**From:** Art Howell /EPA
**To:** LLTF
**Date:** 7/29/02 12:54PM
**Subject:** Fwd: DB LLRT List

Folks,

Just a reminder. The attached is highly sensitive. It should not be provided to anyone not on the tea
Obviously, the e-mail that attaches the document should not be forwarded

Thanks

Art

H-56

**From:** Joelle Starefos
**To:** Art Howell; David A Timm, Joseph Donoghue, Patrick Castleman; Robert Haag, Ron Lloyd; Russ Bywater; Thomas Koshy
**Date:** 7/25/02 4:40PM
**Subject:** DB LLRT List

***Predecisional and Sensitive Information***

***Joelle Starefos, NRC Resident Inspector***
***Browns Ferry Nuclear Plant***
***(256) 729-6196***

# Davis-Besse Lessons Learned Task Force Meeting

*(7/24-25/2002)*

***~~NRC PreDecisional~~***

Art Howell
Ron Lloyd
Joe Donoghue
Bob Haag
Tom Koshy
Pat Castleman
Russ Bywater
Joelle Starefos
Sonia Eischen (State of Ohio; Observer)
David Timm (Office of Inspector General)

Using modified IAEA approach. Fact Level. What Level. Conclusion Level.

| | | |
|---|---|---|
| | a | **NRC failed to adequately assess symptomsof RCS leakage.** |
| 12 | A | CAC/Rad Monitor cleaning known by NRC through BC level |
| 13 | A | BA on head known by SRI during RFO12 |
| 16 | A | RIII (Grant) knowledge of Rad Monitor |
| 18 | A | BCs logs on CAC/RMs & discussed in morning meetings |
| 19 | A | CAC cleaning observed by inspectors (DRS) |
| 20 | A | PM knew about CACs |
| 22 | A | DRP BC listed CAC cleaning (2001) |
| 23 | A | RIII didn't see CAC/RM cleaning as important |
| 38 | A | No one suggested NRC look at RCS leakage in containment during PIR |
| 41 | A | 3 inspection reports discussing RMs without conclusions |
| 52 | A | RIII didn't view leakage as a problem |
| 58 | A | Multiple cleaning of CACs |
| 76 | A | No documentation of CAC evaluation inspection |
| 77 | A | No NRC doc of RM leak detection reliability insp. |
| 83 | A | No open items for CAC/RM or BA on head |
| 87 | A | Pzr safety valve mod increased leakage; NRC accepted without question |
| 88 | A | Assumed Pzr safety valve leakage was reason for CAC fouling |
| 97 | A | CR for CAC/RM not seen as safety-sig would be screened out |
| 98 | A | NRC Briefing package for Merrified didn't include BA problems |
| 107 | A | TS requirements for CAC/RM were relaxed |

