements:

1. Numerous examples of several issues that were known but not properly addressed.
2. Numerous examples of giving and accepting the easy and often the wrong answer.
3. Numerous examples of inadequate, untimely, and erroneous corrective actions.

These statements allude to the fact that the organization does not have a full understanding or appreciation of the root causes associated with the RPV Head Degradation (CR 02-00891). These statements further allude to us not having made the transition yet to an organization with a questioning attitude. That questioning attitude is what the organization needs, to be capable of properly capturing issues and prosecuting the issues through the corrective action process in a manner that results in problem correction and elimination of repetition.

Since we are in the process of educating the organization and eventually will assess the organization's understanding of the issues and transition to one with that "questioning attitude," this CR needs to be incorporated into the CR written earlier by the Director, Engineering on performance of an Assessment of Engineering Capability (CR 02-07525). Rolling this CR into CR 02-07525 should ensure that the assessment includes attributes on Human Performance and assimilation of the FENOC Engineering Principles and Expectations into the everyday work practices.

These condition reports document various aspects of concerns with the Davis-Besse Nuclear Engineering Department capabilities to support the safe and reliable operation of the Davis-Besse Nuclear Power Station.

Consequences of event/condition investigated

The failure of the Davis-Besse Nuclear Engineering Department to adequately identify and resolve issues concerning the safe operation of the Davis-Besse Nuclear Power Station directly contributed to allowing the degradation of the Reactor Pressure Vessel Head to occur. The investigation of the management and human performance aspects of this failure is documented in the Root Cause Analysis Report entitled "Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head", dated 8/13/02.

That investigation was focused on the attributes that directly contributed to the degradation event and it was expected that the corrective actions assigned would address any weaknesses in the Engineering organization and prevent like events from occurring.

CR 02-02434 documents examples of marginal engineering analyses of concerns and issues.

CR 02-03668 identifies failures to adequately address problems.

CR 02-07525 acknowledged that weaknesses in Engineering had been an area of concern and actions had been taken and that an assessment of current Engineering capabilities would be formally documented.

CR 02-07813 expresses concerns, caused by work schedule, which could adversely affect employees and the successful restart and safe operation of the facility.

CR 02-08199 alludes to the engineering organization not having a full understanding or appreciation of the root causes associated with the RPV Head Degradation and not having made the transition yet to an organization with a questioning attitude.

These conditions represent the failure of the engineering organization to properly contribute to safe and reliable plant operation and to foster improvements in plant performance, efficiency, and reliability by optimizing overall engineering support. Therefore, it is likely that other generic weaknesses may exist and an investigation should be performed to determine how the Davis-Besse Engineering organization functions in comparison to how a high performing engineering organization should function. Corrective actions can then be developed and implemented to ensure the organization begins and continues to function as a top performing engineering organization in support of safe and reliable plant operation.

Immediate actions taken

1. No immediate actions were taken in response to the identification of the need to assess the current Engineering capabilities.

Remedial actions taken

1. The Management and Human Performance Improvement Plan was developed prior to the initiation of this condition report to address the previously identified management and human performance issues. The corrective actions assigned to resolve these issues address some aspects of the weaknesses of the DBNPS Nuclear Engineering Department.
2. An Engineering Assessment Board was established to review the products of the DBNPS Nuclear Engineering Department and provide feedback to the individual preparer(s). This review is intended to ensure the necessary engineering rigor and standards are utilized in the development, review and approval of engineering products.

3. A team of industry leaders was assembled and tasked with assessing the current status of the DBNPS Nuclear Engineering Department capabilities and making recommendations for improvements. These recommendations provide near term as well as long-term resolutions to the identified weaknesses.

Remedial actions proposed

1) Recruit and fill key manager and supervisory positions in the engineering organization.
2) Develop behaviors/expectations for Davis-Besse Engineering personnel.
3) Coordinate the development/expectations for FENOC Engineering.
4) Standardize the Davis-Besse Engineering organizations and functions consistent with the FENOC model.
5) Develop proposed vision, roles and responsibilities for the engineering organization.
6) Obtain agreement with and support from station counterparts that the proposed roles and responsibilities are right and that the entire site organization will support them.
7) Develop communication plan on the revised engineering roles and responsibilities.
8) Approve communication plan for revised FENOC roles and responsibilities.
9) Communicate new organizational roles and responsibilities.
10) Fill open position for Engineering Training Instructor.
11) Develop and implement training plan on revised engineering roles and responsibilities.
12) Identify and modify process, procedure and program constraints that conflict with the desired engineering roles and responsibilities.
13) Reinforce individual accountability and performance through utilization of FENOC ownership for Excellence process.
14) Develop staffing and qualification plan to fill existing organizational gaps to the standard structure, including operations and maintenance personnel in the potential pool of candidates with special consideration to ensure sufficient plant specific, PWR and operational experience exists in the engineering organization.
15) Develop succession plan down to the supervisor level in engineering, targeting individual contributors to receive leadership and supervisory training prior to assuming positions. Include targeted rotation inside and outside of engineering in the plan.
16) Coordinate the development of succession plans at Davis-Besse with FENOC wide succession planning activity.
17) Reinstitute the Senior Reactor Operator Certification Program for technical personnel.
18) Complete deficiency resolution required for Davis-Besse restart.

Event Narrative

The events leading to the discovery of the degradation of the Reactor Pressure Vessel Head at the Davis-Besse Nuclear Power Station are documented in the Root Cause Analysis Reports associated with Condition Report No. 02-00891. The first report, titled "Significant Degradation of the Reactor Pressure Vessel Head," Revision 1, and dated 8/27/02, deals with the technical causes of the event. The second report, titled "Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head", and dated 8/13/02, deals with the management and human performance issues that allowed the event to occur and progress to the extent that it did.

Several related issues, identified during the extended outage, have been documented in condition reports dealing with the management and human performance aspects of the functioning of the Nuclear Engineering Department. These issues are also addressed by the results of this investigation.

CR 02-02434 identified that a review of historical condition reports linked to the degradation of the RPV head indicated a marginal engineering analysis of concerns and issues. The CR recommended that immediate compensatory measure be instituted to ensure the outputs of the engineering organization are technically correct, that sound scientific methodology is applied, and that all activities reflect professional engineering standards and ownership. Additionally, since weaknesses were evident at varied levels of management, the measures should be applied to reviews and approvals as well as to the origination of these products. The conditions identified by this CR were forwarded to the root cause team investigating the management and human performance issues related to the RPV head degradation to determine what influenced these behaviors.

CR 02-03668 identified that the chronic leakage at the Reactor Coolant Pumps' casing-to-cover joints were not addressed in a timely manner. This is contrary to the FENOC Engineering Principles and Expectations to be intolerant of failures of critical equipment. The leakage was first identified in 1996 but only recently was the cause determined and the appropriate corrective action, an Engineering Change Request, initiated.

CR 02-07525 identified that, during it's review of the Management and Human Performance Root Causes for the Reactor Pressure Vessel Head degradation event, the NRC questioned how the shortcomings in the engineering support of proper resolution of issues surrounding the event were going to be addressed. In response, Senior FENOC Management acknowledged that weaknesses in Engineering had been an area of concern and that actions had been taken, even before the head degradation had been found. Management agreed that an assessment of the current Engineering capabilities would be formally documented and the actions taken in response to identified weaknesses would be assessed to ensure their adequacy for plant restart.

CR 02-07813 identified an apparent lack of management concern for the safety and well being of employees due to an excessive use of overtime. The initiator expressed safety, health and efficiency concerns that the current work schedules could constitute adverse effects on employees and the successful restart and safe operation of the facility.

CR 02-08199 identified that the NRC reported the discovery of numerous examples of the Davis-Besse organization not addressing known issues; developing and accepting the easy, and often incorrect, resolution to issues; and providing inadequate, untimely, and erroneous corrective actions for issues. These statements were interpreted as alluding to a lack of full understanding

or appreciation of the root causes associated with the RPV head degradation and not making the transition to an organization with a questioning attitude.

Permanent and interim measures have been instituted to correct or compensate for these identified weaknesses. A new management structure, along with new management personnel, has been instituted. A Return to Service Plan was developed to provide the course of action for the plant's safe and reliable return to service.

This course of action includes those actions necessary to address each of the commitments in the NRC Confirmatory Action Letter (CAL) regarding the RPV head degradation; the near-term corrective and preventive actions necessary to address the causal factors associated with the RPV Head degradation event; and the long-term actions necessary to assure that the underlying causal factors remain corrected and the continued safe performance of the Davis-Besse Nuclear Power Station can be sustained. In addition, the root cause(s) related to management not promptly identifying the degradation of the RPV Head will be corrected.

This plan consists of seven Building Blocks, designed to support safe and reliable restart of the plant and to ensure sustained performance improvements:

A. Reactor Head Resolution Plan

B. Containment Health Assurance Plan

C. System Health Assurance Plan

D. Program Compliance Plan

E. Management and Human Performance Excellence Plan

F. Restart Test Plan

G. Restart Action Plan.

The Return to Service Plan and its' associated component plans will address the aspects related to the RPV Head degradation event, the causal factors leading to the occurrence of the event and provide assurance that a similar event will not recur in the future. One of the issues, identified as a significant contributor to the event, was the lack of adequate support for safe and reliable operation by the Davis-Besse Engineering Organization. To address this issue, as well as improve the overall standards and efficiency of the First Energy Nuclear Operating Company (FENOC) Engineering Organization, a corporate policy to focus on ensuring that FENOC Engineering standards were consistent with the best in the industry was developed. This standard was published as Nuclear Operating Policy, NOPL-CC-0001, FENOC Engineering Principles and Expectations, and distributed as a handbook to FENOC Engineering employees. Engineering Department and Section meetings were held to discuss these principles; develop an understanding of their meaning; and encourage their incorporation into the culture of the Engineering organization.

A new Engineering organizational structure was also developed that incorporated some functions into a central FENOC Corporate Engineering Organization to provide support to all the FENOC sites and also standardized the Engineering organizational structure at each production site. The implementation of this new organizational structure will necessitate relocation for some personnel and new assignments for others. These organizational changes, as well as promotions, personnel actions and other attrition, have resulted in various personnel openings in management and supervisory positions in the DBNPS engineering organization. Initial attempts to fill these positions were not successful as few qualified candidates applied to the job postings.

In response to the commitment made to perform an assessment of the current Engineering capabilities and develop the appropriate corrective actions, the Institute of Nuclear Power Operations was requested to facilitate an Industry Assessment of Engineering at Davis-Besse. The assessment of the DBNPS engineering organization was performed from December 9-13, 2002 by an independent industry team that included senior industry engineering leaders. The team's objective was to evaluate the organizational effectiveness of the DBNPS engineering organization and the capability of the organization to support safe plant operations and to identify any areas for improvement particularly focused over the long-term.

The team identified a need to focus on building and maintaining a solid engineering organization over the long term. Specifically, the team identified weaknesses and made recommendations for improvement in the following areas:

- Engineering Organization
- Engineering Roles and Responsibilities
- Staff Development
- Learning Organization
- Resolution of Open Items
- Engineering Assessment Board
- Owner Acceptance of Vendor Products
- Work Management
- Performance Monitoring

Data Analysis

DATA REVIEW

Davis-Besse has been shutdown for approximately 10 months at the time of this assessment. Substantial progress has been achieved in the building block programs by providing focused project management as well as contract resources. This short-term focus on the extent of condition from the causes and contributors to the reactor vessel head degradation event has held management's attention (appropriately). Renewed focus on building and maintaining a solid engineering organization over the long-term is now needed.

The following provides further elaboration on the areas reviewed.

A. Engineering Organization

Although the engineering leadership team is not in place, positive steps were taken to establish the leadership team with the recent movement of experienced company personnel into the director – nuclear engineering, manager – design basis engineering, and manager – projects positions. However, significant weaknesses exist with first-line supervisor ranks. Two of four plant engineering supervisor positions are vacant with one of the two remaining supervisors temporarily assigned to restart activities. Two of four supervisor positions in design engineering are vacant. Also, the manager – plant engineering is moving to a new position. The mechanical system design organization has significant vacancies. The first and arguably most important step to full organizational recovery is to select and fill these positions. The absence of leaders in these positions fosters organizational misalignment low morale, misinformation and the reduced ability to coordinate work within the station. In many groups, engineers do not receive necessary coaching, technical guidance, or reinforcement of expected behaviors.

B. Engineering Roles and Responsibilities

Substantial information was evident to suggest that clear roles and responsibilities for engineering either do not exist or are misunderstood. For example, many people interviewed questioned the engineering involvement in day-today maintenance activities. There is a strong need to implement the following:

1) clearly define the roles and therefore the accountability of each engineering department/section; and

2) work with senior management, other station organizations, and the engineering organization to gain acceptance and support for these roles.

Also, the Davis-Besse organization is different from the other FENOC engineering organizations. The station should adopt the FENOC standard organization for engineering as soon as possible. It is the team's judgement that rebuilding the engineering capability at Davis-Besse takes precedence over staffing engineering functions in the proposed corporate organization.

Teamwork and alignment of purpose, both internal to engineering and among departments, will be key to long-term success. Recommendations are included for engineering management and supervisory personnel to retreat from the site to develop the items spelled out above and come together as a management team. They should work

together to articulate what a healthy, well-functioning engineering organization looks and feels like. They should develop a renewed sense of commitment to lead engineering to achieve its future vision and support each other as they work to achieve that goal.

It will be important for the proper level of engineering management to be represented, together with counterparts in other organizations, at all key leadership activities. Site leadership needs to be consistently supportive and offer positive, constructive feedback as engineering seeks to improve.

C. Staff Development

With the engineering team in place, emphasis needs to be on performance management of engineering personnel. A good first step has been taken with development of engineering principles and expectations. The entire staff needs to become ingrained with and live up to these principles and expectations. Engineering management, in meetings and other interactions with the engineering staff, should set the example and live up to these expectations and principles.

D. Learning Organization

Emphasis also needs to be placed on making engineering a learning organization. The lessons learned from the ongoing engineering review and assessment activities are not being captured and cataloged for use by FENOC personnel. Several good practices have been implemented, such as the Engineering Assessment Board (EAB) and the systematic reviews or programs and plant systems; however, feedback to the engineering training program is not provided to ensure all appropriate engineering personnel learn from these activities. Minimal participation in external industry activities can lead to an isolated organization. Therefore, a plan is needed to force appropriate involvement.

E. Resolution of Open Items

The discovery phase in each area under engineering cognizance (containment health, system health and latent issue reviews, and program reviews) is coming to completion. Containment health has evaluated the impact of the reactor coolant system leaks on systems and components within the containment building. System readiness reviews have determined the current statuses of the systems, as well as refreshed the system engineers on the systems. Open issues have been cataloged through latent issue reviews for selected systems and by other system design reviews. Engineering programs have been assessed and open issues require resolution to ensure sustained improved performance.

Many of the deficiencies identified from these reviews were known and documented prior to the event at Davis-Besse but were not corrected. Regardless of the reasons for failure to follow through on these open items in the past;

1) a program should now be defined that properly evaluates each item based on plant impact and potential risk;

2) schedules for completion of the outstanding items should be developed based on risk significance; and

3) resources should be dedicated over the next few years to fully complete this effort

Station Management must understand the importance of closing out open design items and implementing configuration management programs properly to prevent repeating these problems.

F. Engineering Assessment Board

The EAB was established as an interim compensatory measure to ensure:

1) the outputs of the engineering organization were technically correct,

2) that sound scientific methodology was applied, and

3) that all activities reflected professional engineering standards and ownership.

This constitutes a process barrier that needs to transition to a true assessment board, with the objective of raising the quality standards of all engineering products. The board membership needs to be representative of the engineering organization with clearly defined roles and responsibilities and qualification requirements.

G. Owner Acceptance of Vendor Products

The large volume of contracted services has demonstrated a weakness in the process for review and acceptance of vendor products at DBNPS. The expectations for the review and acceptance of vendor products are unclear, contributing to inconsistent reviews and high backlogs of products requiring review by Davis-Besse personnel. Opportunities exist to conduct these reviews more efficiently and effectively by better defining the scope of work and conducting in-process reviews. The typical review resources in the industry can be 10-15% of the total project resource requirements.

