Date	Time	Source	Description
5/30/80		M80-1188	DB responds to IN 80-27. Inspection showed no corrosion of the studs at DB.
6/17/80		IN 80-27	DB receives IN 80-27 Degradation of Reactor Coolant Pumps (Fort Calhoun 1 reactor coolant pump casing flange studs).
3/16/82		IN 82-06	DB receives IN 82-06 Failure of Steam Generator Primary Side Manway Closure Studs.
6/10/82		IEB 82-02	DB receives IEB 82-02 Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants (Fort Calhoun RCP closure studs and Maine Yankee steam generator primary manway closure studs).
8/4/82		Serial 1-284	DB responds to IEB 82-02.
10/22/82		Log A82-1651C	DB responds to IN 82-06. Closed to IEB 82-02.
1/9/87		IN 86-108	DB receives IN 86-108 Degradation of Reactor Coolant System Pressure Boundary Resulting from Boric Acid Corrosion (ANO-1 HPI nozzle thermal sleeve)
4/3/87		NED-87-20156	DB responds to IN 86-108.
4/24/87		IN 86-108 Sup1	DB receives IN 86-108 Supplement 1 Degradation of Reactor Coolant System Pressure Boundary Resulting from Boric Acid Corrosion (Turkey Point 4 reactor vessel head)
11/30/87		IN 86-108 Sup2	DB receives IN 86-108 Supplement 2 Degradation of Reactor Coolant System Pressure Boundary Resulting from Boric Acid Corrosion (Salem 2 reactor vessel head and San Onofre 2 valve packing)
12/22/87		NES-87-10423	DB responds to IN 86-108, Supplement 1 and 2. RCS leak management policy incorporates the need to identify, if possible, where leakage is and evaluate any boric acid corrosion concerns.
3/10/88		Cycle History	Begin 5RFO
3/30/88		Log 2532	DB receives GL 88-05 Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants.
5/27/88		Serial 1527	DB provides response to GL 88-05. No commitment to inspect and remove boric acid from the head.
12/15/88		Cycle History	End 5RFO
6/26/89		Serial 1-885	DB provides revised response to GL 88-05. No commitment to inspect and remove boric acid from the head.
1/26/90		Cycle History	Begin 6RFO
2/8/90		Log 3166	NRC audit of DB boric acid corrosion prevention program has resulted in an acceptable finding and considered the issue closed.
2/21/90		PCAQR 90-0120	During an inspection of the CRDM to nozzle flange interface (RV Head) a chunk of boron was noticed laying on the floor of the CRDM stator cooling plenum (ductwork) in front of the "I" air flow hole in the RV head service structure shroud. This chunk was cone shaped, approximately 5 inches from the tip to base of the cone, and approximately 8 inches in diameter. It was loose on the inside floor of the plenum and was left as is (there were smaller chunks which may have fallen off). Flange leakers were noticed during this inspection.
3/5/90		IN 90-10	DB receives IN 90-10 Primary Water Stress Corrosion Cracking (PWSCC) of Inconel 600.
3/9/90		PCAQR 90-0120	A video inspection of the CRD flanges was performed by B&W and reviewed by System Engineering to determine which CRD flanges show evidence of leakage and therefore should be re-worked during 6RFO. Based on the inspection, the following locations identify which CRD flanges should be reworked: F2, C5, L2, D8, C9, F8, L6, H8, O7, O9, L12, H14, E3, D4, F4, G7, N8, K11, H12, G13, F14, and N10. Proposed remedial action for PCAQR 90-0120 is to disassemble, clean, and reassemble each of the leaking CRD flanges using new gaskets. Additionally, a PM is already scheduled to inspect the service structure vent fan internals to ensure there is no damage/potential damage from any boric acid that may have reached the fans. Also, a video inspection of the reactor vessel head (below the insulation) will be done during 6R to ensure there is no leakage onto the head itself.