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~~*NRC PreDecisional*~~

| | | |
|---|---|---|
| 118 | A | BC didn't tell RI to pursue BA issues |
| 125 | A | RA knew of CAC issues |
| | **b** | **NRC failed to follow-up on Generic Communications.** |
| 59 | B | 62001 not used for DB (precursor events) |
| 61 | B | 62001 used 15 reactors (all RIV PWRs) |
| 62 | B | No insp followup of GL97-01 |
| 66 | B | NRC followup for 88-05 audited 10 plants; DB acceptable |
| 129 | B | TI on BU2001-01 didn't address BA issues |
| 132 | B | 2515 IP do not look at BA/GC followup |
| 133 | B | The old inspection program (9000 series) looked at OE issues |
| 154 | B | # of Generic Comm (NRC) not corrected with # of events |
| 156 | B | MD8.5 can't be followed because it hasn't been updated |
| 160 | B | No NRC programmatic guidance for effectiveness review of generic comm. |
| 161 | B | Sample/shotgun method for verification of generic comm implementation |
| 164 | B | IP62001 deleted w/o considering why it existed |
| 165 | B | NRC generated 17 boric acid generic communication |
| 187 | B | 11/93 SER recommended inspection (visual) or leak detection system |
| 189 | B | 11/93 SER recognized circumferential cracking, but didn't make recommendations |
| 190 | B | Staff action plan GL97-01 can't be found |
| 201 | B | GL97-01 closeout for DB based on generic info |
| 202 | B | DB was the only B&W licensee that didn't do inspections (ref GL97-01) NRC |
| 232 | B | 1972 requested enhanced ISI for BA corrosion |
| | **c** | **NRC failed to understand implications of BA corrosion.** |
| 14 | C | Licensee stated that NRR knew about BA on head |
| 15 | C | SRI saw CR on BA on head |
| 28 | C | BA CRs not selected for PIR |
| 29 | C | Abbreviated version (issue) of BA CRs not represented |
| 33 | C | No apparent NRC followup of 96, 98 PCAQs |
| 42 | C | Aware of BA on RPV head and didn't inspect |
| 43 | C | SRI knew of flange leaks |
| 45 | C | Neither of Residents received training on BA |
| 49 | C | DRP BC and former SRI (only) knew of flange leaks |
| 50 | C | Flange leaks not pursued |
| 65 | C | 1992 precursor insp no perf issues/no F/U of BA control prog |
| 95 | C | RIII saw RC-2 as a material control problem -vs- boric acid prog prob |
| 105 | C | NRC doesn't review owner's group input |
| 116 | C | BC/SRI/RI didn't observe RPV head videos |

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| | | |
|---|---|---|
| 128 | C | RI reviewed CR/equivalent in some manner |
| 130a | C | BA buildup not a safety issue by NRC |
| 155 | C | NUREG 6245 (CRDM crack) NRC not aware of B&W content |
| 169 | C | NRC 1993 SER addressed RVH nozzle cracks as not immed. safety issue |
| 197a | C | Risk significance of BA on RPV head is low NRC |
| 222 | C | NRC staff believed dry boric acid not corrosive |
| 226 | C | Postulated breech of RPV not considered |
| 227 | C | Industry and NRC were managing BA issue by leakage |
| 228 | C | NRC doesn't review all of the industry guidance on BA |
| 229 | C | NUMARC 1993 and NEI 1995 letters - GL88-05 will let the industry locate leaks before a real problem is identified |
| 233 | C | 1993 2.206 Greenpeace response - cracking issues |
| | **d** | **NRC failed to establish adequate requirements.** |
| 139 | D | Enforcement history doesn't equate with OE |
| 140 | D | Lack of enforcement for RCS leakage |
| 141 | D | Enforcement/NRR trying to figure out what should be done for RCS leakage |
| 142 | D | 1997 SONGS nozzle cracking cited Maintenance Rule |
| 143 | D | NRC response (policy) not consistent - SONGS/Oconee |
| 145 | D | No ASME Code requirement (of inspections/RCS leakage) |
| 146 | D | Code didn't require insulation to be removed for inspections |
| 147 | D | VC Summer had RCS leakage and didn't report it |
| 149 | D | Several "no color" issues design -vs- performance |
| 205 | D | 12/31/2001 was an arbitrary date for shutdown; basis question |
| 219 | D | Code did not require insulation removal (VT-2) |
| 243 | D | Enhanced visual meant for circ, not axial cracking (vol NDE) |
| 245 | D | ANO a through wall CRDM crack is a statistical certainty |
| 253 | D | Several CRDM nozzles cracked, some through wall NRC |
| | **e** | **NRC inspection and assessment programs failed to adequately assess DB performance** |
| 1 | E | Region viewed Davis-Besse as good performer. |
| 8 | E | PM inspection approach changing. |
| 21 | E | One PPR summary listed CAC cleaning |
| 25 | E | PI&R/40500 did not review area |
| 26 | E | PI&R samples began 1999 for 3/01 (gap issue) |
| 27 | E | Gap of 2 ½ years between CA inspections (missed events) |
| 39 | E | Inspection reports don't list all docs reviewed (6 years of reports) |
| 44 | E | RC-2 escalated enforcement didn't require closeout inspection |