H. Work Management

Engineering lacks an effective work management process to enable appropriate prioritization and management of engineering resources. This condition has resulted in work inefficiencies, frequent priority changes and, in some cases, disconnects between the station and engineering priorities.

I. Performance Monitoring

Management lacks effective tools for monitoring and trending the performance of the engineering organization.

FACT LIST

1. Key leadership positions in the engineering organization are vacant or staffed with temporary personnel.
2. Roles and responsibilities of engineering personnel are not clearly defined.
3. The Davis-Besse engineering organizational structure is different from other FENOC sites.
4. Performance management and hence accountability is not evident in the engineering organization.
5. Engineering does not emphasis being a learning organization.
6. Backlog of open engineering issues exists from prior to the head degradation event.
7. Engineering Assessment Board is a reactive process barrier.
8. Volume of contracted vendor products exists that require owner review and acceptance.

9. An effective engineering work management process does not exist.

10. Effective tools for monitoring and trending engineering performance does not exist.

CAUSAL FACTORS

The HPES Causal Factors Analysis identified the following:

Managerial methods, the processes used to control or direct work-related plant activities, including how manpower and material is allocated for a particular objective, is the primary cause of the condition identified in the problem statement. All of the elements that make up this causal factor are represented in the analysis of these conditions.

Management Directions:

a. Policy guidance/management expectations were not well defined or understood. This has been previously identified (CR 02-00891) and initially addressed by the promulgation of the FENOC Engineering Principles and Expectations Policy. These absorption of these principles and expectations into the everyday work habits of all engineering personnel must be constantly encouraged and reinforced by management

b. Job performance standards were not adequately defined. Corrective actions to develop clearly defined roles and responsibilities for each position in the Davis-Besse Nuclear Engineering Department as well as the FENOC Corporate Engineering Department has been assigned. Corrective actions for implementation of effective personnel performance management in the engineering organization have also been assigned.

c. Personnel exhibited insufficient awareness of the impact of actions on nuclear safety or reliability. The evidence from the root cause report on the management and human performance issues associated with the reactor vessel head degradation (CR 02-00891) provides more than ample justification for this symptom. Corrective actions assigned by CR 02-00891, the Davis-Besse Restart Action Plan and the Management and Human Performance Improvement Plan address many aspects of this issue. The corrective actions assigned to the two previous symptoms should also increase the awareness of engineering personnel of the need to make conservative decisions regarding the impact of their actions on nuclear safety or equipment reliability.

Management Monitoring:

a. Management follow-up or monitoring of activities did not identify problems. CR 02-02434 documents that management either did not identify the existence of the reactor vessel head degradation or chose to not follow-up of the evidence presented that a problem existed. This type of management performance was also evident in the response to the findings from NQA Audits and Surveillances and Engineering Self-Assessments, since many of the problems discovered during the recent reviews were previously documented but either ignored or given minimal attention. The recent empowerment of the oversight organization and replacement and/or retraining of key management personnel are completed actions to strengthen the response and investigation of concerns and questions. Additionally, corrective actions to strengthen the self-assessment process are assigned by this condition report.

Management Assessment:

a. Causes of a previous event or known problem were not identified. A lack of depth in previous cause analyses has been identified as a weakness in the Corrective Action

Program and corrective actions have been assigned to correct these issues. The review of CRs documented by NQA in CR 02-02434 indicates the prevalence of this symptom and the need for performance management of engineering personnel.

b. Previous Industry or in-house operating experience was not effectively used to prevent problems. The evidence from the investigation of the reactor vessel head degradation indicates that large volume of operating experience information existed on the corrosion of reactor coolant system components from boric acid leakage. This evidence was not given the appropriate credence to establish the probability of the head degradation. An INPO Assessment had also indicated weaknesses in the use of Operating Experience and recent Program Compliance Reviews discovered the need for additional improvements in the implementation of the Operating Experience Program. Corrective actions from the program reviews and improvement in the engineering management monitoring of the problem solving activities by engineering personnel should improve the use of operating experience.

Accountability:

a. Responsibility of personnel was not well defined or personnel were not held accountable. The absence of personnel in key leadership positions and lack of clearly defined roles and responsibilities has fostered organizational misalignment, low morale, misinformation and the reduced ability to coordinate work within the station. In many groups, engineers do not receive necessary coaching, technical guidance, or reinforcement of expected behaviors. This has resulted in personnel not knowing what they should be doing and thus not being held accountable for poor performance.

Corrective Action:

a. Response to a known or repetitive problem was untimely – Corrective actions for known or recurring problems were not performed at or within the proper time. The identification of the conditions reviewed by NQA in CR 02-02434 is an excellent example of this symptom.

b. Corrective action for previously identified problem or previous event cause was not adequate to prevent recurrence. Management failed to take meaningful corrective action for consequential or non-consequential events. The response to the corrosion of valve RC-02 (CR 02-06505) is one example of inadequate corrective actions.

c. Inadequate implementation of corrective actions. Although effective corrective actions were determined, the actions were not properly implemented resulting in ineffective corrective actions. The examples that were cited in CR 02-08199 exemplify this symptom of inadequate managerial methods.

CONCLUSION

Inadequate managerial methods have resulted in the deterioration of the Davis-Besse Engineering Organization's ability to support the safe and reliable operation of the plant.

Experience Review

An Experience Review was performed and the Davis-Besse and Nuclear Industry searches identified the following related issues. The keywords used for the searches were organizational effectiveness/engineering capabilities/assessment of engineering/human performance/engineering rigor.

Davis-Besse

A review of the CREST database for CRs initiated at Davis-Besse, where the investigation or corrective actions documented an assessment or weakness of engineering capabilities, revealed numerous issues dealing with less than adequate engineering rigor. The failure of engineering to adequately support the safe operation of the plant is documented in the root cause analysis report for CR 02-00891 and weaknesses in the performance of various engineering activities are reported in other DBNPS CRs. While these are related issues, repeating them and incorporating their findings into this investigation will not add clarity but more likely would cloud the issues being addressed.

Nuclear Industry

The CREST databases for both the Beaver Valley Power Station and the Perry Nuclear Power Plant document organizational effectiveness reviews of engineering and associated corrective actions for improvement opportunities. Neither database documents a failure of their engineering organizations to support safe plant operation nor the other areas for improvement identified in this condition report.

A common feature of the nuclear power generating facilities that were placed on the NRC's watch list has been weaknesses in the capabilities of the associated engineering organizations. This has been documented in the INPO documents "Themes ("Warning Flags") From Recent Extended Shutdowns," and "Warning Flags -Precursors of Weak/Declining Engineering Performance." Most of the "warning flags" symptoms were determined to exist to some degree in the Davis-Besse Nuclear Engineering Department.

Conclusions

A critical assessment of the Davis-Besse Nuclear Engineering Department performance against the symptoms listed in the INPO documents could have alerted management to the declining performance indicators. However, it is unlikely that the results would have changed given the minimalistic nature of the culture that prevailed at the time.

Root Cause Determination

The following are the root causes and contributing causes addressing the issues presented in the Problem Statement.

ROOT CAUSES

The root cause of the decline in engineering capabilities is documented in the results of the HPES Causal Factors Analysis. The corrective actions assigned to address this root cause analysis are in addition to the actions being taken to address the causes detailed in CR 02-00891 and the Management and Human Performance Improvement Action Plan.

Less than adequate managerial methods are evident in the processes used to control and direct work-related plant activities of the Davis-Besse Nuclear Engineering Department. This is indicated by the evidence that there was a practice of living with known problems and that previously implemented corrective actions were inadequate or were not implemented in a timely manner. (CREST Cause Code H00)

CONTRIBUTING CAUSES

New management personnel and the implementation of improved engineering principles and expectations are addressing the weaknesses in the principles and expectations of previous management and their contribution to the current state of the engineering department. This assessment has identified the following conditions that need to be improved to allow the organization to function as a top performing engineering organization.

Key management and supervisory positions remain open in the organization. The absence of individuals in these leadership positions fosters organizational misalignment, low moral, misinformation, and the inability to coordinate work within the station.

The engineering organization's roles and responsibilities at the station are not clearly defined. This condition has impacted the ability of engineering and the station to efficiently process work, establish appropriate accountabilities and prioritize core-engineering functions.

Key positions in plant and design engineering are currently vacant, staffed with temporary personnel, or staffed with personnel not fully qualified. The lack of succession planning in engineering has resulted in posted supervisor positions with no or limited applicants.

Engineering is not sufficiently capitalizing on learning opportunities from the current station shutdown to improve processes and develop personnel. Examples are that leads for most of the major initiatives are with contract personnel, and feedback from Engineering Assessment Boards is not shared with the organization. Also, training opportunities are not routinely being identified to improve performance.

Engineering Assessment Board process improvements are needed to maximize board effectiveness. The EAB must transition from a process barrier to an assessment function with the objective of raising quality standards in engineering products.

The expectations for review and acceptance of vendor products are unclear, contributing to inconsistent reviews and high backlogs of products requiring review by Davis-Besse personnel. Typical review resources in the industry are on the range of 10 – 15% of the total project resource requirements. Opportunities exist to conduct these reviews more efficiently and effectively by better defining the scope of work and conducting in-process reviews.

Engineering lacks effective work management to enable appropriate prioritization and management of engineering resources. This has resulted in work inefficiencies, frequent priority changes and, in some cases, a disconnect between the station and engineering priorities.

It is clear the engineering team recognizes the importance of configuration management. However, a backlog of design deficiencies exists from building block reviews and from previous reviews and programs. Priority has not been given to complete these backlog items in the past.

Management lacks effective tools for monitoring and trending of the engineering organization's performance.

Extent of Condition

The extent that similar conditions may exist in other station departments is addressed by the functional area reviews being performed by those departments and is not addressed in this report. These self-assessments are also being directed by the Management and Human Performance Improvement Action plan and will determine if similar conditions exist in those departments.

Recommended Corrective Action

A. Key management and supervisory positions remain open in the organization. The absence of individuals in these leadership positions fosters organizational misalignment, low moral, misinformation, and the inability to coordinate work within the station.

1. Fill managerial and supervisory position vacancies.

   E&S J. Powers 01/24/03

2. Develop behaviors/expectations for Davis-Besse Engineering personnel

   E&S J. Powers 01/31/03

3. Coordinate the development of behaviors/expectations for FENOC Engineering

   FE K. Pech 01/31/03

4. Standardize the Davis-Besse Engineering organization and functions consistent with the FENOC model.

   E&S J. Powers 02/07/03

B. The engineering organization's roles and responsibilities at the station are not clearly defined. This condition has impacted the ability of engineering and the station to efficiently process work, establish appropriate accountabilities and prioritize core-engineering functions.

1. Develop proposed vision, roles and responsibilities for the engineering organization.

   VPES G. Leidich 01/24/03

2. Obtain agreement with and support from station counterparts that the proposed roles and responsibilities are right.

   E&S J. Powers 01/31/03

3. Develop communication plan on the revised engineering roles and responsibilities.

   FE R. Wilkins 01/24/03

4. Approve communication plan

   VPES G. Leidich 01/27/03

5. Communicate new organizational roles and responsibilities.

   E&S J. Powers 02/07/03

6. Fill open position for Engineering Training Instructor.

   TRAN W. Mugge 01/24/03

7. Develop and implement training plan on revised engineering roles and responsibilities.

   TRAN W. Mugge 02/28/03

8. Identify and modify process, procedure and program constraints that conflict with the desired engineering roles and responsibilities.

   E&S D. Woodfin 02/28/03

C. Key positions in plant and design engineering are currently vacant, staffed with temporary personnel, or staffed with personnel not fully qualified. The lack of succession planning in engineering has resulted in posted supervisor positions with no or limited applicants.

1. Reinforce individual accountability and performance through utilization of FENOC Ownership for Excellence process.

   E&S J. Powers 02/28/03

2. Develop staffing and qualification plan for the organizational gaps, including operations and maintenance personnel in the potential pool of candidates with special consideration for plant specific, PWR and operational experience.

   FE F. Giese 03/31/03

3. Develop succession plan down to the supervision level targeting individual contributors to receive leadership and supervisory training prior to assuming positions. Include targeted rotations inside and outside of engineering in the plan.

   E&S J. Powers 03/31/03

4. Coordinate the development of succession plans at Davis-Besse with FENOC wide succession planning activity.

   FE F. Giese 03/31/03

5. Reinstitute the Senior Reactor Operator Certification Program for technical personnel.

   TRAN W. Mugge 06/30/03

D. Engineering is not sufficiently capitalizing on learning opportunities from the current station shutdown to improve processes and develop personnel. Examples are that leads for most of the major initiatives are with contract personnel, and feedback from Engineering Assessment Boards is not shared with the organization. Also, training opportunities are not routinely being identified to improve performance.

1. Assign FENOC leads to all contracted work to maximize transfer of knowledge.

   E&S C. Hawley 01/31/03

2. Strengthen the Engineering Training Program to incorporate current lessons learned (e.g., EAB feedback, CR feedback, observations, etc.)

   TRAN W. Mugge 01/31/03

3. Develop a plan to increase engineering personnel involvement and knowledge of industry activities including:

   a. Benchmarking of other utilities,

   b. Participation in industry working groups, and

   c. Assessments at other utilities

   Set expectation that best practices are incorporated into conduct of engineering.

   FE K. Pech 02/14/03

E. Engineering Assessment Board process improvements are needed to maximize board effectiveness. The EAB must transition from a process barrier to an assessment function with the objective of raising quality standards in engineering products.

1. Capture and trend the results of EAB reviews for use by line management to develop corrective action to address these deficiencies.

   E&S H. Stevens 01/31/03

2. Ensure consistency with the FENOC corporate approach for the EAB.

   FE W. Kline 01/31/03

3. Develop a plan for the transition of the EAB to station personnel and the evaluation of EAB membership.

   E&S H. Stevens 01/31/03

4. Ensure the transition plan is consist with the FENOC corporate approach for the EAB at all sites.

   FE W. Kline 01/31/03

F. The expectations for review and acceptance of vendor products are unclear, contributing to inconsistent reviews and high backlogs of products requiring review by Davis-Besse personnel. Typical review resources in the industry are on the range of 10 – 15% of the total project resource requirements. Opportunities exist to conduct these reviews more efficiently and effectively by better defining the scope of work and conducting in-process reviews.

1. Establish a standard directive (NOP) on owner's acceptance of contracted/vendor work.

   FE W. Kline 01/31/03

2. Define interim deliverables for project management and mid-course direction for owner's acceptance.

   E&S C. Hawley 01/31/03

3. Incorporate improvements into NOP-CC-2003, Engineering Changes.

   FE W. Kline 01/31/03

4. Establish performance indicators for measuring vendor performance.

   FE T. Lentz 01/31/03

G. Engineering lacks effective work management to enable appropriate prioritization and management of engineering resources. This has resulted in work inefficiencies, frequent priority changes and, in some cases, a disconnect between the station and engineering priorities.

1. Develop the engineering work request and scheduling system that captures all critical engineering work and uses a simple priority system to decide actions.

   FE K. Pech 06/30/03

2. Establish method for tracking and notification of activities directed by all engineering programs similar to surveillance activities.

   FE K. Pech 06/30/03

3. Implement corporate standard for accessibility of engineering documents (i.e. ATLAS software).

   FE Ken Pech 06/30/03

4. Implement a scheduling system for all engineering work that is integrated with the site schedule.

   E&S C. Hawley 07/30/03

5. Develop performance indicators that set goals and measure backlog, throughput and age.

   FE K. Pech 08/30/03

H. It is clear the engineering team recognizes the importance of configuration management. However, a backlog of design deficiencies exists from building block reviews and from previous reviews and programs. Priority has not been given to complete these backlog items in the past.

1. Complete deficiency resolution required for Davis-Besse restart.

   NA R. Schrauder 03/30/03

2. Develop a program to properly evaluate each item based on plant impact and potential risk such as using expert panel reviews.