3/19/90		RFA 90-0510	RFA noted an inspection of the reactor vessel head revealed several areas where boric acid has leaked down from the CRD flanges and accumulated on the head (PCAQR 90-0120). The head is carbon steel and is therefore susceptible to degradation from the boric acid. The RFA requests Design prepare a modification package to install access holes in the service structure to allow cleaning and subsequent inspection. Sketches from B&W were included, as B&W was currently doing the analysis to do this work for Crystal River.
3/20/90		PCAQR 90-0221	CRDM F2 vessel flange has slight erosion in outer gasket groove. CRDM F4 vessel flange has 2 small irregularities on face.
3/21/90		MOD 90-0012	MOD 90-0012 initiated to install multiple access ports with closure plates in the closure head to permit cleaning and inspection of the reactor head. Boric acid has leaked from the CRD flanges and has accumulated on the reactor head. The reactor head is carbon steel and therefore is susceptible to degradation.
4/10/90		PCAQR 90-0120	Inspection of fan internals found no boron deposits in either fan. Based on additional inspections of CRD flanges during re-work of the originally identified flanges, K11 was not re-worked because it was not leaking and G3 was added to the ones to be re-worked because it appeared to be leaking. Inspection of the reactor vessel closure head below the insulation found three areas with boron deposits. The areas were located near reactor vessel stud holes 3, 34, and 45. These areas were accessible through the service structure mounting flange drain holes. The three areas were cleaned by RC personnel using wire brushes and a vacuum cleaner. After cleaning, these areas were visually re-inspected by Systems Engineering personnel to be sure the deposits were removed and there were no surface irregularities from the deposits. The deposits were removed and no surface irregularities were found. Root cause was determined to be inadequate CRDM flange gasket performance (a known problem). In future outages, when leaking CRDM flanges are found, replace the gaskets with the new
7/3/90		Cycle History	End 6RFO
9/9/90		RFM 90-0012	Telcon between DB and Crystal River to find out what Crystal River's experience was during their recent refueling outage when they modified their service structure. Nine 12" diameter holes were installed equally spaced around the service structure. Took two 10 hour shifts to machine the access holes and bolt holes. Takes ~30 minutes to install covers. No problems encountered with installation. Boron was found on the head. Removed boron with scrapers and vacuum cleaner. Half a wheelbarrow of boron removed. No degradation of the reactor vessel head or insulation support steel was found. Crystal River has done many visual and video inspections of the reactor vessel head through the mouse holes. In 1981 or 1982, they tried to clean the head through the mouse holes using long handled tools. The cleaning was unsuccessful due to the poor access and the inability to see the entire head. Overall, the modification was worthwhile.
Dec-90		EPRI NP-7094	EPRI issued EPRI NP-7094, Literature Survey of Cracking of Alloy 600 Penetrations in PWRs (EPRI Project 2006-18) to document the problem of stress corrosion cracking of alloy 600 penetrations in PWR pressurizers and to identify corrective actions that utilities can take to address this issue. Lists CRDM Nozzles as an Alloy 600 component.
12/28/90		PCAQR 90-0120	Maintenance Procedure DB-MM-09023, Routine CRDM Maintenance, revised to reflect the use of the new gasket parts and require the use of the ultrasonic measurement techniques.