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| | | |
|---|---|---|
| 46 | E | Inspection on RM didn't provide any performance issues |
| 47 | E | Neither the old/new insp programs found/discussed RM issues |
| 51 | E | Former SRI did not perform any followup on leak hunt plan RFO12 |
| 55 | E | NRC prompted Lic regarding RCS leak on MUIA described as positive in IR |
| 56 | E | DB PIR viewed as the best by RIII |
| 60 | E | 62001 cancelled in 10/01 |
| 67 | E | NRC audit of BAC didn't include Rx head/instr |
| 71 | E | Not enough hours in ROP for (BA) inspections didn't allow some inspection |
| 72 | E | Verbatim comp. W/insp procedures (not there/can't do) |
| 73 | E | Can't go outside of the baseline unless you have a >green finding |
| 74 | E | Baseline inspection doesn't include structures or passive components |
| 75 | E | ROP eliminated good practice of containment closeout insp |
| 82 | E | ISI didn't look at A600 |
| 85 | E | RIII issued SL3 for RC-2; would be a green finding today |
| 86 | E | RC-2 event would have not gone beyond baseline |
| 96 | E | RIII had differing views for RC-2 followup |
| 100 | E | Some interviews indicated RI/SRI not as visible in ctmt and CR post ROP |
| 106 | E | MC2515 AppD doesn't provide thorough guidance for review of CR |
| 115 | E | NRR PM limited visits to DB |
| 121 | E | NRC thought that the licensee was rigorous in their leak hunt |
| 122 | E | RI thought the RPV head was 100% cleaned |
| 127 | E | ALARA insp didn't show that CAC cleaning was largest dose |
| 204 | E | No process for verifying licensee info for continued operation |
| 206 | E | PM don't conduct site visits |
| 207 | E | Some PM haven't visited plants |
| 208 | E | PM didn't review commitment change reports |
| 211 | E | NRR not implementing procedures |
| 212 | E | LA/SE for RM for RCS leakage didn't consider DB OE |
| 213 | E | NRR perception was that DB was a good performer |
| 224 | E | Risk informed process didn't alert the NRC to a potential risk |
| 225 | E | Over-reliance on risk information -vs- deterministic |
| 252 | E | 62001 intended for 16 hours every other outage |
| 270 | E | Kerosene burner not eval'd for ctmt |
| 271 | E | No oper eval for the clogging of CACs |
| 272 | E | Non-conservative assumption of LOCA steam clean CACs |
| 278 | E | Lic didn't complete all RC2 CAs |
| 290 | E | No doc'd eval of CAC clogging |

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| | | |
|---|---|---|
| 293 | E | All PI's green prior to event |
| 294 | E | Inadequate temp mod safety eval on code safety seat leakage |
| | **f** | **NRC staff resources & experience** |
| 2 | F | NRC staffing level not filled for all positions |
| 3 | F | One year period (1999), only one Resident on site. |
| 4 | F | Project Engineer - two 8-month gaps. |
| 5 | F | Resident inspectors not certified. |
| 6 | F | SRI position delayed in filling. |
| 7 | F | High Project Manager turnover rate (9 PMs in 10-years) |
| 9 | F | Limited commercial nuclear experience RI |
| 10 | F | Resident inspector had a materials background |
| 11 | F | SRI experience with only DB containment |
| 40 | F | Low number of inspection hours compared to other RIII sites (½ in 1999) |
| 53 | F | 1998 events diverted inspection efforts re:BA issues |
| 57 | F | Resident not aware of OOS logs |
| 63 | F | PE little time at DB (1997&1999) |
| 92 | F | Between PE coverage gaps, 8 months/3months coverage/8 months |
| 93 | F | BC had Clinton 0350 plant coincident w/DB |
| 110 | F | RIII resources decreasing |
| 111 | F | RIII insp contractor support poor |
| 112 | F | RIII too many competing priorities which detract from insp. |
| 131 | F | No 1245 cert requirements for BA corrossion |
| 158 | F | Contract support after '98 report dried up (staff decreased/# reports decreased) |
| 167 | F | AEOD had 80+ FTE; now 2.5 FTE for OE (RES) |
| 215 | F | No guidance for background training for PM |
| | **g** | **NRC failed to communicate critical information** |
| 17 | G | Other than DD-DRP; others didn't recollect CAC/RM issues |
| 94 | G | NRR inspection branch has no feedback form on Plant status time as addressed by RI interview |
| 101 | G | Procedure for RIII morning meeting isn't followed |
| 102 | G | RIII not conducive to info exchange |
| 103 | G | Senior RIII Managers not the audience for the morning meeting |
| 117 | G | RI not aware of FeO on CAC |
| 126 | G | RA didn't know about BA on head |
| 136 | G | IRO didn't participate to follow MD8.3 for AIT determination |
| 137 | G | NRR/RIII didn't follow MD8.3 |
| 203 | G | Deferral of DB shutdown not well documented |