   E&S C. Hawley 06/30/03

3. Develop a schedule for completion of the open items based on risk significance and the engineering organization's ability to be involved in the resolutions.

   E&S C. Hawley 06/30/03

4. Dedicate resources for the ultimate completion of the project on a long-term basis ensuring the issue is completely resolved.

   LCM D. Eshelman 06/30/03

I. Management lacks effective tools for monitoring and trending of the engineering organization's performance.

1. Develop and implement performance indicators with set goals for:

   - Quality of engineering work,
   - System and Program health, and
   - Work Management.

   FE T. Lentz 01/31/03

2. Ensure indicators are consistent throughout FENOC.

   LCM D. Eshelman 02/28/03

3. Develop a FENOC NOP for the self-assessment program that critically assesses all key elements of engineering performance, programs and processes on a periodic basis.

   FE K. Pech 03/31/03

4. Implement the NOP for the self-assessment program at Davis-Besse

   E&S J. Powers 06/30/03

References

Documents reviewed:

1) Safety Conscious Work Environment Survey Results
2) Davis-Besse Management and Human Performance Excellence Plan
3) Management and Human Performance Improvement Action Plan
4) Management and Human Performance Improvement Plan Status
5) Davis-Besse Engineering Organizational Development Plan
6) Davis-Besse Engineering Organization Charts
   - Current
   - Proposed
7) Davis-Besse System Health Reports, Fourth Quarter 2001
   - Executive Summary
   - Auxiliary Feedwater System
   - Component Cooling Water System
   - Decay Heat – Low Pressure Injection Systems
   - Reactor Coolant System
   - Containment Integrity
   - Heat Exchanger Performance Program
   - Leak Reduction Program
   - Primary Leakage Program
   - Preventive Maintenance Program
   - Temporary Modifications
8) Operability Evaluations
   - 2001-0001, Removal of One ECCS Room Cooler from Service
   - 2001-0002, MU Pump #2 pump inboard bearing sight glass is filling with oil.
   - 2001-0003, Refurbished breakers have different stock code arcing contact MTG kits.
   - 2001-0004, AFP #2 Agastat Relay PSL4931X2 trending slower.
   - 2001-0005, Indications of CRD power supply problems.
   - 2001-0006, SFAS Ch. 2 RCS Pressure power supply voltage degraded.
   - 2001-0007, MU Pump 1-1 outboard motor bearing RTD out.
   - 2001-0009, CF1544 leaks by closed seat.
   - 2001-0010, Loss of remote control of AFPT 2 governor.

- 2001-0011, EDG 2 fails to start on DA 31 side.
- 2001-0012, OJ for ECCS Room Cooler #5 maintenance.
- 2001-0013, EDG 1 fails to start on DA 30 side.
- 2001-0014, Door 321 failed 24 Hour Fire Door Visual Inspection Test.
- 2001-0015, High Voltage Switchgear Room temperature concerns.
- 2001-0017, OJ for ECCS Room Cooler #5 maintenance.
- 2001-0018, EDG kW output during testing.
- 2001-0019, Door 221 broken.
- 2001-0020, HIS 6454 on SFAS Ch. 2 went from low to high level select automatically.
- 2001-0021, Evaluation of letdown for an Appendix R Fire - Self-Assessment 2001-0108
- 2001-0022, EDG 2 DA 45 air start side relay valve DA 62 not resetting properly.
- 2001-0023, EDG 2 DA 31 delayed start.
- 2001-0024, Flooding in SW Pump Room during pump maintenance.
- 2001-0025, HFA Relays in SFAS Sequencer circuits.
- 2001-0026, Intake Structure flooding issue with pumps removed.
- 2001-0027, EDG 1 DA 44 air start side regulator valve, DA 2988, blowing air.
- 2001-0028, Errors in AFW DC-Powered MOV Voltage Drop Calculations.
- 2001-0029, Non-conformance of AFW Pump #2 for MSLB Break concurrent with LOOP
- 2001-0030, Non-conformance of AFW Pump #2 for MSLB Break concurrent with LOOP
- 2001-0031, AFW Pump operation following a seismic event and loss of Off Site Power.
- 2001-0032, Lack of positive indication of AFW valve control circuit isolation.
- 2001-0033, Over-torqued coupling bolts on EDG 1 in 1996.
- 2002-0001, OE-13070 (Greyboot Connectors) should be reviewed for impact on DB-ME-09500.
- 2002-0002, Potential generic snubber issue.
- 2002-0003, TS 3.9.2 LCO for Source Range NI'S during Refueling.
- 2002-0004, Decay Heat Pump #2 oil problems.
- 2002-0005, MS375 failed to stroke within its expected stroke time range.
- 2002-0006, Incorrect inert gas was used for West Electrical Penetrations.
- 2002-0007, DH14A did not meet its expected stroke time but was within the maximum stroke time.
- 2002-0008, VT-3 Examination failure for a snubber.
- 2002-0009, Environmental Qualification for flooding in the Auxiliary Building.

- 2002-0010, RC 1773A stroke time is outside its expected stroke time range.
- 2002-0011, Decay Heat Pump 1 inboard bearing oil discolored.
- 2002-0012, Unexpected AC Transformer lockout.
- 2002-0013, DH 14B stroke time outside of expected stroke time range.
- 2002-0014, RE 8447 spiking into alert.
- 2002-0015, EDG 1 power factor swings at low load.
- 2002-0016, Check valve CF30 banging in flow stream.
- 2002-0017, Leak on Decay Heat Train 1 Line.
- 2002-0018, CV5007 did not meet expected close stroke time range during DB-PF-03270.
- 2002-0019, Corrosion of Containment Vessel at interface with concrete. (R01 asked to include CR 02-2594 and 02-2595)
- 2002-0020, EWR 01-0402-00 EAB Review.
- 2002-0021, Painting in SFP without a paint permit.
- 2002-0022, Corrosion in Containment Penetrations.
- 2002-0023, Inadequate ventilation for Rooms 323, 324, 325.
- 2002-0024, Boric Acid is on the CCW pipes for DH Pump 1.
- 2002-0025, Lack of a Performance Test Acceptance Criterion Margin for SW flow to CCW Heat Exchangers.
- 2002-0026, Lack of a periodic testing verification for DBA ventilation flow rates.
- 2002-0028, Test Control Program Self-Assessment (Usable volume of fuel oil in the EDG Week Tanks).
- 2002-0029, EDG #2 Voltage Regulator and Governor stability.
- 2002-0030, EDG 1 and EDG 2 Room Inlet Air Damper Hydramotors possibly missing parts.
- 2002-0031, Potential "NON-Q" Material installed on Decay Heat Pump #2 rotating element.
- 2002-0032, Environmental Qualification items identified during the AFW Latent Issue Review.
- 2002-0033, EDG oil type in Intake Air Filter.
- 2002-0034, High silicon in EDG #1 Lube Oil.
- 2002-0038, Conflict between new baseline data and Design Basis for SW Pumps #1 and #3
- 2002-0039, Clearing Mode 6 restraint for EDG Operability based on ambient temperature

9) Engineering Self-Assessment Reports
   - SA2001-0025, Ultimate Heat Sink

- SA2001-0052, Effectiveness Review of Root Cause for Year 2000 Equipment Issues
- SA2001-0061, Engineering Quality in Modification Packages
- SA2001-0063, System Engineer Roles and Responsibilities
- SA2001-0064, Ultimate Heat Sink (Lake Erie and Forebay)
- SA2001-0080, Effectiveness of Human Performance Program
- SA2001-0088, Inservice Test Program
- SA2001-0092, Vibration Program
- SA2001-0095, Design Criteria Manual
- SA2001-0096, Seismic Qualification
- SA2001-0097, EQ Program
- SA2001-0103, Shutdown PSA
- SA2001-0108, Safe Shutdown Analysis
- SA2001-0117, Maintenance Rule
- SA2002-0077, Boric Acid Corrosion Control Program

10) Davis-Besse Calendars

- Key Events Calendar
- Program Review Board Meetings
- Station Calendar

11) Davis-Besse Nuclear Quality Audit and Surveillance Reports

- AR-01-FIREP-01, Fire Protection Program
- AR-01-NFUEL-01, Special Nuclear Material Control Program
- AR-01-PROMC-01, Procurement, Material Control, and the Environmental Qualification (EQ) Program
- SR-01-ENGRG-01, 13RFO Modification Package Development and Implementation
- SR-01-ENGRG-02, Risk Assessment Process in the Conduct of Maintenance
- SR-01-ENGRG-04, Performance Monitoring, Inspection, and Maintenance of Heat Exchangers
- SR-01-ENGRG-05, New 10CFR50.59 Process Implementation
- SR-01-ENGRG-09, Emergency Diesel Generator Air Start Systems
- SR-01-ENGRG-010, Auxiliary Feedwater System
- SR-01-ENGRG-011, Maintenance Rule Program Compliance
- SR-01-ENGRG-012, Completed Modifications and the 10 CFR 50.59 Program
- SR-02-ENGRG-01, Effectiveness of Corrective Actions from AR-01-PROMC-01

12) Engineering Assessment Board Meeting Minutes

13) Program Review Board Meeting Minutes

Personnel contacted:

1) Lew Myers, FENOC Chief Operating Officer
2) Gary Leidich, FENOC Executive Vice President
3) Randel Fast, Plant Manager
4) James Powers, Director of Nuclear Engineering
5) Robert Schrauder, Director of Support Services
6) Michael Stevens, Director of Work Management
7) Joe Rogers, Manager of Plant Engineering
8) John Grabnar, Manager of Design Basis Engineering
9) Andy Migas, Supervisor of Design Joint Engineering Team
10) Dave Gudger, Manager of Performance Improvement
11) Michael Roder, Manager of Nuclear Operations
12) Tony Stallard, Superintendent of Nuclear Operations
13) Richard Walleman, Nuclear Operations Shift Manager
14) On-Shift Operations Shift Supervisors (2)
15) Pete Roberts, Manager of Nuclear Maintenance
16) Greg Dunn, Manager of Work Control and Outage Management
17) Ron Wells, Superintendent of Nuclear Maintenance
18) John VanGelder, Superintendent of Nuclear Maintenance
19) Steve Seagall, Superintendent of Nuclear Maintenance
20) Rick Rospert, Supervisor of Nuclear Maintenance
21) Mark Gruenberg, Supervisor of Nuclear Maintenance
22) Jim Howell, Supervisor of Nuclear Maintenance
23) Pat McCloskey, Manager of Nuclear Regulatory Affairs
24) D.B. Kelley, Supervisor of Reactor Engineering
25) Dave Wahler, Reactor Engineer
26) Dave Dibert, Reactor Engineer
27) Dennis Mominee, Nuclear Engineering Supervisor
28) Guy Leblanc, Nuclear Engineering Supervisor
29) Jon Hook, Nuclear Engineering Supervisor
30) Ken Byrd, Nuclear Engineering Supervisor

31) Bob Hovland, Nuclear Engineering Supervisor

32) Allen McAllister, Nuclear Engineering Supervisor

33) John Cunnings, Nuclear Engineering Supervisor

34) Jim Marley, Nuclear Engineering Supervisor

35) Tim Ridlon, Design Engineer

36) Gabe Barteck, Design Engineer

37) Pete Jacobsen, Design Engineer

38) Dick Bair, Design Engineer

39) Bob Rishel, Design Engineer

40) Kevin Zellers, Design Engineer

41) Dennis Adams, System Engineer

42) Allen Wise, System Engineer

43) Tim Laurer, System Engineer

44) Eric Bennet, System Engineer

45) Tracy St. Clair, System Engineer

46) Dan Haley, System Engineer

47) Mat Murtha, System Engineer

48) Steve Osting, Program Manager

49) Kevin Bell, Program Manager

50) Jim Tabbert, Program Manager

51) Chuck Daft, Program Manager

52) Steve Henry, Engineering Planner and Scheduler

53) Steve Loehlein, Manager of Nuclear Quality Assessments

54) Ed Chimahusky, Supervisor of Engineering Assessments

55) Dave Studley, Former Chairman of Engineering Assessment Board

56) Henry Stevens, Chairman of Engineering Assessment Board

57) Bill Mugge, Manager of Nuclear Training

58) Bill Pearce, Vice President of FENOC Oversight

Methodologies employed:

Engineering programs, procedures, policies and products were reviewed. Engineering personnel as well as client personnel were interviewed. Meetings were observed where engineering personnel interacted with each other and with their peers from other organizations. The current and proposed new engineering organization charts with current and proposed staffing indicated were also reviewed. The assessment team experientially compared the results of these observations, reviews and interviews to the characteristics of top performing engineering

organizations. Based on these comparisons, recommendations were developed for near term and for longer-term improvements.

Formal causal analyses have been performed for both the technical issues and the management and human performance issues associated with the degradation of the Davis-Besse Reactor Pressure Vessel Head. These analyses determined that the root cause was that management ineffectively implemented processes, and thus failed to detect and address plant problems as opportunities arose.

A HPES Human Performance Causal Factors Analysis was performed using the evidence and conclusions of the assessment team to determine what were the root and contributing causes and to validate the recommendations of the assessment team.

Attachments

1. Assessment of Engineering Report, dated 1/03/03

DAVIS-BESSE NUCLEAR POWER STATION

Assessment of Engineering

Date: 1/03/03

Assessment Team Members:

Mike Delowery
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Institute of Nuclear Power Operations

Rick Jacobs
Director, Plant Support Division
Institute of Nuclear Power Operations

Mark Manoleras
Manager, Design Engineering
Beaver Valley Power Station
First Energy Nuclear Operating Company

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Detroit Edison – Fermi 2

Jim Meister
Vice President, Engineering
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Jim Maddox
Vice President, Nuclear Engineering
and Technical Services
Tennessee Valley Authority

Danny Pace
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Entergy Nuclear Northeast

Charlie Cronan
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DAVIS-BESSE NUCLEAR POWER STATION
INDUSTRY ASSESSMENT OF ENGINEERING

I. Purpose and Summary

From December 9-13, 2002, an independent industry team performed an assessment of the Davis-Besse Nuclear Power Station (DBNPS) engineering organization. The assessment was facilitated by the Institute of Nuclear Power Operations (INPO) and included senior industry leaders. The team's objective was to evaluate the organizational effectiveness of the DBNPS engineering organization and the capability of the organization to support safe plant operations and to identify any areas for improvement, particularly focused over the long-term. The team did not make judgments regarding the technical adequacy of engineering work.

The team identified a need to focus on building and maintaining a solid engineering organization over the long term. Specifically, the team identified and made recommendations for improvement in the following areas:

- Engineering Organization
- Engineering Roles and Responsibilities
- Staff Development
- Learning Organization
- Resolution of Open Items
- Engineering Assessment Board
- Owner Acceptance of Vendor Products
- Work Management
- Performance Monitoring

FENOC subsequently developed a plan for implementing the team's recommendations, along with integrating them into the FENOC Corporate planning. The Implementation Plan for the Assessment of Engineering Capabilities is included as an attachment to this report.

II. Background

In February 2002, significant degradation of the reactor vessel head was discovered at the station. Weaknesses in engineering effectiveness contributed to the head degradation event. As part of the corrective actions for the event, First Energy Nuclear Operating Company (FENOC) management committed to performing an assessment of current engineering capability.

In response to this commitment, Gary Leidich, executive vice president at FENOC, requested that INPO facilitate an Industry Assessment of Engineering.

The assessment team was comprised of the following members:

Rick Jacobs, Director of Plant Support Division, INPO
Jim Maddox, Vice President of Engineering & Technical Services, TVA
Jim Meister, Vice President of Engineering, Exelon Nuclear
Danny Pace, Vice President of Engineering, Entergy Nuclear Northeast
Rick Libra, Director of Nuclear Engineering, Fermi 2
Charles Cronan, Vice President of Engineering, Shaw Group
Mike Delowery, Senior Evaluator, INPO

III. On-Site Activities

An entrance meeting was held with site management on December 9, 2002 to discuss the scope and logistics for the visit. Information was obtained during the visit through interviews with a cross-section of station personnel and reviews of appropriate station documentation. The team worked closely with station engineering leadership to develop the recommendations. The results of the assessment were discussed with Gary Leidich; Lew Meyers, chief operating officer and acting site vice president; Jim Powers, director of engineering; Bill Pierce, vice president of oversight; and key engineering managers on December 13, 2002.