1/9/91		EXT-91-00088 B&WOG Materials Committee Report 51-1201160-00	DB received B&WOG Materials Committee Report 51-1201160-00, "Alloy 600 SCC Susceptibility: Scoping Study of Components at Crystal River 3" dated November 1990. This document summarizes the completed research regarding Alloy 600 components used at a target B&WOG plant (Crystal River 3). Based on this information, a susceptibility rating is given, along with recommendations for ensuring RCS integrity through inspections of appropriate components. The applications of Alloy 600 at other B&W operating plants were identified and the applicability of the target plant evaluation to these other operating plants is confirmed. This summary is to be used by the B&WOG Materials Committee in assessing the probable potential for future SCC occurrences with Alloy 600 components at B&W operating plants. The report notes that it is expected that the locations having the highest temperatures in the RCS would be the most susceptible to SCC. The reactor vessel upper head is identified as one area where attention should be given. The report recommends the control rod housing bodies be inspected, if possible, at an opportune time. The report includes a table of Alloy 600 locations at Davis-Besse, whic

1/21/91		NED-91-20038	Memo summarizes the evaluation of PWSCC of Inconel 600 material, reviews industry information available on PWSCC of Inconel 600 (IN 90-10, SER 2-90), and provides recommended actions related to Davis-Besse. The B&W Owners Group Materials Committee sponsored a task to identify all Inconel 600 locations and assess the relative potential of those locations for PWSCC. The 69 CRDM tubes are included in this list. B&W further recommended that those items marked with an asterisk be scheduled for visual inspection (the CRDM tubes were marked with an asterisk). This recommendation was made with the assumption that all materials are essentially equivalent in microstructure, therefore the priority should be on components in elevated temperature service. However, until a complete accounting of the specific materials is made, it is not known if a more sensitive material heat is in a lower temperature service condition. Recommendations: (1) Visually inspect those components in 7RFO. Visual inspection can only determine if a through-wall crack is present. The incipient crack will not be identified. Additionally, the ANO-1 experience showed that as the plant was cooling down from Mode 3, the nozzle stop
1/24/91		NEO-91-00067	DB responds to IN 90-10.
8/31/91		Cycle History	Begin 7RFO
9/12/91		PCAQR 91-0353	An inspection of the reactor vessel head flange noted an excessive amount of boron on the reactor vessel head. One boron flow location ran along the curvature of the head and stopped on the head flange by the closure bolts. Identified leakage on several CRDM flanges and reworked several flanges.
9/23/91		EPRI TR-103345	At Bugey III (France), during the mandatory 10 years hydrotest required by French regulations, a leak was detected at CRDM penetration situated on the periphery of the vessel head.
10/8/91		EPRI TR-100852	1991 EPRI Workshop on PWSCC of non-steam generator Alloy 600 materials in PWR plants was held. Provided extensive coverage of PWSCC in Pressurizer Instrument nozzles, Pressurizer Heater Sleeves, Steam Generator Drain Lines, and Hot Leg Instrument Nozzles. The B&WOG provided an update on B&W activities, including the Materials Committee scoping study of Crystal River 3 and the areas of concern, including the Control Rod Housing Bodies. Davis-Besse did not send a representative.
11/7/91		Cycle History	End 7RFO
2/24/92		PCAQR 92-0072	Visual inspection of the CAC coil face revealed that a white (assumed to be boric acid) build up exists all around it. Cooler performance over the last two weeks had decreased.
3/25/92		PCAQR 92-0139	During filter changeout of RE 4597AA boron was found on the old filter. Boron has been found in the radiation monitors before due to a pressurizer vent valve leak.
5/14/92		NED-92-20101	DB engineer issued trip report summary of B&WOG Materials Committee meeting presentation (Work on PWSCC of Alloy 600 Nozzles and Components) with NRC staff held on 5/12/92. Presentation included information on Bugey III CRD nozzle leakage. The NRC seemed to be satisfied with the actions being taken by the B&WOG on the PWSCC of Alloy 600 nozzles and components issue. Regarding the emerging CRDM cracking issue, NRC concurred with the B&WOG that, based on the available information on the French CRDM nozzle inspection, there is no immediate safety concern due to the fact that the identified cracks are axial in nature. The following were suggested by NRC during the above meeting: To meet with NRC during 1st quarter 1993 to cover the following on the CRDM nozzle cracking vis-a-vis B&WOG plants: 1. 50.59 Safety Evaluation to provide sufficient assurance that the issue is not a safety concern. 2. CRDM nozzle inspection strategy/criteria 3. Evaluation of leak detection/monitoring system The decision was made to track these B&WOG items on TERMS to track the B&WOG response to these questions, so TERMS Commitment A16892 was created.
6/19/92		MOD 90-0012	MOD 90-0012 Void Request submitted. Modification no longer required. This modification was initiated to allow easier access for inspection of CRDM flanges and for cleaning of the reactor vessel head. Current inspection techniques using high powered cameras preclude the need for inspection ports. Additionally, cleaning of the reactor vessel head during last 2 outages was completed successfully without requiring access ports.