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| | | |
|---|---|---|
| 216 | G | Interviews indicate that NRR and RIII communications poor/nonexistent |
| 291 | G | Late arrival of calcs for crack propagation |
| | **h** | **NRC failed to adequately assess relevant operating experience** |
| 157 | H | OE review in NRC not performed by independent or long review |
| 163 | H | NRR is reactive for short-term/current event |
| 166 | H | NRC generic issue program takes too long/too hard...use bulletins instead |
| 170 | H | Foreign OE was reviewed by NRC |
| 171 | H | 70 LERs about Boric Acid leaks |
| 172 | H | Axial cracks known from early 1970s , Circumferential from 1980s |
| 173 | H | LIC-503 references some wrong procedures in RES |
| 183 | H | No clear process for using foreign experience |
| 184 | H | French corrective actions were documented but never used |
| 185 | H | Mind set that French CA was an over reaction from NRC perspective; aggressive inspection was reponse |
| 186 | H | NRC never asked the French why they were replacing their RPV heads |
| 188 | H | Swedish, Spanish, Japanese, French have replaced heads |
| 193 | H | NRR staff not aware BA leakage OE |
| 209 | H | RES procedure 2i not used/not known by staff |
| 210 | H | Cracking/BA corrosion not considered by either NRR or RES to be a GI (MD 6.4) |
| 230 | H | GI program relies on user needs before taking action |
| 231 | H | Preferred process flow for OE: nothing; IN; BU; GL; GI (all else fails) |
| 297 | H | No NRC review of submittals/reports (ISI) |
| | **i** | **Licensee failed to implement owners group guidance.** |
| 202a | I | DB was the only B&W licensee that didn't do inspections (ref GL97-01) LIC |
| 236 | I | No BWOG verification for implementation of GL97-01 |
| 237 | I | No BWOG verification for implementation of GL88-05 |
| 247 | I | No tracking system to ensure that industry guidance was included in site guidance/ processes. |
| 261 | I | 93 B&W report flange leaks need to be eval first |
| 289 | I | BA corr handbook shows CAC/RM as evidence of RCS leak |
| | **j** | **Licensee failed to understand implications of BA corrosion.** |
| 32 | J | BA on head was a "routine" CR |
| 36 | J | 1996 CR on BA stayed open for ~2 years |
| 130 | J | BA buildup not a safety issue by DB |
| 155a | J | NUREG 6245 (CRDM crack) Industry not aware of B&W content |
| 178 | J | BACC person also had many other duties as a system engineer |
| 194 | J | BWOG rep didn't know the significance of Brown/red tinted BA buildup |