IV. Assessment

Davis-Besse has been shut down for approximately 10 months at the time of this assessment. Substantial progress has been achieved in the building block programs by providing focused project management as well as contract resources. This short-term focus on extent of condition from the causes and contributors to the reactor vessel head degradation event has held management's attention (appropriately). Renewed focus on building and maintaining a solid engineering organization over the long-term is now needed.

The following discussion provides further elaboration on the areas reviewed. The specific improvement areas with recommended actions are provided in Section V of this report.

A. Engineering Organization

Although the engineering leadership team is not in place, positive steps were taken to establish the leadership team with the recent movement of experienced company personnel into the director–nuclear engineering, manager-design basis engineering, and manager-projects positions. However, significant weaknesses exist with first-line supervisor ranks. Two of four plant engineering supervisor positions are vacant, with one of the remaining supervisors temporarily assigned to restart activities. Two of four supervisor positions in design engineering are vacant. Also, the manager-plant engineering is moving to a new position. The mechanical system design organization has significant vacancies.

The first and arguably most important step to full organization recovery is to select and fill these positions. The absence of leaders in these positions fosters organization misalignment, low morale, misinformation and the reduced ability to coordinate work within the station. In many groups, engineers do not receive necessary coaching, technical guidance, or reinforcement of expected behaviors.

B. Engineering Roles & Responsibilities

Substantial information was evident to suggest that clear roles and responsibilities for engineering either do not exist or are misunderstood. For example, many people interviewed questioned the engineering involvement in day-to-day maintenance activities. There is a strong need to implement the following: 1) clearly define the roles and therefore the accountability of each engineering department/section; and 2) work with senior management, other station organizations, and the engineering organization to gain acceptance and support for these roles. Also, the Davis-Besse organization is different from the other FENOC engineering organizations. The station should adopt the FENOC standard organization for engineering as soon as possible. It is the team's judgment that rebuilding the engineering capability at Davis-Besse takes precedence over staffing engineering functions in the proposed corporate organization.

Teamwork and alignment of purpose, both internal to engineering and among departments, will be key to long-term success. Recommendations are included for engineering management and supervisory personnel to retreat from the site to develop the items spelled out above and come together as a management team. They should work together to articulate what a healthy, well-functioning engineering organization looks and feels like. They should develop a renewed sense of commitment to lead engineering to achieve its future vision and support each other as they work to achieve that goal.

It will be important for the proper level of engineering management to be represented, together with counterparts in other organizations, at all key leadership activities. Site leadership needs to be consistently supportive and offer positive, constructive feedback as engineering seeks to improve.

C. Staff Development

With the engineering team in place, emphasis needs to be on performance management of the engineering personnel. A good first step has been taken with development of engineering principles and expectations. The entire staff needs to become ingrained with and live up to these principles and expectations. Engineering management, in meetings and other interactions with the engineering staff, should set the example and live up to these expectations and principles. Engineering management should provide consistent coaching to the staff to reinforce the expected behaviors.

D. Learning Organization

Emphasis also needs to be placed on making engineering a learning organization. The lessons learned from the ongoing engineering review and assessment activities are not being captured and cataloged for use by FENOC personnel. Several good practices have been implemented, such as the Engineering Assessment Board (EAB) and the systematic reviews of programs and plant systems; however, feedback to the engineering training program is not provided to ensure all appropriate engineering personnel learn from these activities. Minimal participation in external industry activities can lead to an isolated organization. Therefore, a plan is needed to force appropriate involvement.

E. Resolution of Open Items

The discovery phase in each area under engineering cognizance (containment health, system health and latent issue reviews, and program reviews) is coming to completion. Containment health has evaluated the impact of the reactor coolant system leak on systems and components within the containment building. System readiness reviews have determined the current statuses of the systems, as well as refreshed the system engineers on the systems. Open issues have been cataloged through latent issue reviews for selected systems and by other system design reviews.

Many of the deficiencies identified from these reviews were known and documented prior to the event at Davis-Besse but were not corrected. Regardless of the reasons for failure to follow through on these open items in the past, 1) a program should now be defined that properly evaluates each item based on plant impact and potential risk; 2) schedules for completion of the outstanding items should be developed based on risk significance; and 3) resources should be dedicated over the next few years to fully complete this effort. Station management must understand the importance of closing out open design items and implementing configuration management programs properly to prevent repeating these problems.

V. Recommendations for Improvement

The following recommendations are provided for consideration and incorporation into an Engineering Excellence Plan.

A. Engineering Organization

Focus: Key management and supervisory positions remain open in the organization. The absence of individuals in these leadership positions fosters organizational misalignment, low morale, misinformation, and the inability to coordinate work within the station.

Recommendations:

1. Recruit and fill key manager and supervisory positions in the engineering organization. Although vacancies exist across the organization, the need to fill these positions is most acute in plant engineering.

2. Standardize the Davis-Besse engineering organization and functions consistent with the other FENOC sites.

3. Principles and expectations exist for the engineering organization. As a new engineering management team is developed, the opportunity exists to develop expectations for management involvement and behaviors. When manager and supervisor vacancies are filled, have engineering management meet off-site to build as a team and agree on behaviors and principles for the management team such as feedback and coaching, involvement in daily activities, reinforcement of principles and expectations, setting good examples, and communications.

B. Engineering Roles and Responsibilities

Focus: The engineering organization roles and responsibilities at the station are not clearly defined. This condition has impacted the ability of engineering and the station to efficiently process work, establish appropriate accountabilities, and prioritize core engineering functions.

Recommendations:

1. Develop proposed vision, roles, and responsibilities for engineering. Analyze how well engineering is meeting these roles today and identify gaps.

2. Work with counterparts at senior management, director, manager, and supervisor levels to obtain agreement that proposed roles and responsibilities are the right ones and that the entire site organization will support them. Focus should be on how to reduce engineering involvement with routine maintenance, operational, and other day-to-day work while ensuring true engineering needs continue to be met and preserving and enhancing relationships.

3. Develop and implement a communication and training plan on revised engineering roles and responsibilities.

4. Identify process, procedure, and program constraints that are at odds with desired roles and responsibilities for engineering. Modify these processes as appropriate to be consistent with desired roles.

C. Staff Development

Focus: Key positions in plant and design engineering are currently vacant, staffed with temporary personnel, or staffed with personnel not fully qualified. The lack of succession planning in engineering has resulted in posted supervisor positions with no or limited applicants.

Recommendations:

1. Develop a staffing and qualification plan to fill existing organizational gaps to the standard site organizational structure. Include existing operations and maintenance personnel in the potential pool of candidates. Special consideration should be given to ensure sufficient plant-specific, PWR, and operational experience exists in the engineering organization.

2. Reinforce individual accountability and performance through use of the FENOC ownership for excellence process.

3. Develop a succession plan down to the supervisor level in engineering. Target individual contributors in the organization to receive leadership and supervisory training prior to assuming positions. Plans should include targeted rotations within and outside engineering.

4. Reinstitute operational training for technical personnel, such as a SRO Certification Program.

D. Learning Organization

Focus: Engineering is not sufficiently capitalizing on learning from the current station shutdown to improve processes and develop personnel. Examples are that leads for most major initiatives are with contract personnel, and feedback from Engineering Assessment Boards is not shared with the organization. Also, training opportunities are not routinely being identified to improve performance.

Recommendation:

1. Establish FENOC leads for appropriate contracted work to maximize transfer of knowledge.

2. Reinforce expectations associated with the engineering training program. For example, training topics to improve engineering performance should be collected from EAB feedback, condition reports, and observations.

3. Develop a plan to increase engineering personnel involvement and knowledge of industry activities. Include within the plan benchmarking of other sites, participation with industry engineering-related working groups, and assessment activities with other sites. Set the expectation that best practices are incorporated into station conduct of engineering activities.

E. Resolution of Open Items

Focus: It is clear the engineering team recognizes the importance of configuration management. However, a backlog of design deficiencies exists from building-block reviews and from previous reviews and programs. Priority has not been given to complete these backlog items in the past.

Recommendations:

1. Develop a program that properly evaluates each item based on plant impact and potential risk. (Expert panel reviews should be considered.)

2. Design a schedule for completion of the outstanding items based on risk significance. The schedule should reflect the engineering organization's ability to complete the work with Davis-Besse personnel involved in the resolution.

3. Identify potential critical items, such as auxiliary feedwater equipment qualification and service water design margins, and provide management focus on a proper resolution of these items.

4. Dedicate resources for the ultimate completion of items from the system and program reviews. This is a long-term project, and the FENOC organization must commit to it to ensure this issue is completely resolved.

F. Engineering Assessment Board

Focus: EAB process improvements are needed to maximize board effectiveness. The EAB must transition from a process barrier to an assessment board, with the objective of raising quality standards in engineering products.

Recommendations:

1. Capture and trend results of the EAB reviews, and ensure line management uses the information to develop corrective actions to address deficiencies more proactively.

2. Develop a plan for transition of the EAB to the station personnel, including roles and responsibilities and a method to confirm the appropriateness of the membership.

G. Owner Acceptance of Vendor Products

Focus: The expectations for review and acceptance of vendor products are unclear, contributing to inconsistent reviews and high backlogs of products requiring review by Davis-Besse personnel. Typical review resources in the industry can be up to 10-15% of the total project resource requirements. Opportunities exist to conduct these reviews more efficiently and effectively by better defining the scope of work and conducting in-process reviews.

Recommendations:

1. Review of portions of vendor products early to ensure that the requested scope is being met to prevent rework. Portions of the owner's review can be done in parallel and meetings held in-process to resolve discrepancies. An owner's review should be completed prior to acceptance of the product.

2. Develop expectations and structure for vendor review. Include in-process reviews and clear scoping.

3. Establish and review scope definition and performance indicators to ensure efficient and quality contractor work.

H. Work Management

Focus: Engineering lacks effective work management to enable appropriate prioritization and management of engineering resources. This condition has resulted in work inefficiencies, frequent priority changes, and, in some cases, a disconnect between the station and engineering priorities.

Recommendations:

1. Implement an engineering work request system to capture all critical engineering work, and use a simple priority system to decide actions.

2. Implement a system to schedule all engineering work. Ensure the engineering schedule is integrated with the site schedule.

3. Develop indicators that measure and set goals for backlog, throughput, and age.

4. For all engineering programs, establish a method that identifies what work is required to be done and when, and flag management when items are not completed.

I. Performance Monitoring

Focus: Management lacks effective tools for monitoring and trending the engineering organization performance.

Recommendations:

1. Develop and implement performance indicators with goals that measure quality of engineering work, system and program health, and work management.

2. Develop and implement a robust self-assessment program that critically assesses all key elements of engineering performance, programs, and processes on a periodic basis.

Issue Summary	Recommended Actions	Accountability	Due Date
A. Management:			
Key positions remain open in the organization. This fosters organizational misalignment, low moral, misinformation, and the inability to coordinate work.	1. Fill managerial and supervisory position vacancies.	J. Powers	01/24/03
	2. Develop behaviors/expectations for Davis-Besse Engineering personnel	J. Powers	01/31/03
	3. Coordinate the development of behaviors/expectations for FENOC Engineering	K. Pech	01/31/03
	4. Standardize the Davis-Besse Engineering organization and functions consistent with the FENOC model.	J. Powers	02/07/03

Approved By: _____
James J. Powers
Director, Nuclear Engineering
Davis-Besse Nuclear Power Station

Approved By: _____
Gary R. Leidich
Executive Vice President
First Energy Nuclear Operating Company

Approved By: _____
Lew W. Myers
Chief Operating Officer
First Energy Nuclear Operating Company

Issue Summary	Recommended Actions	Accountability	Due Date
B. Engineering Roles and Responsibilities:			
The organization's roles and responsibilities are not clearly defined. This impact the ability to process work, establish accountabilities and prioritize core functions	1. Develop proposed vision, roles and responsibilities for the engineering organization.	G. Leidich	01/24/03
	2. Obtain agreement with and support from station counterparts that the proposed roles and responsibilities are right.	J. Powers	01/31/03
	3. Develop communication plan on the revised engineering roles and responsibilities.	R. Wilkins	01/24/03
	4. Approve communication plan	G. Leidich	01/27/03
	5. Communicate new organizational roles and responsibilities	J. Powers	02/07/03
	6. Fill open position for Engineering Training Instructor.	W. Mugge	01/24/03
	7. Develop and implement training plan on revised engineering roles and responsibilities.	W. Mugge	02/28/03
	8. Identify and modify process, procedure and program constraints that conflict with the desired engineering roles and responsibilities.	D. Woodfin	02/28/03

Issue Summary	Recommended Actions	Accountability	Due Date
C. Staff Development:			
The lack of succession planning has resulted in posted supervisor positions with no or limited applicants.	1. Reinforce individual accountability and performance through utilization of FENOC Ownership for Excellence process.	J. Powers	02/28/03
	2. Develop staffing and qualification plan for the organizational gaps, including operations and maintenance personnel in the potential pool of candidates with special consideration for plant specific, PWR and operational experience.	F. Giese	03/31/03
	3. Develop succession plan down to the supervision level targeting individual contributors to receive leadership and supervisory training prior to assuming positions. Include targeted rotations inside and outside of engineering in the plan.	J. Powers	03/31/03
	4. Coordinate the development of succession plans at Davis-Besse with FENOC wide succession planning activity.	F. Giese	03/31/03
	5. Reinstitute the Senior Reactor Operator Certification Program for technical personnel.	W. Mugge	06/30/03

Issue Summary	Recommended Actions	Accountability	Due Date
D. Learning Organization:			
Engineering is not capitalizing on opportunities to learning from the station shutdown to improve processes and develop personnel.	1. Assign FENOC leads to all contracted work to maximize transfer of knowledge.	C. Hawley	01/31/03
	2. Strengthen the Engineering Training Program to incorporate current lessons learned (e.g., EAB feedback, CR feedback, observations, etc.)	W. Mugge	01/31/03
	3. Develop a plan to increase engineering personnel involvement and knowledge of industry activities including: a. Benchmarking of other utilities, b. Participation in industry working groups, and c. Assessments at other utilities Set expectation that best practices are incorporated into conduct of engineering.	K. Pech	02/14/03

Issue Summary	Recommended Actions	Accountability	Due Date
E. Engineering Assessment Board (EAB)			
The EAB needs to transition from a process barrier to a process improvement function with the objective of raising quality standards in engineering products.	1. Capture and trend the results of EAB reviews for use by line management to develop corrective action to address these deficiencies.	H. Stevens	01/31/03
	2. Ensure consistency with the FENOC corporate approach for the EAB.	W. Kline	01/31/03
	3. Develop a plan for the transition of the EAB to station personnel and the evaluation of EAB membership.	H. Stevens	01/31/03
	4. Ensure the transition plan is consist with the FENOC corporate approach for the EAB at all sites.	W. Kline	01/31/03

Issue Summary	Recommended Actions	Accountability	Due Date
F. Owner Acceptance of Vendor Products			
The expectations for review and acceptance of vendor products are unclear, leading to inconsistent reviews and high backlogs needing acceptance.	1. Establish a standard directive (NOP) on owner's acceptance of contracted/vendor work.	W. Kline	01/31/03
	2. Define interim deliverables for project management and mid-course direction for owner's acceptance.	C. Hawley	01/31/03
	3. Incorporate improvements into NOP-CC-2003, Engineering Changes.	W. Kline	01/31/03
	4. Establish performance indicators for measuring vendor performance.	T. Lentz	01/31/03

Issue Summary	Recommended Actions	Accountability	Due Date
G. Work Management:			
Engineering lacks an effective work management tool to enable appropriate prioritization and management of resources resulting in work inefficiencies, frequent priority changes and some disconnects between station and engineering priorities.	1. Develop the engineering work request and scheduling system that captures all critical engineering work and uses a simple priority system to decide actions.	K. Pech	06/30/03
	2. Establish method for tracking and notification of activities directed by all engineering programs similar to surveillance activities.	K. Pech	06/30/03
	3. Implement corporate standard for accessibility of engineering documents (i.e. ATLAS software).	Ken Pech	06/30/03
	4. Implement a scheduling system for all engineering work that is integrated with the site schedule.	C. Hawley	07/30/03
	5. Develop performance indicators that set goals and measure backlog, throughput and age.	K. Pech	08/30/03