7/7/92		MOD 90-0012	MOD 90-0012 Void Request rejected by PRG meeting. Mod has been removed from the void process and placed in unbudgeted 9R MODs until after 8R and will be re-evaluated.
8/10/92		B&W Trip Report Alloy 600 Program 1992 Deliverables	Trip Report 92-020 documents the results of the EPRI Alloy 600 Coordinating Group Meeting Concerning CRDM Nozzle Cracking on Behalf of the B&WOG. The meeting was attended by representatives from each of the NSS vendors, several utilities, and Dominion Engineering. Recent work on CRDM nozzle cracking in the Owners Groups was presented and discussed. One important item discussed was that no one is expected to inspect CRDM nozzles during the 1992 fall outage schedule unless required by the NRC. The NRC position is expected to be finalized at a WOG meeting on 8/18/92.
8/17/92		B&W Trip Report Alloy 600 Program 1992 Deliverables	Trip Report 92-022 documents the results of the Westinghouse Owners Group. NRC Meeting Concerning PWSCC of Alloy 600 CRDM Nozzle Cracking. The meeting was attended by representatives from each of the NSS vendors, each of the Owners Groups, several utilities, and consultants. The NRC provided an overview of Alloy 600 PWSCC and their view on CRDM nozzle inspections. The staff views the CRDM nozzle cracking as a minimal safety impact, but that prudence suggests an orderly inspection program. The NRC is concerned that the potential for cracking exists in a large number of nozzles and that there is concern with boric acid corrosion of the reactor vessel head. The staff presentation slides indicated the following inspection, evaluation, and repair guidance: (1) For PWR plants refueling before Spring 1993, visual inspection during leakage test, with special attention to CRD penetrations at periphery locations and visual inspections (VT-2 quality) remote or direct to inspect the inside surface of the spare CRD penetrations; (2) For PWR plants refueling after Spring 1993,
9/10/92		MOD 90-0012	MOD 90-0012 Void Request submitted. Modification no longer required. This modification was initiated to allow easier access for inspection of CRDM flanges and for cleaning of the reactor vessel head. Current inspection techniques using high powered cameras preclude the need for inspection ports. Additionally, cleaning of the reactor vessel head during last 3 outages was completed successfully without requiring access ports.
10/2/92		B&W 51-1218440-00	B&W issued Alloy 600 PWSCC Time-To-Failure Models, proprietary document 51-1218440-00, presenting a PWSCC susceptibility ranking model and six failure models that have been proposed within the nuclear industry to model time-to-failure of Alloy 600 components as a result of PWSCC. A ranking of 4, 4-5, or 5 indicates a high (50%) probability of failure within 20 years; a ranking of 3 or 3-4 indicates a medium (50%) probability of failure within 40 years; and a ranking of 2-3 or below indicates a low probability of failure within 40 years. All failures to date have been ranked between 4 and 5 with this ranking model. The report concluded that, although none of the models addressed in this document accurately predicts any of the existing industry failures of Alloy 600 components, there is a good base of ideas to improve the time-to-failure model. It is recommended that this model be further refined based on industry and research data that may become available.
12/1/92		EPRI TR-103345	1992 EPRI Workshop on PWSCC of Alloy 600 in PWRs is held. See Proceedings in EPRI TR-103345. Workshop sessions focused on current concerns about PWSCC of alloy 600 penetrations in the reactor pressure vessel head in several plants, including Bugey 3 plant in France. Framatome presented a summary of stress analysis, concluding the stresses are highest in the outermost nozzles for Westinghouse plants. B&W presented a summary of stress analysis, concluding the stresses are essentially the same for central and outer row nozzles. Another report indicated filed experience shows cracks have occurred predominantly in peripheral row nozzles, consistent with the results of finite element stress analyses.