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| | | |
|---|---|---|
| 197 | J | Risk significance of BA on RPV head is low LIC |
| 217 | J | BA procedure not "QA" until 5/02 |
| 234 | J | Mod on service structure delays |
| 239 | J | Ombudsman & cleaning statements |
| 274 | J | PRG staff didn't viewed head tapes |
| 275 | J | Former VP viewed as-found, not after tape until Fall2001 |
| 282 | J | Only staff involved in head cleaning |
| 296 | J | PCAQ 96-0551 was one of ten oldest CRs before it was resolved |
| 298 | J | Multiple people involved in head cleaning w/o raising issues |
| 299 | J | Same job done by Framatome at other plants? |
| | **k** | **Licensee failed to resolve chronic RCS leakage.** |
| 24 | K | Routine CAC cleaning |
| 108 | K | CAC/RM fouling may have been the impetus for TS change in #107 |
| 109 | K | HEPA filter for RM may defeat the purpose of the RM workarounds -vs- fix the problem |
| 119 | K | Licensee not rigorous in finding RCS leaks |
| 120 | K | Licensee deleted Mode 3 walkdown for BA |
| 235 | K | CAC fouling and ALARA |
| 244 | K | DB entered a 6-hour shutdown TS situation because of RM Problems with BA |
| 248 | K | Ability to differentiate between flange leakage/ head penetration leakage |
| 255 | K | Until RFO13 lic had flange leaks |
| 262 | K | Heavy boron buildup on CACs |
| 268 | K | No systematic leak search for 12RFO |
| 269 | K | Deleted mode 3 walkdown |
| 273 | K | Long history of thermowell leaks |
| 280 | K | Triage plan for flange leak / didn't fix all flange leaks |
| 287 | K | 100% NDE 5.7Rem estimate <past head cleaning |
| 300 | K | Relief valve mod masking other leaks in 1998-99 time frame |
| | **l** | **Licensee failed to properly implement an adequate BACC program.** |
| 34 | L | 1996 CR explicit on the BA concern |
| 35 | L | ~50% of RPV head cleaned in 1996 |
| 70 | L | BAC checklists not kept/tracked/trended |
| 123 | L | None of the RPV head cleanings were 100% |
| 124 | L | Lost control of video tapes |
| 144 | L | BAC procedure wasn't followed |
| 251 | L | Appropriate cleaning methods for RPV head (water-vs-vacuum) |
| 254 | L | #4, 5 nozzles still had boron on them following cleaning |

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| | | |
|---|---|---|
| 260 | L | Couldn't complete head cleaning due to schedule pressure |
| 263 | L | Potential CRDM G9 leak was crack, not dispositioned |
| 266 | L | RCS sys engr: scaffold was removed without permission |
| 267 | L | RP considered head cleaning as decon, so no procedure |
| 279 | L | No deviations from RFO12 WO to clean RPV head |
| 281 | L | RCS sys engineer upset that they head wouldn't be totally cleaned |
| 283 | L | Index of head tapes incomplete |
| 284 | L | 4/17/00 head mislabeled as as-left |
| 285 | L | Head inspection tape not documented as to what was actually inspected - QA zip |
| | **m** | **Licensee failed to learned from internal/external OE.** |
| 68 | M | DB's BACC didn't include Rx head/instr until 5/02 |
| 151 | M | Oconee OE not evaluated at DB until 5/2002 |
| 152 | M | OE in US...Boric acid leaks. #1 area was CRDM, DB considered not significant |
| 153 | M | 100% B&W units had RCS PB leakage |
| 162 | M | DB OE procedure doesn't require NRC LER review |
| 168 | M | 100% CE had RCS pressure boundary leakage |
| 174 | M | 45% of Oconee cracking (CRDM) appears in the same quadrant as DB leakage problems |
| 175 | M | CE plants dominated RCS instrumentation nozzle leakage (10 of 13 leaks) |
| 176 | M | Average # of operating years prior to CRDM leakage ~22 years |
| 179 | M | Foreign experience would indicate that the "crack" model is flawed |
| 191 | M | NUREG/CR 6245 recommended enhanced online leakage detection systems (NRC?) |
| 192 | M | Calvert Cliffs LER indicated wet boron vs dry |
| 198 | M | Annealing nozzle temps were different than required |
| 200 | M | 3 LERS involved pzr material wastage |
| 218 | M | B&W recommended the service structure mod |
| 276 | M | Two precursor BA events...RC2, SG line |
| | **n** | **Licensee staff resources & experience** |
| 159 | N | 40-50% DB staff decrease over 10 years |
| 246 | N | Multiple job assignments depending on cycle (outage, ops, EP) |
| 277 | N | Lack of system engineer continuity |
| | **o** | **Licensee failed to communicate critical information** |
| 150 | O | Lic Response to BU2001-01 contained many inaccurate info /response |
| 177 - | O | Many licensee (DB) staff thought that a whole head inspection/cleaning was done |
| 264 | O | Lic Managers / staff knew of head cleaning %, lower staff thought that head was 100% cleaned |
| 265 | O | Lic managers said they showed NRC the as-found video tapes of the head |