Issue Summary	Recommended Actions	Accountability	Due Date
H. Resolution of Open Items:			
A backlog of design deficiencies exists from building block reviews and previous reviews and assessments. Priority has not been given to complete these backlog items in the past.	1. Complete deficiency resolution required for Davis-Besse restart.	R. Schrauder	03/30/03
	2. Develop a program to properly evaluate each item based on plant impact and potential risk such as using expert panel reviews.	C. Hawley	06/30/03
	3. Develop a schedule for completion of the open items based on risk significance and the engineering organization's ability to be involved in the resolutions.	C. Hawley	06/30/03
	4. Dedicate resources for the ultimate completion of the project on a long-term basis ensuring the issue is completely resolved.	D. Eshelman	06/30/03

Implementation Plan for the Assessment of Engineering Capabilities

Issue Summary	Recommended Actions	Accountability	Due Date
I. Performance Monitoring:			
Management lacks effective tools for monitoring and trending of the engineering organization's performance.	1. Develop and implement performance indicators with set goals for: • Quality of engineering work, • System and Program health, and • Work Management.	T. Lentz	01/31/03
	2. Ensure indicators are consistent throughout FENOC.	D. Eshelman	02/28/03
	3. Develop a FENOC NOP for the self-assessment program that critically assesses all key elements of engineering performance, programs and processes on a periodic basis.	K. Pech	03/31/03
	4. Implement the NOP for the self-assessment program at Davis-Besse	J. Powers	06/30/03

Enclosure 6

Evaluation of Corporate Management

FirstEnergy, DAVIS-BESSE NUCLEAR POWER STATION

Evaluation Of Corporate Management Issues

Arising from Degradation of the Reactor Pressure Vessel Head

Revision 0

DATE: 12 / 18 / 02

Davis-Besse Sponsor: Lew W Myers

Lew Myers
Vice President and FENOC COO

Approved by: GR Leidich for Bob Saunders

Bob Saunders
FENOC President and CNO

1.0 INTRODUCTION

In March 2002, FirstEnergy Nuclear Operating Company (FENOC) identified significant degradation of the reactor pressure vessel (RPV) head at Davis-Besse Nuclear Power Station. As a result, both FENOC and the Nuclear Regulatory Commission (NRC) have performed a number of root cause analyses and other assessments of the causes of degradation and the failure of FENOC to identify the degradation sooner. Based upon the results of these assessments, FENOC has developed various plans for correcting the causes and improving performance, including a Management and Human Performance Improvement Plan. While none of the causes of the failure to prevent or detect the reactor vessel head degradation were directly linked to or associated with the corporate oversight, the adequacy of this oversight function is called into question. A key function of a corporate structure is that of oversight, and in this case it clearly demonstrated the need for improvement. The non-technical root cause report did not pursue this issue any further due to the fact that on-site leadership and operators of the facility are ultimately responsible for behaviors and culture, and furthermore, there was also no direct factual evidence linking the corporate functions to warrant further investigation. It is apparent that throughout the years, the corporate organization was not able to detect the decline in standards that occurred at Davis-Besse. While not associated directly with any one cause, it is clear that the organization outside of the plant could have provided additional oversight. Through this period, there were several merger related activities, and several different corporate structures with a variety of different individuals involved. There were several different reporting relationships for Davis-Besse and the rest of the current FENOC fleet in this time period. In the recent past, there was only one individual assigned to nuclear from the corporate office, with oversight over the three FENOC stations, and the main focus was mostly on another unit, requiring attention at that time. By all indications, it appeared at that time that Davis-Besse was being managed and operated properly, and therefore did not warrant increased attention Since degradation of the RPV head was discovered in March 2002, FENOC has recognized that the corporate nuclear structure and focus should be changed and has taken efforts to increase the oversight associated with the corporate organization. FENOC has created three executive positions to provide new leadership for both Davis-Besse and its other nuclear plants. Each of these positions has been filled by highly qualified individuals who have had substantial nuclear experience outside of the FENOC system. These positions are as follows:

- Chief Operating Officer (COO)
- Executive Vice President
- Vice President of Oversight

The reporting structure for the Vice President of Oversight is unique in that he reports directly to the Board of Directors, independent of the Nuclear Operation. Along with the current FENOC President position, these additional individuals will be able to provide greater attention to the FENOC units.

2.0 PURPOSE

The purpose of this report is: 1) to perform an evaluation of the corporate management role relative to the issues identified in the various RPV head degradation reports, and 2) ensure that the Management and Human Performance Improvement Plan includes the necessary and sufficient actions to address the issues related to corporate management.

3.0 METHODOLOGY

The evaluation consisted of the following steps:

1) A list was prepared of the various functions that were performed or could have reasonably been performed by corporate management, as related to the activities associated with the RPV head. The following corporate management functions were designated for evaluation:
   - Corporate Management Involvement
   - Policies on Safety
   - Adequacy of Resources
   - Incentive Programs
   - Common Processes for FENOC Nuclear Plants
   - Sharing of Information among FENOC Plants
   - Corporate Assessments (including Quality Assurance (QA) and the Company Nuclear Review Board (CNRB))

2) The issues from the root cause analyses and other assessments were collected and assigned to one or more of the functions, as applicable. In some cases, the issues identified by the assessments had no reasonable relationship to corporate management and were not further considered in the evaluation.

3) For each function, the identified issues were evaluated, similar issues were combined, and a consolidated list of issues for each corporate management function was developed.

4) For each issue on the consolidated list, a review was performed to determine whether the Management and Human Performance Improvement Plan contains an appropriate action to address the issue.

The following root cause analyses and assessments were reviewed to identify issues related to corporate management:

- Root Cause Analysis Report – Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head (August 13, 2002)

- Root Cause Analysis Report – Significant Degradation of the Reactor Pressure Vessel Head (April 15, 2002)
- Nuclear Quality Assessment Examination of Five Closed Nonconformances Related to the Reactor Pressure Vessel Head (06/13/02)
- Root Cause Analysis Report – Failure in Quality Assurance Oversight to Prevent Significant Degradation of the Reactor Pressure Vessel Head (September 10, 2002)
- Davis-Besse Safety Conscious Work Environment Survey (8/2002)
- INPO Industry Peer Recommendations to FENOC (5/29/02)
- Assessment of the FENOC Company Nuclear Review Board (August 13, 2002)
- Root Cause Analysis Report on Operations Role in Maintaining Site Safety Focus (11/22/02)
- NRC Inspection Report 05000346-02-03, FirstEnergy Nuclear Operating Company, Davis-Besse Nuclear Power Station, Augmented Inspection Team (May 3, 2002)
- NRC Inspection Report 05000346-02-08, FirstEnergy Nuclear Operating Company, Davis-Besse Nuclear Power Station, Augmented Inspection Team Follow-up Special Inspection (October 2, 2002)
- NRC Lessons-Learned Task Force Report, Degradation of the Davis-Besse Nuclear Power Station Reactor Pressure Vessel Head Lessons-Learned Report (September 30, 2002)

Table 1 lists the principal issues from each of these reports, and identifies the corporate management functions (if any) applicable to each issue. Table 2 sorts the applicable issues by corporate management function.

4.0 RESULTS

For the most part, FENOC has had a decentralized corporate structure. As a result, the management functions listed in the previous section were largely performed at Davis-Besse rather than by the FENOC corporate office. In particular, the activities associated with the RPV head degradation and related events were performed under the direction and oversight of site management, largely using site procedures and policies. Therefore, with a few exceptions, the issues listed on Tables 1 and 2 do not directly pertain to FENOC corporate management and but instead pertain to the site.

For the purposes of this evaluation, the site-related issues in Tables 1 and 2 were extrapolated to identify opportunities where corporate management might have become more fully involved in preventing the issues from arising. In particular, the issues in Tables 1 and 2 were evaluated to identify areas for improvement in corporate management activities related to setting appropriate policies, providing appropriate direction and resources, and ensuring that the policies and directions are followed by FENOC's nuclear plants.

4.1 Corporate Management Involvement

The relevant issues in Tables 1 and 2 were organized into three categories: 1) management personnel and organization, 2) management involvement and oversight, and 3) management style. The evaluation of each of these topics is discussed below.

4.1.1 Management Personnel and Organization

There were two issues related to management personnel and organization:

1) Stabilize both the corporate nuclear executive team and Davis-Besse line management organizations.

2) For a period of time, the management of the quality assurance (QA) process was not independent from the management of the corrective action process.

The Management and Human Performance Improvement Plan includes actions that address these issues. In particular:

- Management Personnel – As discussed in Section 6.2 of the Plan, FENOC has created three executive positions to provide new leadership for Davis-Besse and its other nuclear plants. Each of these positions has been filled by highly qualified individuals who have had substantial nuclear experience outside of the FENOC system. These positions are Chief Operating Officer (COO), Executive Vice President with responsibility for engineering, and Vice President of Oversight. Not only do these additions provide greater control and oversight of the nuclear fleet, but also add to the nuclear presence within the FirstEnergy corporate structure. In addition, as discussed in Section 6.2 of the Plan, within the last year, FENOC has replaced each of the Directors and most of the managers at Davis-Besse.

- Independence of QA – Section 6.2 of the Plan states that FENOC has created a new position of Vice President of Oversight. The Vice President reports directly to the FENOC President and the FirstEnergy Board of Directors. This will ensure the independence of QA. Additionally, Section 6.4 of the Plan states includes provisions for ensuring that issues raised by QA are elevated to senior management in cases where the staff has not taken effective corrective action.

In addition to these actions which are currently summarized in the Management and Human Performance Improvement Plan, the President of FENOC reports directly to the Board of Directors of FirstEnergy. Additionally, FENOC is centralizing within corporate management certain functions related to Engineering and Nuclear Services to improve overall fleet performance in terms of safe and reliable operations. These functions include management of common processes and program assessment, procurement engineering, access authorization, nuclear fuel, core design and analysis, and fleet asset management. These actions will be added to the Management and Human Performance Improvement Plan.

In summary, the Management and Human Performance Improvement Plan includes actions to increase corporate management personnel and improve the capability of their role. It also has actions to ensure that QA is independent of individual site management and reports to FENOC corporate management.

4.1.2 Management Involvement and Oversight

The Table 2 lists a number of similar and overlapping issues related to management involvement and oversight. For the purpose of this report, these individual issues were consolidated into the following two issues:

1) Management monitoring of field activities did not identify problems or changes in conditions, because management had minimal entries into containment and observation of conditions in the containment.

2) There was a lack of management and supervisory ownership, including a lack of management involvement in important safety significant work activities and decisions, self-assessments, corrective action, and problem resolution.

Although these issues primarily apply to previous site management, the issues have been extrapolated to corporate management for the purposes of this evaluation. The Management and Human Performance Improvement Plan includes actions that address these issues. In particular, at the corporate level, the creation of the three new executive position discussed in Section 6.2 of the Plan has enabled FENOC corporate management to provide substantial additional monitoring, ownership, and involvement in plant activities (including observation of activities in the field and containment). Furthermore, as discussed in Section 6.2 of the Plan, the COO has also been acting as site vice president for Davis-Besse, providing direct corporate management of the plant. With these new positions, FENOC management is able to provide higher levels of oversight to all the FENOC units. The addition of these positions provide greater control and oversight of the nuclear fleet, and also add more nuclear perspective to the FirstEnergy corporate structure. These additions will facilitate more involvement and communication opportunities throughout corporate management. Finally, the Nuclear Committee of the Board of Directors has been more active in overseeing plant activities, including increasing the frequency of meetings from quarterly to monthly for the recovery period, and holding meetings at Davis-Besse.

Additionally, the Management and Human Performance Improvement Plan provides for actions to improve management involvement by site management. In particular:

- Management Monitoring – Section 6.3 of the Plan states that a Management Observation Program will be established at Davis-Besse based upon the program successfully used at FENOC's Perry and Beaver Valley plants. Additionally, Section 6.2 of the Plan states that a Management Monitoring Process will be established and

implemented to monitor and trend the performance of the management observation activities of individual management personnel. This includes field observations by management and plant/containment tours by management.

- Management Ownership – Section 6.2 of the Plan states that new Ownership for Excellence accountabilities will be established for all Directors and Managers. This is the program that sets and communicates individual employee accountabilities, and is used to provide follow-up evaluation and appraisal of performance. Merits are assigned based on meeting the documented expectations, so putting the proper focus and attributes in the Ownership for Excellence will help foster the correct behaviors. Additionally, Section 6.2 of the Plan states that Leadership training will be implemented for the management team. Customized and focused Leadership in Action training will be provided to communicate the learning opportunities from the RPV head degradation event. This training will include lessons learned from the issues or attributes identified in the Root Cause Analysis Report on the failure to identify the degradation of the head. This leadership training will set the standards for how the management team will be expected to conduct business. This training will include managerial and supervisory personnel. This is a common program within FENOC.

4.1.3 Management Style

The following issues were identified in this area:

1) Aggressive management style that challenged individuals who raised issues

2) A lack of a questioning attitude by managers.

Although these issues primarily apply to previous site management, the issues have been extrapolated to corporate management for the purposes of this evaluation. At the corporate level, the Management and Human Performance Improvement Plan includes actions that address these issues. As discussed in Section 6.2 of the Plan, the new FENOC Executive Management Team has outside experience and high safety standards. These individuals bring a strong questioning attitude. More importantly, this team is committed to ensuring an open atmosphere for communication of concerns exists. This team has provided clear expectations for the management behaviors which will maintain the proper atmosphere. Furthermore, as discussed in Section 6.1 of the Plan, the COO has been holding "4-Cs" meeting with groups of employees to listen to their concerns. The employee concerns program has also been changed in that it is proactive rather than reactive.

Additionally, as discussed in the Management and Human Performance Improvement Plan, FENOC has taken action to improve the management style and questioning attitude of site management. In particular:

Management Style – Section 6.2 of the Plan states that the Foundations for Leadership supervisory training program will be reviewed to ensure the correct focus is on the right behaviors, such as coaching, reinforcing expectations, and communicating openly. This is a common training course, and therefore will receive the same focus at all FENOC sites.

Questioning Attitude – Section 6.1 of the Plan states that training will be provided to management on maintaining the proper nuclear safety focus. Lessons learned regarding manager / supervisor behaviors that led to the RPV head degradation will be factored in to this training.

4.2 Policies on Safety

The relevant issues in Tables 1 and 2 were organized into seven categories: 1) procedure compliance, 2) corrective actions, 3) technical standards and assessments, 4) nuclear safety focus, 5) policy statements, 6) role of Operations Department, and 7) Safety Conscious Work Environment. The evaluation of each of these topics is discussed below.

4.2.1 Procedure Compliance

The Table 2 lists a number of similar and overlapping issues related to procedure compliance. For the purpose of this report, these individual issues were consolidated into the following issue:

- There was a lack of compliance with procedures, including the Boric Acid Corrosion Control procedure, Inservice Inspection procedure, and Corrective Action procedure.

Although this issue applies primary to the plant, the issue has been extrapolated to corporate management for the purposes of this evaluation. At the corporate level, the Management and Human Performance Improvement Plan includes actions that address this issue. As discussed in Section 6.1 of the Plan, a FENOC Policy on safety will be established as part of the Business Plan, and the policy will be incorporated into procedures, guidelines, job descriptions and performance evaluations, as appropriate. This policy will emphasize the need for procedure compliance. Additionally, as discussed in Section 6.5 of the Plan, Davis-Besse has performance indicators and performs assessments that address procedure compliance.

Additionally, at the plant level, the Management and Human Performance Improvement Plan includes actions that address policies and expectations for procedure compliance. In particular, Section 6.5 of the Plan states that Davis-Besse will be reinforcing standards and expectations for procedure compliance and the need for work practice rigor. Additionally, the need for procedure compliance will be discussed regularly at the morning meetings of managers. Finally, FENOC is establishing a Management Observation Program to provide direct management observation of and guidance to workers, including observations of procedure compliance by employees.