12/18/92		B&W 51-1219143-00	B&W issued CRDM Nozzle Characterization, proprietary document 51-1219143-00, regarding PWSCC of CRDM nozzles. The fabrication and manufacturing processes for B&W-design CRDM nozzles and French-design CRDM nozzles are discussed. A comparison of this information is made, and the similarities and differences are noted. It is determined that B&W-design nozzles are not significantly different than the French-design nozzles, and, thus, are not immune to PWSCC.
3/1/93		Cycle History	Begin 8RFO

3/8/93		PCAQR 93-0098	Head vent flange on SG 1-2 has evidence of boric acid corrosion
3/19/93		PCAQR 93-0132	Reactor coolant found leaking from CRDM flanges. Several CRDM flanges identified and reworked.
3/30/93		PCAQR 93-0175	Boric acid residue on service water piping-connections to the CACs.
3/31/93		TERMS A16892	TERMS update memo from V. Kumar: An "Ad Hoc Advisory Committee (AHAC)" headed by NUMARC with members from B&WOG, WOG, CEOG, and EPRI has been formed and working to formulate the needed CRDM nozzle inspection criteria and coordinate the relevant industry activities. AHAC met with NRC on 3/3/93 during which WOG Safety Evaluation was discussed. WOG has decided to include an evaluation of the OD initiated cracking, seen by the French, in the Safety Evaluation. NRC will not review the WOG Safety Evaluation (nor any other OG'S) until the form of payment has been determined. The following actions for NUMARC resulted: (a) Notify NRC ASAP a schedule for Safety Evaluation submittals and the basis for waiting for a leak before break scenario; and (b) Determination of acceptance criteria for issuance to NRC. Contingent upon inspection/repair/and mitigation technique availability three US utilities are likely to perform CRDM nozzle inspection in 1994.
		Video	CRDM Inspection (8RFO)
4/30/93		Cycle History	End 8RFO
5/26/93		EXT-93-02137	B&WOG Materials Committee issues Letter OG-1214 to NRC (NRR). At the 3/3/93 meeting between NRC and NUMARC AHAC for Alloy 600 CRDM Nozzle Cracking, the B&WOG committed to perform an evaluation of the safety significance of potential nozzle cracking. Safety Evaluation attached which summarizes the stress analysis, crack growth analysis, leakage assessment, and wastage assessment for flaws initiating on the inner surface of the CRDM nozzles. The overall conclusion reached in this evaluation is that the potential for cracking in the CRDM nozzles does no present a near-term safety concern. Crack growth analysis predicts that once a crack initiates, it will take a minimum of six years for the flow to propagate through-wall. If a crack propagates through-wall above the nozzle-to-head weld, leakage is anticipated and a large amount of boric acid deposition is expected. Once boric acid deposition occurs from leakage, wastage of the reactor vessel head can initiate. It is predicted that wastage of the reactor vessel head can continue for six years before ASME code limits are exceeded.
5/26/93		BAW-10190P EXT-93-02136	B&WOG Materials Committee issues BAW-10190P, "Safety Evaluation for B&W Design Reactor Vessel Head CRDM Nozzle Cracking" via letter OG-1217. The B&WOG utilities have developed plans to visually inspect the CRDM nozzle area to determine if through-wall cracking has occurred. At each of the B&WOG utilities' plants, a walkdown inspection of the RV head has been implemented in response to NRC GL 88-05. Enhanced visual inspection of the CRDM nozzle areas has also been incorporated. If any leaks or boric acid crystal deposits are located during the inspection of the RV head area, an evaluation of the source of the leak and the extent of any wastage will be completed. A conservative wastage volume of 1.07 cubic inches per year is believed to be possible from a leaking CRDM nozzle. The postulated corrosion wastage within and in the vicinity of the RV head penetration from a leaking CRDM nozzle would not affect safe operation of the plant for at least six years. Since inspections of the head area (for leakage and boric acid deposits) are performed during each outage, it is unlikely that a leak will go undetected for a period of six years.
5/28/93		EXT-93-02156	B&WOG issued Letter ESC-407 to Davis-Besse (V. Kumar) forwarding copy of BAW-10190P Safety Evaluation.