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| | w | Awaiting additional review |
|---|---|---|
| 31 | W | We rely on lic to give NRC correct info |
| 37 | W | Long time to close out CRs |
| 54 | W | CCW event (10/98) resulted in Spec Insp |
| 64 | W | Limited entries into containment by NRC |
| 78 | W | 1997 NOP/NOT walkdown by NRC found no leaks |
| 81 | W | 1992 uptake event insp closeout, then 1998 uptake occurred |
| 84 | W | RIII factored BU2001-01 commitments as part of Baseline prog. |
| 89 | W | RIII invoked MC0350 w/o DB having met criteria |
| 90 | W | DB event risk not completed yet |
| 91 | W | SDP has taken 5 months |
| 113 | W | Only 1 SES manager inside containment since 1996 |
| 114 | W | Limited senior manager visits to DB |
| 134 | W | No NRC review of Ombudsman files |
| 138 | W | Range of opinions on whether an AIT/IIT/SI |
| 180 | W | Story differences between what DB told NRC -vs- what NRC thought they were told about BA by DB |
| 181 | W | NRR not told about red/brown BA buildup until after the DB event |
| 182 | W | After the RPV head videos were shown to the NRC, a vote was taken: 3 for shutdown; remaining (10-13) voted to allow continued operation |
| 196 | W | Conclusion in the EPRI guidebook not supported |
| 199 | W | "Boric acid on the head is good." |
| 214 | W | INPO ratings declined from 1 to 2 within the last few years |
| 220 | W | DB experienced no insulation deflections caused by BA buildup on the head |
| 221 | W | License Renewal report (GALL) addresses acceptability of GL88-05 for aging management to be updated to reflect lessons learned |
| 223 | W | Extending the inspection for DB was largely based on the belief that a "strong" VT-2 inspection was done at DB |
| 238 | W | O&M/capital budget and actuals have decreased over last 10-years |
| 240 | W | BU2001-01 documentation responses by DB not accurate |
| 241 | W | 12-16 people at DB reviewed DB response to BU2001-01 |
| 242a | W | MNSA - repair of joints, boric acid issues NRC |
| 242 | W | MNSA - repair of joints, boric acid issues LIC |
| 249 | W | Bonus correlation with operations |
| 256 | W | VP - No NDE tools by 12/31 |
| 257 | W | VP -Ops last know |
| 259 | W | Lic did not eval use of power washer |

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| | | |
|---|---|---|
| 292 | W | QA group didn't have a problem with BAC RFO12 report shows positive finding |
| 295 | W | NRC questioned how the licensee was able to do a visual insp. given that boron was left on the head |
| | x | **Deleted** |
| 30 | X | CRs reviewed for PI&R ~7000 |
| 48 | X | SSDI insp in 2000 indicated performance was worse than expected |
| 69 | X | 40500 insp in '98 indicated that commitment tracking NG |
| 79 | X | SRI 97-98 no recollection of flange leaks |
| 80 | X | Former SRI works for FENOC |
| 99 | X | PI&R doesn't allow independent look by inspectors |
| 104 | X | PI&R team leader thought that the short form description of CR was adequate |
| 135 | X | RIII inspector was told that DB was SALP 1 didn't take findings seriously (arrogant) |
| 148 | X | Nothing in allegation area was relevant to BA/cracking issues |
| 195 | X | BACC person indicated that the next major nuclear accident will be caused by BAC |
| 250 | X | Basis for dose estimates for RPV head inspections |
| 258 | X | Eng received closed door talking to for CR initiation |
| 286 | X | Lic is doing an assessment of BU2001-01 submittal |
| 288 | X | No VT-2 insp during RFO12 per RCS sys eng |