4.2.2 Corrective Actions

The Table 2 lists a number of similar and overlapping issues related to corrective action. For the purpose of this report, these individual issues were consolidated into the following issue:

- Corrective actions were untimely and ineffective.

Although this issue applies primary to the plant, the issue has been extrapolated to corporate management for the purposes of this evaluation. At the corporate level, the Management and Human Performance Improvement Plan includes actions that address this issue. As discussed in Section 6.1 of the Plan, a FENOC Policy on safety will be established and will be incorporated into procedures, guidelines, job descriptions and performance evaluations, as appropriate. This policy will emphasize the need for effective corrective action. Additionally, as discussed in Section 6.5 of the Plan, Davis-Besse has performance indicators and performs assessments that address corrective action. These are available for corporate review.

Additionally, at the plant level, the Management and Human Performance Improvement Plan includes actions that address corrective action. In particular, Section 6.5 of the Plan states that FENOC is taking several actions to improve corrective actions, including the following: greater use Engineering resources in initial Operability determination; improvements in cause determinations; improvements in effectiveness of corrective actions; and improvements in the Corrective Action Review Board. Additionally, Section 4.5.3 below discusses improvement in the corrective action procedure.

4.2.3 Technical Standards and Assessments

The Table 2 lists a number of similar and overlapping issues related to technical standards and assessments. For the purpose of this report, these individual issues were consolidated into the following issue:

- Technical standards and assessments lacked rigor, including failure to integrate and apply NRC guidance, key industry information, and site knowledge/experience.

Although this issue applies primary to the plant, the issue has been extrapolated to corporate management for the purposes of this evaluation. At the corporate level, the Management and Human Performance Improvement Plan includes actions that address this issue. As discussed in Section 6.1 of the Plan, a FENOC Policy on safety will be established and the policy will be incorporated into procedures, guidelines, job descriptions and performance evaluations, as appropriate. This policy will emphasize the need for rigorous technical standards and assessments, and the Management and Human Performance Improvement Plan will be revised to mention this commitment. Additionally, as discussed in Section 6.3 of the Plan, FENOC has established common processes for Perry and Beaver Valley on analyses of safety issues and decision-making, and FENOC will be applying these common processes to Davis-Besse. Finally, as

discussed in Section 6.3 of the Plan, Davis-Besse has performance indicators and performs assessments that address technical standards and decision-making, and these performance indicators and assessments are made available to corporate management for review and action as necessary.

- Additionally, at the plant level, the Management and Human Performance Improvement Plan includes actions that address this issue. In particular, Section 6.3 of the Plan identifies several actions to improve technical standards and assessments, including establishment of written technical expectations; improvements in the use of operating experience; training on technical standards and problem solving skills; and training on decision-making to prompt a questioning attitude. This will be common at the FENOC sites.

4.2.4 Nuclear Safety Focus

The Table 2 lists a number of similar and overlapping issues related to nuclear safety focus. For the purpose of this report, these individual issues were consolidated into the following issue:

- Less than Adequate Nuclear Safety Focus – A production focus established by management, combined with taking minimum actions to meet regulatory requirements, resulted in missed opportunities to identify the RPV head degradation and acceptance of degraded conditions on the RPV head and other components affected by boric acid.

The Management and Human Performance Improvement Plan includes actions that address this issue. In particular, Section 6.1 of the Plan identifies several measures to improve nuclear safety focus, including establishment of a new FENOC Executive Management Team with outside experience and high safety standards. Additionally, FENOC management is holding meetings with employees to communicate the need for a nuclear safety focus. An important part of these communication opportunities is not only to provide expectations, but to listen to concerns and issues from the employees. From these concerns, actions can be taken to create the open atmosphere required for a safety focus. In addition, on November 5, 2002, the Chairman and Chief Executive Officer of FirstEnergy held a town meeting with Davis-Besse personnel, stressing the need for an uncompromising commitment to safe operation and emphasizing that productivity is meaningless without safe operation first. He has held a similar meeting at the Perry Plant, and is scheduled to hold one at Beaver Valley Station in January 2003.

Additionally, at the plant level, Section 6.1 of the Plan identifies several measures to improve nuclear safety focus, including training of management on nuclear safety focus and case study training on nuclear safety.

4.2.5 Policy Statements

The Table 2 lists a number of similar and overlapping issues related to policy statements. For the purpose of this report, these individual issues were consolidated into the following issue:

- The written vision, policies, and expectations have been inconsistent and incomplete in their treatment of employee and nuclear safety and do not support a strong safety focus.

The Management and Human Performance Improvement Plan includes actions that address this issue. In particular, Section 6.1 of the Plan states that FENOC will establish a policy emphasizing that nuclear, radiological, and personnel safety have the highest priority and take precedence over other objectives, such as cost and production. The policy will be incorporated into procedures, guidelines, job descriptions and performance evaluations, as appropriate. Additionally, although currently not discussed in the Plan, the Board of Directors of FirstEnergy will be issuing a resolution that emphasizes the preeminence of safety.

4.2.6 Role of Operations Department

The Table 2 lists a number of similar and overlapping issues related to the role of the Operations Department. For the purpose of this report, these individual issues were consolidated into the following issue:

- Operations had minimal involvement in resolution of boric acid issues, and management expectations and standards for Operations to take a leadership role on safety issues were not well defined or understood.

This issue is primarily a plant-specific issue, but it does pertain indirectly to corporate management. The Management and Human Performance Improvement Plan includes actions that address this issue at the plant level. In particular, Section 6.2 of the Plan states that the Operations Department has developed an improvement plan to ensure that Operations is recognized as the lead organization at Davis-Besse and Operations takes ownership of equipment deficiencies. From the corporate perspective, management at all levels must embrace and support the leadership role of operations. This expectation must come from the top levels of management. The new FENOC management has a strong operational focus. Their experiences and background with other plants needing help have been successful due to strong leadership from Operations. The Shift Manager Roles and Responsibility memo, signed by the Chief Operating Officer, will affirm this expectation and support.

4.2.7 Safety Conscious Work Environment (SCWE)

The Table 2 lists a number of similar and overlapping issues related to SCWE. For the purpose of this report, these individual issues were consolidated into the following two issues:

1) Employees should be encouraged to report concerns, and management should develop a higher tolerance for dissenting views in the organization.

2) A cultural survey should be performed, the Ombudsman Process should be strengthened, and management's effectiveness in detecting and preventing retaliation should be improved.

The Management and Human Performance Improvement Plan includes actions that address this issue. In particular:

- Encouragement of employee concerns -As discussed in Section 6.1 of the Plan, FENOC's Chief Operating Officer (COO) is holding "4-Cs" meetings with small groups of employees. At these meetings, employees can anonymously express "compliments, communications, concerns, and changes" to a facilitator who then relays them to the COO. The COO then communicates his response (including communicating the need for high safety standards) directly back to the employees. The results of these meetings are also communicated to the employees through the site newsletter. Additionally, at the site level, Table 1 of the Plan includes provisions for development and implementation of a Site Communication Plan to encourage employees to report concerns.

- Improvements in employee protection – The President of FENOC will be issuing a policy for maintaining a safety conscious work environment at all of FENOC's nuclear plants. This action will be added to the next revision of the Management and Human Performance Improvement Plan. Additionally, Section 6.1 of the Plan states that a plan has been developed to improve SCWE at Davis-Besse. This plan includes provisions for training on SCWE for supervisor and managers, communications to employee emphasizing the importance of SCWE, establishment of a team to evaluate the appropriateness of proposed significant adverse action against employees before the action is taken to help detect and prevent the potential for retaliation for raising safety concerns, development of a process for resolving issues raised by employees, creation of employee concerns program that reflects best industry practices, and monitoring SCWE performance and attitudes. Under the leadership of FENOC's Vice President of Oversight, FENOC will evaluate application of these improvements to its other nuclear plants.

4.3 Adequacy of Resources

The only issue in this area involves a comment by the NRC's Lessons Learned Task Force that Davis-Besse had "strained engineering resources." FENOC's assessments did not identify this matter as a cause or observation related to the RPV head degradation.

The Management and Human Performance Improvement Plan includes an action that addresses this issue. In particular, Section 6.3 of the Plan states that FENOC will

augment the Engineering staff with personnel from outside of Davis-Besse to provide new insights and experiences to the Engineering staff. From the corporate perspective, the resources to provide oversight have been increased, as mentioned previously. Also, the new Executive Vice President has responsibility for engineering, and will provide the corporate awareness and control of FENOC engineering resources. There is no indication that the corporate organization refused to provide resources (personnel or monetary) when or if requested by DB management. With the more involved corporate structure and the new site management, oversight of station activities as well as communication of needs will be enhanced.

4.4 Incentive Programs

The only issue in this area involves an observation that FENOC's monetary incentive program rewards production more than safety at senior levels of the organization. This was not identified as a cause related to the RPV head degradation.

The Management and Human Performance Improvement Plan includes an action that addresses this issue. In particular, Section 6.1 of the Plan states that incentives will be realigned to ensure the proper focus on safety and safe operation of the station. The incentive program consists of both corporate and FENOC incentives. The FENOC incentives will be reviewed by group council to ensure proper alignment of both safety and personnel incentives.

4.5 Common Processes for FENOC Plants

FENOC owns and operates three nuclear power plants (Davis-Besse, Perry, and Beaver Valley Units 1 and 2). For some activities, FENOC has established a "common process" or Nuclear Operating Procedure (NOP) to govern the activities at all three plants. In other areas, each plant has had its own process or procedure.

In some cases, the issues in Tables 1 and 2 pertain to a common process or NOP. In those cases, this evaluation considered whether there was a need for improvement in the common process or NOP.

In other cases, the issues pertain to a process specific to Davis-Besse. In those cases, the evaluation considered whether a common process or NOP should be created to resolve those issues.

The results of the evaluation are discussed below with respect to each process.

As a general matter, Section 6.3 of the Management and Human Performance Improvement Plan states that the common processes that are currently being used at Perry and Beaver Valley will also be applied to Davis-Besse to ensure consistent policies and standards at all FENOC plants. The FENOC Common Process program will ensure benchmarking and good industry practices are sought out and used at all three FENOC sites. The FENOC executives are strong advocates of implementing good common

processes, and have demonstrated their support and expectations in various meetings. In the near future, common processes will be changed to corporate governed processes, with routine assessments being performed by the corporate entity to ensure consistent implementation at all sites.

4.5.1 Boric Acid Corrosion Control (BACC) Program

The Table 2 lists a number of similar and overlapping issues related to the BACC Program. For the purpose of this report, these individual issues were consolidated into the following issue:

- The BACC Program and its implementation were ineffective with regard to the RPV head, including a lack of a requirement for inspection of the RPV head or CRDM nozzles.

The Management and Human Performance Improvement Plan includes actions that address this issue. In particular, Section 6.5 of the Plan states that FENOC is making a number of improvements to the BACC Program, and it identifies a number of specific improvements including establishing a Boric Acid Nuclear Operating Procedure applicable to all FENOC pressurized water reactors.

4.5.2 Inservice Inspection (ISI) Program

The Table 2 lists a number of similar and overlapping issues related to the ISI Program. For the purpose of this report, these individual issues were consolidated into the following issue:

- The ISI program and its implementation were ineffective with regard to the RPV head.

Given the different designs of each of FENOC's three nuclear plants, it is not practical to have a common process that governs ISI for all three plants. Therefore, this is a site-specific issue.

The Management and Human Performance Improvement Plan includes actions that address this issue for Davis-Besse. In particular, Section 6.5 of the Plan states that FENOC is making a number of improvements in its ISI Program as it pertains to inspections for RCS leakage, and it identifies a number of specific improvements to the ISI program.

4.5.3 Corrective Action Program (CAP)

The Table 2 lists a number of similar and overlapping issues related to the CAP. For the purpose of this report, these individual issues were consolidated into the following issue:

- The Corrective Action Procedure has provisions that do not reflect state-of-the-art practice in the industry, and the corrective action process was ineffective.

The Management and Human Performance Improvement Plan includes actions that address this issue. For the last several years, Davis-Besse has used a Nuclear Operating Procedure for corrective action that is common to all of FENOC's nuclear plants, but has used site-specific guidance to implement the NOP. Section 6.5 of the Plan states that FENOC will benchmark the corrective action procedure against industry standards. As a result of this review, FENOC will be taking appropriate corrective actions for any identified weaknesses. In addition, based upon its other assessments, FENOC has already determined to make the improvements in the process for operability reviews, categorization of adverse conditions, cause determinations, effectiveness of corrective actions, and trending. In the longer term, FENOC will assign ownership of the CAP to a centralized, corporate entity to provide better oversight and consistency for all of the FENOC units.

4.5.4 Miscellaneous Issues

The following issue was identified in this area:

- Develop specific lower-level performance metrics in each performance area, and implement reviews that look beneath the measures for causes and trends.

Currently, each of FENOC's plants has higher-level performance indicators that are provided to FENOC corporate management. By definition, the issue related to lower-level performance metrics is a site-specific issue and not a corporate issue.

The Management and Human Performance Improvement Plan includes actions that address this issue. In particular, Section 6.5 of the Plan states that performance indicators will be established by program owners to measure and communicate the health of the individual programs. To supplement the indicators, the open communications with employees and the management monitoring will supplement the measurement of performance.

4.6 Sharing of Information among FENOC Plants

The Table 2 lists a number of similar and overlapping issues related to sharing of information. For the purpose of this report, these individual issues were consolidated into the following two issues:

1) Previous industry and in-house experience were not effectively used to prevent and correct problems.

2) Inadequate communications and teamwork.

The Management and Human Performance Improvement Plan includes actions that address these issues. In particular:

- Operating Experience – Section 6.3 of the Plan states that improvements to the station benchmarking program will be made to promote taking action on good practices observed elsewhere. This program allows station personnel the opportunity to visit and assess programs at several different stations and will help ensure that Davis-Besse is aware of and using best industry practices. FENOC will also make improvements to the Industry Operating Experience program to ensure appropriate actions identified from other plants or sources of information are properly tracked and implemented. These improvements will include issuance of expectations on when to seek information on operating experience for use in proposed plant activities, where to seek the information, how to determine the validity of the information, and how to track the information for future updates and use. This will become a common process at all FENOC units.
- Communications and Teamwork - On a corporate level, FENOC is taking several actions to improve communications and teamwork. As stated in Section 6.3 of the Plan, FENOC stations (including Davis-Besse) will share assistance and expertise among themselves. This will promote sharing of information and good practices. Additionally, FENOC will rotate assignments for management personnel to prevent isolation from other stations.

4.7 Corporate Assessments

The relevant issues in Tables 1 and 2 were organized into five categories: 1) Quality Assurance (QA), 2) the Company Nuclear Review Board (CNRB), 3) assessments of Engineering, 4) corporate level assessments, and 5) several miscellaneous issues. The evaluation of each of these topics is discussed below.

4.7.1 Quality Assurance

There were three issues related to QA:

1) For a period of time, the management of the audit/evaluation process was not independent from the management of the corrective action process.

2) There was little evidence of QA's involvement related to the RPV degradation, and the documented findings by QA were of mixed quality.

3) Since the mid-1990s, Davis-Besse's nuclear safety values, behaviors and expectations were such that oversight was not set apart, in terms of expectations and performance standards, from the balance of the station.

The Management and Human Performance Improvement Plan includes actions that address these issues. In particular:

- QA Independence – Section 6.2 of the Plan states that FENOC has created a new position of Vice President of Oversight. The Vice President reports directly to the FENOC President and the FirstEnergy Board of Directors.

- QA Involvement – Section 6.4 of the Plan calls for improvements in QA, including increased QA oversight of Engineering activities and increased use of performance based assessments.

- QA Values, Behaviors, and Expectations - Section 6.4 of the Plan includes provisions for raising the standards of the QA organization and ensuring that issues raised by QA are elevated to senior management in cases where the staff has not taken effective corrective action.