7/7/93		EXT-93-02596	B&WOG Materials Committee issues the non-proprietary B&WOG Report BAW-10190, "Safety Evaluation for B&W Design Reactor Vessel Head CRDM Nozzle Cracking" dated June 1993 via letter OG-1236. Report includes a stress analysis of B&W Design CRDM nozzles, crack growth analysis, leakage assessment, and wastage assessment.
7/19/93		SER 20-93	Intergranular Stress Corrosion Cracking in Control Rod Drive Mechanism Penetrations
9/27/93		MOD 90-0012	MOD 90-0012 Void Request approved. Current inspection techniques using high powered cameras preclude the need for inspection ports, additionally, cleaning of the reactor vessel head during last 3 outages was completed successfully without requiring access ports.

11/19/93		NRC Letter PCAQR 94-0295	NRC letter dated 11/19/93 to NUMARC attaches safety evaluation on NUMARC's submittal of 6/16/93 addressing Alloy 600 CRDM PWR vessel head penetration cracking issue. The staff concluded there is no immediate safety concern for cracking of the CRDM penetrations. This finding is predicated on the performance of the visual inspection activities requested in GL 88-05. The NRC stated in its evaluation that "the staff believes it is prudent for NUMARC to consider the implementation of an enhanced leakage detection method for detecting small leaks during plant operation. Since there is no commitment made to the NRC by DB or by the B&WOG to perform any other inspections than those already being performed to satisfy the requirements of GL88-05, TERMS Commitment A16892 is CLOSED.
Dec-93		EPRI TR-103104	EPRI issued EPRI TR-103104 (Project 3223-02), "Residual Stress Measurements on Alloy 600 Pressurizer Nozzle and Heater Sleeve Weld Mockups," to quantify residual stresses in prototypical instrument nozzles and heater sleeves of Alloy 600 before and after welding.
12/14/93		BAW-10190P EXT-93-04330	B&WOG Materials Committee issues BAW-10190P Addendum 1, "External Circumferential Crack Growth Analysis for B&W Design Reactor Vessel Head CRDM Nozzles" via letter OG-1322. Report provides an evaluation of external circumferential crack growth, gross leak-before-break, and CRDM nozzle straightening. Potential for circumferential cracking presents no immediate safety concern to the operation of B&W designed vessels. The overall conclusions presented in B&W-10190P remain unchanged with this addendum. The current GL88-05 walkdown visual inspections or the reactor vessel head areas provide adequate leak detection capability.
3/17/94		PCAQR 94-0295	TERMS commitment A16892 requires a visual inspection of the reactor vessel head every refueling to determine the potential for CRDM nozzle cracking in support of B&W safety evaluation to the NRC discussing CRDM nozzle cracking. This safety evaluation requires a visual inspection be performed to either no cracking exists or to confirm its presence. Regulatory Affairs and Design Engineering believe that although the enhanced visual inspection is not a commitment made to the NRC, it is recommended that it be done.
4/29/94		PCAQR 94-0295	Since the enhanced visual inspection of the reactor vessel head is not a commitment to the NRC and due to the fact that no cases of head cracks have been identified in the U.S. and boric acid leakage through the CRDM nozzle flanges is low, Plant Engineering doesn't think there is significant risk of a crack being present. In addition, the inspection methods currently available to us are not highly reliable. Therefore, he does not believe that it is necessary to perform the inspection at this time.
5/27/94		MOD 94-0025	Initiated MOD 94-0025 to install service structure inspection openings. Reasons for the modification include ongoing industry concern involving corrosion of the Inconel 600 CRDM reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of the modification. Inspections of the reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as a follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head. Cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. Installation of these inspection openings would allow a thorough inspection and cleaning of the head. All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification.
7/18/94		MOD 94-0025	MOD 94-0025 approved for budget and design approval.
9/12/94		IN 94-63	DB receives IN 94-63 Boric Acid Corrosion of Charging Pump Casing Caused by Cladding Cracks (North Anna 1 high head safety injection pump casing)
10/1/94		Cycle History	Begin 9RFO
10/10/94		PCAQR 94-0912	CRDM leakage video inspection identified the following CRDM flanges as leaking M3, K3, G5, M11, O11, E13, K5, and M9.