The actions and lessons learned from Davis-Besse are also being applied at the other FENOC sites. Sharing of resources between the oversight organizations at all sites has been increased, and this will also help in maintaining high standards and consistency.

4.7.2 CNRB

There were seven issues related to the CNRB:

1) Corporate Nuclear Review Board met only infrequently and the majority of their time was spent on reviews of safety evaluations and Licensing Amendment Requests.

2) The CNRB failed to identify the reactor vessel head degradation issue.

3) The "Expectations" for the CNRB appear to not be clear.

4) The CNRB meeting and the information presented and reviewed, had little focus on operational, technical, and safety topics.

5) The CNRB may not be meeting its charter to provide an independent safety audit function.

6) A major source of "input" information for the CNRB review should be the Nuclear Quality Assurance organization, and the supporting Corrective Action Program.

7) The present Chairman of the CNRB also has Nuclear Quality Assurance line management responsibilities.

The Management and Human Performance Improvement Plan includes an action that addresses this issue. In particular, Section 6.4 of the Plan states that changes are being made to improve the safety focus of the CNRB. In particular, the CNRB will place less

emphasis on status of plant activities and license amendment requests and will engage in more review of key technical and safety issues, including reviews of the adequacy of activities during outages as well as operation. Additionally, the interval between CNRB oversight visits will be reviewed and changed if necessary. The FENOC executives take part in these oversight meetings, and therefore will ensure a proper safety focus is maintained. With this corporate involvement, lessons learned are applied to all FENOC sites.

4.7.3 Assessments of Engineering

The Table 2 lists a number of similar and overlapping issues related to assessments of Engineering. For the purpose of this report, these individual issues were consolidated into the following issue:

- The site should have independent oversight of engineering, including review of equipment and system problems and engineering programs

The Management and Human Performance Improvement Plan includes an action that addresses this issue. In particular, Section 6.4 of the Plan states that an Engineering Assessment Board (EAB) has been established, consisting largely of experienced outside consultants and some FENOC employees. The EAB is reviewing engineering products and the results of program, system, and other reviews to ensure the readiness of Davis-Besse to restart. These reviews are helping to ensure the adequacy of these products, as well as raising the standards of Davis-Besse employees who prepare the products. In addition to its role in overseeing readiness to restart from the current outage, the EAB will be made a permanent feature at Davis-Besse, and will gradually transition to use primarily Davis-Besse employees. The permanent responsibility of the EAB will include monitoring various engineering work products for appropriate standards. The EAB will use indicators to show performance at the section level, based on product reject rate and feedback. The EAB process will also be applied at the other FENOC sites.
Another important change from the corporate perspective is the addition of the Executive Vice President mentioned previously. This individual has overall responsibility for the FENOC engineering groups, and will therefore provide control and oversight of the engineering activities.

4.7.4 Corporate Level Assessments

The following issue was identified regarding corporate level assessments:

- Oversight did not establish an effective method for assessing the oversight function. The process for providing oversight of the oversight function was less than adequate, feedback provided was mixed, and corrective actions were sometimes ineffective.

The Management and Human Performance Improvement Plan includes an action that addresses this issue. In particular, Section 6.4 of the Plan states that FENOC will work with the Joint Utility Management Audits or other independent contractor to develop

more rigorous annual assessments of the oversight and assessment functions at Davis-Besse. With the new corporate oversight executive addition, this individual will provide extra oversight, as well as ensure consistency among the FENOC sites.

4.7.5 Miscellaneous Issues

The following miscellaneous issues were identified regarding corporate assessments:

1) Re-examine the structure and membership of safety review entities.

2) Apply applicable lessons learned from Davis-Besse to both Perry and Beaver Valley.

3) Ineffective self-assessments of safety performance.

The Management and Human Performance Improvement Plan includes actions that address these issues. In particular:

- Safety review groups – As discussed in Section 6.4 of the Plan, FENOC has created several new review groups (e.g., Engineering Assessment Board). Initially, some of these have been supplemented with outside consultants. Additionally, Sections 6.4 and 6.5 of the Plan state that Davis-Besse is improving the charter and membership of existing groups (such as the Project Review Committee and Corrective Action Review Board).

- Assessments of Perry and Beaver Valley – Section 6.5 of the Plan states that Perry and Beaver Valley will perform assessments of their management / human performance quality based on the lessons learned from the Davis-Besse root causes.

- Self-assessments – Section 6.4 of the Plan states that Davis-Besse will being making improvements in Self-Assessments, including more aggressive use of outside peers for self-assessments and the use of INPO peer assist visits in the future. Additionally, Section 6.5 of the Plan states that the self-assessment program will be improved. This will ultimately become a FENOC common process.

5.0 CONCLUSIONS

The evaluation determined that, in general, the Management and Human Performance Improvement Plan includes actions that address the issues arising from the assessments of the Davis-Besse RPV head degradation that have implications for FENOC corporate management. In several cases, FENOC is taking or planning to take additional actions to improve corporate management that are not explicitly discussed in the Plan, and the Plan will be revised to discuss those actions. Those actions are listed below:

1. The Nuclear Committee of the Board of Directors has been more active in overseeing plant activities, including increasing the frequency of meetings from quarterly to monthly, and meeting at Davis-Besse.

2. Performance indicators and assessments are provided to corporate management for its review and action as necessary.

3. The FENOC policy on nuclear safety will emphasize the need for procedure compliance, effective corrective action, and rigorous technical standards and assessments.

4. The Board of Directors of FirstEnergy has issued a resolution that emphasizes the preeminence of safety.

5. The President of FENOC will be issuing a Nuclear Safety Policy for all of FENOC's nuclear plants.

6. FENOC will evaluate application of the Davis-Besse SCWE improvements to its other nuclear plants.

7. Incentives for management positions at FENOC's other plants will be realigned to focus on safety and safe operation of the station.

8. In the long term, FENOC will assign ownership of the CAP to a centralized, corporate entity to provide better oversight and consistency for all of the FENOC units

9. The Operating Experience Program will become a common process at all FENOC units.

10. The EAB process will also be applied at the other FENOC sites.

11. The Self-Assessment Program will become a FENOC common process

12. The President of FENOC reports directly to the Nuclear Committee of the Board of Directors of FirstEnergy.

13. FENOC is centralizing within corporate management those functions related to management of common processes and program assessment, procurement engineering, access authorization, nuclear fuel, core design and analysis, and life cycle management.

14. The Chairman and Chief Executive Officer of FirstEnergy will hold meetings with personnel at FENOC's nuclear plants, stressing the need for an uncompromising commitment to safe operation and emphasizing that productivity is meaningless without safe operation first.

TABLE 1

ISSUES IDENTIFIED BY ROOT CAUSE ANALYSES AND OTHER ASSESSMENTS

Issue	**Relevant Corporate Management Functions**
Root Cause Analysis Report of Significant Degradation of the Reactor Pressure Vessel Head (April 15, 2002) (Ref. 1)	
PWSCC cracking in the CRDM nozzle interface at the J-groove weld due to material susceptibility in the presence of a suitable environment.	N/A
Boric Acid Corrosion Control and ISI programs and program implementation regarding the RPV head.	Common Processes Policies on Safety
Environmental conditions, cramped conditions due to the design and high radiation at the RPV head.	Policies on Safety
Equipment condition due to uncorrected CRDM flange leakage.	Policies on Safety Common Processes
Management monitoring of field activities did not identify problems.	Corporate Management Involvement
Management monitoring of activities did not identify changes in conditions.	Corporate Management Involvement
Technical standards. • Assumptions made in supporting technical decisions were not verified by direct inspection. • Examples where a systematic assessment was not performed are the precipitation on the air monitoring filters and the investigation of RCS unidentified leakage. • The staff did not fully understand the limitations and uncertainties involved with the head inspections and the data supporting the safety evaluation. • The modification to open the inspection holes was deferred without a technical evaluation. • During 12RFO, the reactor head was reinstalled on the vessel without a complete cleaning. • During refueling outages personnel, such as engineering supervisors, are assigned outage positions. This results in a reduction in supervisor oversight of the technical staff.	Policies on Safety
Oversight. • The site does not have independent internal oversight in engineering. As such, the barrier provided by such a group does not exist. • Corporate Nuclear Review Board met only infrequently and the majority of their time was spent on reviews of safety evaluations and Licensing Amendment Requests.	Corporate Assessments

Issue	Relevant Corporate Management Functions
Previous industry and in-house experience were not effectively used to prevent problems. • The lessons learned and experience gained with boric acid corrosion on valve RC 2 were not used in assessing the condition of the reactor head. • The RPV head is not a specific item in the Boric Acid Corrosion Control Program even though IN 86-108, Supplement 1 (April 20, 1987) documents severe corrosion of various components on the RPV head resulting from boric acid corrosion.	Sharing of Information Common Processes
Execution of the Condition Report Program • Appropriate categorization of CR • Over sight of CR responses for technical accuracy and license impacts • Discussions with persons indicate that standards for initiating CRs may not be aligned with program expectations	Policies on Safety
Root Cause Analysis Report of Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head (August 13, 2002) (Ref. 2)	
Less than Adequate Nuclear Safety Focus – A production focus established by management, combined with taking minimum actions to meet regulatory requirements, resulted in acceptance of degraded conditions on the RPV head and other components affected by boric acid.	Policies on Safety Corporate Management Involvement
Less than Adequate Implementation of the Corrective Action Program – Implementation of the Corrective Action Program was less than adequate, as indicated by the following: ▪ Addressing Symptoms Rather Than Causes ▪ Low Categorization of Conditions ▪ Less than Adequate Cause Determinations ▪ Less than Adequate Corrective Actions ▪ Less than Adequate Trending	Policies on Safety Common Processes
Less than Adequate Analyses of Safety Implications – Failure to integrate and apply key industry information and site knowledge/experience, effectively use vendor expertise, and compare new information to baseline knowledge led to less than adequate analyses and decision-making with regard to the nuclear safety implications of boric acid on the reactor vessel head and in the containment.	Policies on Safety

Issue	Relevant Corporate Management Functions
Less than Adequate Compliance with Boric Acid Corrosion Control (BACC) Procedure and Inservice Test Program – Contrary to these programs, boric acid was not completely removed from the RPV head. The affected areas were not inspected for corrosion and leakage from nozzles and the sources of the leakage were not determined.	Policies on Safety
Lack of Hazard Analyses – Evaluations and decisions were made without hazards analyses that may have led to the identification of the nozzle leakage.	Policies on Safety
Corrective Action Procedure – The Corrective Action Procedure has provisions that do not reflect state-of-the-art practice in the industry, which may have allowed less than adequate corrective actions.	Common Processes
Design – The design failed to prevent leaks of boric acid. The Alloy 600 material used in the original design of the CRDM nozzles was susceptible to cracking and leakage, and the original gaskets in the CRDM flanges were susceptible to leakage.	N/A
Training – Training was not provided to the ISI VT-2 inspector on boric acid corrosion, and training on inspections was not provided to the engineers who conducted the inspections of the RPV head for boric acid in 10RFO and 11RFO. The training provided following the RC-2 event was less than adequate.	N/A
Coordination of Boric Acid Control Activities – The RPV head inspection activities and resolution of the corrective action documents on the head were not coordinated through the BACC Coordinator.	N/A
BACC Procedure – The BACC Procedure does not specifically reference the CRDM nozzles as one of the probable locations of leakage.	Common Processes
Untimely Corrective Action – Condition reports associated with the boric acid issues tended to stay unresolved until significant degradation occurred.	Policies on Safety Common Processes
Quality Assurance - There was little evidence of QA's involvement in this area, and the documented findings by QA were of mixed quality.	Corporate Assessments
Incentive Program - The FENOC monetary incentive program rewards production more than safety at senior levels of the organization.	Incentive Programs
Policies on Safety - The written policies have been inconsistent and incomplete in their treatment of employee and nuclear safety and do not support a strong safety focus.	Policies on Safety

Issue	Relevant Corporate Management Functions
Operations Involvement – Operations had minimal involvement in resolution of boric acid issues.	Policies on Safety
Management Observations – Management had minimal entries into containment and observation of conditions in the containment.	Corporate Management Involvement
Root Cause Analysis Report of Failure of Quality Assurance Oversight to Prevent Significant Degradation of Reactor Pressure Vessel Head (September 10, 2002) (Ref. 3)	
Since the mid-1990s, D-B's nuclear safety values, behaviors and expectations were such that oversight was not set apart, in terms of expectations and performance standards, from the balance of the station.	Policies on Safety Corporate Assessments
The training for the RC-2 event was ineffective, It failed to improve the ability of both the oversight and line organizations to recognize corrosive conditions and their significance. This contributed to the failure of the auditing team to raise a concern when auditing the Boric Acid Corrosion control Program during 12RFO.	N/A
Oversight did not establish an effective method for assessing the oversight function. The process for providing oversight of the oversight function was less than adequate, feedback provided was mixed, and corrective actions were sometimes ineffective.	Corporate Assessments
For a period of time, the management of the audit/evaluation process was not independent from the management of the corrective action process.	Corporate Assessments Corporate Management Involvement
Nuclear Quality Assurance Examination of Five Closed Nonconformances Related to the Reactor Pressure Vessel Head (June 13, 2002) (Ref. 4)	
Implementation of the Corrective Action Program was ineffective • Failure to identify issues • Failure to evaluate identified issue • Failure to identify causes • Failure to correct the issues • Failure to prevent recurrence of issues • Lack of timeliness of corrective actions • Failure to evaluate effectiveness of corrective actions	Policies on Safety Common Processes
Lack of management and supervisory ownership	Corporate Management Involvement
Aggressive management style that challenged individuals who raised issues	Policies on Safety Corporate Management Involvement
Lack of Engineering rigor	Policies on Safety

Issue	Relevant Corporate Management Functions
Minimal role of Operations	Policies on Safety
Procedure non-compliance	Policies on Safety
Inadequate communications and teamwork	Sharing of Information
Davis-Besse 8/2002 Safety Conscious Work Environment Survey (Ref. 5)	
Employee willingness to report concerns	Policies on Safety
Confidence in the Employee Concern/Ombudsman Process	Policies on Safety
Management support for Concern Reporting	Policies on Safety
Effectiveness of the Corrective Action Process	Policies on Safety Common Processes
Management's effectiveness in detecting & preventing retaliation	Policies on Safety
INPO 5/29/02 Industry Peer Recommendations to FENOC (Ref. 6)	
Management • Stabilize both the corporate nuclear executive team and Davis-Besse line management organizations • Define (or redefine) the vision for the station, including performance targets and behavioral expectations • Increase involvement of senior site management in self-assessments, corrective action, and problem resolution	Corporate Management Involvement Policies on Safety Corporate Assessments
Processes • Develop specific lower-level performance metrics in each performance area, and implement reviews that look beneath the measures for causes and trends • Re-examine the method used for condition report reviews	Common Processes
Oversight and Review • Re-examine the structure and membership of safety review entities • Develop/strengthen the Engineering Design Review Board and Program Review Board • Establish a structured Equipment and Systems Problem Review Team	Corporate Assessments
Cultural • Perform a "cultural survey" of the organization with the intent of moving toward improving communications and openness • Take specific steps to reduce "isolationism" at the plant • Develop a higher tolerance for dissenting views in the organization. • Ensure that employees do not perceive undue pressure on production and schedule at the expense of safety	Policies on Safety

Issue	Relevant Corporate Management Functions
Other • Develop a plan to address the NRC 0350 inspection regime • Apply applicable lessons learned from Davis-Besse to both Perry and Beaver Valley	N/A Corporate Assessments
Assessment of the FENOC Company Nuclear Review Board (August 13, 2002) (Ref. 7) ***Revise to reflected updated version***	
The CNRB failed to identify the reactor vessel head degradation issue.	Corporate Assessments
The "Expectations" for the CNRB appear to not be clear.	Corporate Assessments
The CNRB meeting and the information presented and reviewed, had little focus on operational, technical, and safety topics.	Corporate Assessments Policies on Safety
The CNRB may not be meeting its charter to provide an independent safety audit function.	Corporate Assessments
A major source of "input" information for the CNRB review should be the Nuclear Quality Assurance organization, and the supporting Corrective Action Program.	Corporate Assessments
The present Chairman of the CNRB also has Nuclear Quality Assurance line management responsibilities.	Corporate Assessments
The unique, important role of the Operations department in guiding and directing overall station safety performance at the station was not apparent in CNRB discussions.	Policies on Safety
The structure, meeting format, subcommittee structure and membership, and meeting frequency do not appear to be effective and efficient, and not optimal for conducting a rigorous safety review of performance at the stations.	Corporate Assessments
Root Cause Analysis Report on Operations Role in Maintaining Site Safety Focus (8/22/02) (Ref. 8) ***Revise to reflect updated version***	
Management expectations were not well defined or understood.	Policies on Safety
Job performance standards were not adequately defined.	Policies on Safety
Responsibility of personnel was not well defined and personnel were not held accountable	Policies on Safety
There is no station policy controlling the documentation and communication of expectations.	Policies on Safety
NRC Inspection Report 05000346-02-03, FirstEnergy Nuclear Operating Company, Davis-Besse Nuclear Power Station, Augmented Inspection Team (May 3, 2002) (Ref. 9)	
The AIT concluded that the probable cause of the cavity at Nozzle 3 was boric acid corrosion of the head associated with reactor coolant leakage from a through-wall crack in this nozzle.	N/A

Issue	Relevant Corporate Management Functions
The AIT concluded that the probable cause of the cracking observed in the five penetration nozzles was PWSCC.	N/A
The AIT identified several opportunities which were available to the licensee to potentially identify this corrosion cavity at an earlier point in time.	Policies on Safety
NRC Inspection Report 05000346-02-08, FirstEnergy Nuclear Operating Company, Davis-Besse Nuclear Power Station, Augmented Inspection Team Follow-up Special Inspection (October 2, 2002) (Ref. 10)	
The inspectors identified an apparent violation of Technical Specification Limiting Condition for Operation for Reactor Coolant System Operational Leakage, paragraph 3.4.6.2, for operation of the plant with pressure boundary leakage from through-wall cracks in the reactor coolant system.	N/A
The inspectors identified an apparent violation involving failure to take adequate corrective action for a continuing buildup of boric acid deposits on the reactor head.	Policies on Safety
The inspectors identified an apparent violation involving failure to take adequate corrective action for recurrent accumulations of boric acid on containment air cooler (CAC) fins.	Policies on Safety
The inspectors identified an apparent violation involving failure to take adequate corrective action for repeated clogging of radiation element filters although a sample of the filter deposits revealed iron oxides, radionuclides, and primary chemistry.	Policies on Safety
The inspectors identified an apparent violation involving the failure to follow the corrective action procedure and take timely corrective action for a condition adverse to quality, in that the licensee failed to implement a modification to permit complete inspection and cleaning of the reactor vessel head and CRDM nozzles.	Policies on Safety
The inspectors identified a finding involving failure to complete an identified corrective action for an adverse trend in RCS unidentified leakage.	Policies on Safety Common Processes
The inspectors identified an apparent violation involving deficiencies in the licensee's Boric Acid Corrosion Control procedure, NG-EN-00324.	Common Processes
The inspectors identified an apparent violation involving multiple examples of failure to follow the boric acid corrosion control procedure.	Policies on Safety
The inspectors identified an apparent violation involving two examples of failure to follow the station's corrective action program procedure.	Policies on Safety

Issue	Relevant Corporate Management Functions
The inspectors identified an apparent violation of 10 CFR 50.9 involving multiple examples of information provided to the Commission or required by the Commission's regulations to be maintained by the licensee that were not complete and accurate.	N/A
NRC Lessons-Learned Task Force Report, Degradation of the Davis-Besse Nuclear Power Station Reactor Pressure Vessel Head Lessons-Learned Report (September 30, 2002) (Ref. 11)	
The licensee failed to: (1) resolve long-standing or recurring primary system component leaks; (2) establish and effectively implement a boric acid corrosion control program; and (3) adequately implement industry guidance and NRC recommendations intended to identify VHP nozzle leakage. Collectively, these and other performance issues involved: (1) strained engineering resources; (2) an approach of addressing the symptoms of problems as a means of minimizing production impacts; (3) a long-standing acceptance of degraded equipment; (4) a lack of management involvement in important safety significant work activities and decisions, including a lack of a questioning attitude by managers; (5) a lack of engineering rigor in the approach to problem resolution; (6) a lack of awareness of internal and external operating experience, including the inability to implement effective actions to address the lessons-learned from past events; (7) ineffective and untimely corrective actions, including the inability to recognize or address repetitive or recurring problems; (8) ineffective self-assessments of safety performance; (9) weaknesses in the implementation of the employee concerns program; and (10) a lack of compliance with procedures.	Policies on Safety; Common Processes; Adequacy of Resources; Corporate Management Involvement Information Sharing Corporate Assessments

TABLE 2

ISSUES RELATED TO CORPORATE MANAGEMENT FUNCTIONS

Issue
1. **Corporate Management Involvement** a. Management Personnel and Organization • For a period of time, the management of the audit/evaluation process was not independent from the management of the corrective action process. (Ref. 3) • Stabilize both the corporate nuclear executive team and Davis-Besse line management organizations. (Ref. 6) b. Management Involvement and Oversight • Management monitoring of field activities did not identify problems. (Ref. 1) • Management monitoring of activities did not identify changes in conditions. (Ref. 1) • Management had minimal entries into containment and observation of conditions in the containment. (Ref. 2) • Lack of management and supervisory ownership. (Ref. 4) • Increase involvement of senior site management in self-assessments, corrective action, and problem resolution. (Ref. 6) • A lack of management involvement in important safety significant work activities and decisions. (Ref. 11) c. Management Style • Aggressive management style. (Ref. 4) • A lack of a questioning attitude by managers. (Ref. 11)
2. **Policies on Safety** a. Procedure Compliance • Boric Acid Corrosion Control and ISI programs and program implementation regarding the RPV head. (Ref. 1) • Less than Adequate Compliance with Boric Acid Corrosion Control (BACC) Procedure and Inservice Test Program. (Ref. 2) • Procedure non-compliance. (Ref. 4) • The inspectors identified an apparent violation involving the failure to follow the corrective action procedure and take timely corrective action for a condition adverse to quality, in that the licensee failed to implement a modification to permit complete inspection and cleaning of the reactor vessel head and CRDM nozzles. (Ref. 10) • The inspectors identified an apparent violation involving multiple examples of failure to follow the boric acid corrosion control procedure. (Ref. 10) • The inspectors identified an apparent violation involving two examples of failure to follow the station's corrective action program procedure. (Ref. 10) • The licensee failed to establish and effectively implement a boric acid corrosion control program. (Ref. 11) • A lack of compliance with procedures. (Ref. 11)

b. Corrective Action

- Equipment condition due to uncorrected CRDM flange leakage. (Ref. 1)
- Execution of the Condition Report Program. (Ref. 1)
- Implementation of the Corrective Action Program was less than adequate. (Ref. 2)
- Condition reports associated with the boric acid issues tended to stay unresolved until significant degradation occurred. (Ref. 2)
- Implementation of the Corrective Action Program was ineffective. (Ref. 4)
- Management support for Concern Reporting. (Ref. 5)
- Effectiveness of the Corrective Action Process. (Ref. 5)
- The inspectors identified an apparent violation involving failure to take adequate corrective action for a continuing buildup of boric acid deposits on the reactor head. (Ref. 10)
- The inspectors identified an apparent violation involving failure to take adequate corrective action for recurrent accumulations of boric acid on containment air cooler (CAC) fins. (Ref. 10)
- The inspectors identified an apparent violation involving failure to take adequate corrective action for repeated clogging of radiation element filters although a sample of the filter deposits revealed iron oxides, radionuclides, and primary chemistry. (Ref. 10)
- The inspectors identified an apparent violation involving the failure to follow the corrective action procedure and take timely corrective action for a condition adverse to quality, in that the licensee failed to implement a modification to permit complete inspection and cleaning of the reactor vessel head and CRDM nozzles. (Ref. 10)
- The inspectors identified a finding involving failure to complete an identified corrective action for an adverse trend in RCS unidentified leakage. (Ref. 10)
- The licensee failed to resolve long-standing or recurring primary system component leaks. (Ref. 11)
- Ineffective and untimely corrective actions, including the inability to recognize or address repetitive or recurring problems. (Ref. 11)

c. Technical Standards and Assessments

- Technical standards. (Ref. 1)
- Failure to integrate and apply key industry information and site knowledge/experience, effectively use vendor expertise, and compare new information to baseline knowledge led to less than adequate analyses and decision-making with regard to the nuclear safety implications of boric acid on the reactor vessel head and in the containment. (Ref. 2)
- Evaluations and decisions were made without hazards analyses that may have led to the identification of the nozzle leakage. (Ref. 2)
- Lack of Engineering rigor. (Ref. 4)
- The licensee failed to adequately implement industry guidance and NRC recommendations intended to identify VHP nozzle leakage. (Ref. 11)
- A lack of engineering rigor in the approach to problem resolution. (Ref. 11)

d. Nuclear Safety Focus

- Environmental conditions, cramped conditions due to the design and high radiation at the RPV head. (Ref. 1)
- Less than Adequate Nuclear Safety Focus – A production focus established by management, combined with taking minimum actions to meet regulatory requirements, resulted in acceptance of degraded conditions on the RPV head and other components affected by boric acid. (Ref. 2)
- Since the mid-1990s, D-B's nuclear safety values, behaviors and expectations were such that oversight was not set apart, in terms of expectations and performance standards, from the balance of the station. (Ref. 3)
- Ensure that employees do not perceive undue pressure on production and schedule at the expense of safety. (Ref. 6)
- The CNRB meeting and the information presented and reviewed, had little focus on operational, technical, and safety topics. (Ref. 7)
- The AIT identified several opportunities which were available to the licensee to potentially identify this corrosion cavity at an earlier point in time. (Ref. 9)
- An approach of addressing the symptoms of problems as a means of minimizing production impacts. (Ref. 11)
- A long-standing acceptance of degraded equipment. (Ref. 11)

e. Policy Statements
- The written policies have been inconsistent and incomplete in their treatment of employee and nuclear safety and do not support a strong safety focus. (Ref. 2)
- Define (or redefine) the vision for the station, including performance targets and behavioral expectations. (Ref. 6)

f. Role of Operations Department
- Operations had minimal involvement in resolution of boric acid issues. (Ref. 2)
- Minimal role of Operations. (Ref. 4)
- The unique, important role of the Operations department in guiding and directing overall station safety performance at the station was not apparent in CNRB discussions. (Ref. 7)
- Management expectations were not well defined or understood. (Ref. 8)
- Job performance standards were not adequately defined. (Ref. 8)
- Responsibility of personnel was not well defined and personnel were not held accountable. (Ref. 8)
- There is no station policy controlling the documentation and communication of expectations. (Ref. 8)

g. Safety Conscious Work Environment (SCWE)
- Aggressive management style. (Ref. 4)
- Employee willingness to report concerns. (Ref. 5)
- Confidence in the Employee Concern/Ombudsman Process. (Ref. 5)
- Management support for Concern Reporting. (Ref. 5)
- Effectiveness of the Corrective Action Process. (Ref. 5)
- Management's effectiveness in detecting & preventing retaliation. (Ref. 5)

- Perform a "cultural survey" of the organization with the intent of moving toward improving communications and openness. (Ref. 6)
- Develop a higher tolerance for dissenting views in the organization. (Ref. 6)
- weaknesses in the implementation of the employee concerns program. (Ref. 11)

3. **Adequacy of Resources**

- Strained engineering resources. (Ref. 11)

4. **Incentive Programs**

- The FENOC monetary incentive program rewards production more than safety at senior levels of the organization. (Ref. 1)

5. **Common Processes**

a. Boric Acid Corrosion Control (BACC) Program

- Boric Acid Corrosion Control and ISI programs and program implementation regarding the RPV head. (Ref. 1)
- The RPV head is not a specific item in the Boric Acid Corrosion Control Program even though IN 86-108, Supplement 1 (April 20, 1987) documents severe corrosion of various components on the RPV head resulting from boric acid corrosion. (Ref. 1)
- The BACC Procedure does not specifically reference the CRDM nozzles as one of the probable locations of leakage. (Ref. 2)
- The inspectors identified an apparent violation involving deficiencies in the licensee's Boric Acid Corrosion Control procedure, NG-EN-00324. (Ref. 10)
- The licensee failed to establish and effectively implement a boric acid corrosion control program. (Ref. 11)

b. Inservice Inspection (ISI) Program

- Boric Acid Corrosion Control and ISI programs and program implementation regarding the RPV head. (Ref. 1)

c. Corrective Action Program

- Equipment condition due to uncorrected CRDM flange leakage. (Ref. 1)
- Implementation of the Corrective Action Program was less than adequate. (Ref. 2)
- The Corrective Action Procedure has provisions that do not reflect state-of-the-art practice in the industry, which may have allowed less than adequate corrective actions. (Ref. 2)
- Condition reports associated with the boric acid issues tended to stay unresolved until significant degradation occurred. (Ref. 2)
- Implementation of the Corrective Action Program was ineffective. (Ref. 4)
- Effectiveness of the Corrective Action Process. (Ref. 5)
- Re-examine the method used for condition report reviews. (Ref. 6)
- The inspectors identified a finding involving failure to complete an identified corrective action for an adverse trend in RCS unidentified leakage. (Ref. 10)

d. Misc.

- Develop specific lower-level performance metrics in each performance area, and implement reviews that look beneath the measures for causes and trends. (Ref. 6)

- Apply applicable lessons learned from Davis-Besse to both Perry and Beaver Valley. (Ref. 6)

6. **Sharing of Information**

- Previous industry and in-house experience were not effectively used to prevent problems. (Ref. 1)
- Inadequate communications and teamwork. (Ref. 4)
- Take specific steps to reduce "isolationism" at the plant. (Ref. 6)
- A lack of awareness of internal and external operating experience, including the inability to implement effective actions to address the lessons-learned from past events. (Ref. 11)

7. **Corporate Assessments**

a. Quality Assurance (QA)

- There was little evidence of QA's involvement in this area, and the documented findings by QA were of mixed quality. (Ref. 2)
- Since the mid-1990s, D-B's nuclear safety values, behaviors and expectations were such that oversight was not set apart, in terms of expectations and performance standards, from the balance of the station. (Ref. 3)
- For a period of time, the management of the audit/evaluation process was not independent from the management of the corrective action process. (Ref. 3)

b. Company Nuclear Review Board (CNRB)

- Corporate Nuclear Review Board met only infrequently and the majority of their time was spent on reviews of safety evaluations and Licensing Amendment Requests. (Ref. 1)
- The CNRB failed to identify the reactor vessel head degradation issue. (Ref. 7)
- The "Expectations" for the CNRB appear to not be clear. (Ref. 7)
- The CNRB meeting and the information presented and reviewed, had little focus on operational, technical, and safety topics. (Ref. 7)
- The CNRB may not be meeting its charter to provide an independent safety audit function. (Ref. 7)
- A major source of "input" information for the CNRB review should be the Nuclear Quality Assurance organization, and the supporting Corrective Action Program. (Ref. 7)
- The present Chairman of the CNRB also has Nuclear Quality Assurance line management responsibilities. (Ref. 7)

c. Engineering

- The site does not have independent internal oversight in engineering. As such, the barrier provided by such a group does not exist. (Ref. 1)
- Develop/strengthen the Engineering Design Review Board and Program Review Board. (Ref. 6)
- Establish a structured Equipment and Systems Problem Review Team. (Ref. 6)

d. Corporate Level Assessments

- Oversight did not establish an effective method for assessing the oversight

function. The process for providing oversight of the oversight function was less than adequate, feedback provided was mixed, and corrective actions were sometimes ineffective. (Ref. 3)

e. Misc.

- Re-examine the structure and membership of safety review entities. (Ref. 6)
- Apply applicable lessons learned from Davis-Besse to both Perry and Beaver Valley. (Ref. 6)
- Ineffective self-assessments of safety performance. (Ref. 11)