10/17/94		PCAQR 94-0974	Scratches present on and across seating surface of CRDM nozzle flange at core location G-5.
10/17/94		PCAQR 94-0975	Half moon gouge found on CRDM nozzle flange at core location M-3.
11/14/94		Cycle History	End 9RFO

11/15/94		EPRI TR-105406	1994 EPRI Workshop on PWSCC of Alloy 600 in PWRs is held. See Proceedings in EPRI TR-105406 Parts 1 and 2. Workshop summarized the field experience associated with PWSCC of alloy 600 CRDM nozzles, reviewed the current status of inspection, repair, and remedial methods as well as strategic planning models, and discussed stress analysis results as well as PWSCC initiation and growth in Alloy 600. Workshop was attended by domestic and overseas utilities, PWR vendors, research laboratories, and consulting organizations. Three U.S. plants have inspected CRDM nozzles; no cracks were found in one plant and only minor cracking was observed on one nozzle in each of the other two plants. Results of inspections in France, Sweden, Spain, Belgium, Japan, and Brazil revealed a trend toward earlier axial cracking in plants with forged nozzles as opposed to those made from rolled bars or extrusions. Other factors such as surface finishing could also play a role. See also EPRI Report TR-103696. Davis-Besse did not send a representative.
12/20/94		PCAQR 94-1338	10CFR21 report on sensitized alloy 600 material that may be susceptible to an increased rate of intergranular attack (IGA) due to increased sulfur levels in the RCS.
1/5/95		IN 86-108 Sup3	DB receives IN 86-108 Supplement 3 Degradation of Reactor Coolant System Pressure Boundary Resulting from Boric Acid Corrosion (Calvert Cliff 1 incore instrumentation flange and TMI 1 pressurizer spray valve body-to-body gasket)
1/18/95		QAD-95-70017	DB responds to IN 94-63 (MU and HPI pumps have solid stainless steel casings).
3/7/95		DBPRC Meeting History	MOD 94-0025 (cycle 11R) tabled at the request of plant engineering manager at PRG. Twenty five percent of B&W plants do not have additional inspection openings at this time. Plant engineering manager is waiting for additional information prior to concluding that the $250K cost is worth the increased degree of assurance.
3/8/95		QAD-95-70078	DB responds to IN 86-108, Supplement 3. NG-EN-00324 Boric Acid Corrosion Control discusses boric corrosion, actions to take if identified, and methods to minimize or prevent corrosion.
4/4/95		DBPRC Meeting History	MOD 94-0025 (cycle 11R) decision tabled at PRG. The cycle 11R MOD was presented for inclusion in the scope of 10RFO.
6/15/95		DBPRC Meeting History	MOD 94-0025 discussion at WSC. Open PRC issue being held open pending further industry information/investigation concerning actual benefit.
2/29/96		QAD-96-70113 SER 20-93	DB responds to SER 20-93. Efforts via the B&WOG BAW-10190P Safety Evaluation for B&W Design Reactor Vessel Head Control Rod Drive Mechanism Nozzle Cracking credited.
3/12/96		IN 96-11	DB receives IN 96-11 Ingress of Demineralizer Resins Increases Potential for Stress Corrosion Cracking of Control Rod Drive Mechanism Penetrations
4/8/96		Cycle History	Begin 10RFO
4/19/96		Video	Weep Hole Video Inspection
4/21/96		PCAQR 96-0551	Video tape of CRDM nozzle inspection shows several patches of boric acid accumulation on the RV head. CRDM nozzle 67 (core location P-6) shows rust or brown stained boron at the bottom of the nozzle at the head. The head area in the vicinity also has rust or brown stained boron accumulation. The inspection of the CRDM nozzle flange did not show any sign of leakage which indicates leakage is from a previous operating cycle.
4/30/96		PCAQR 96-0650	RCP 1-1 pump casing stud leakage
5/1/96		Video	Davis-Besse Weep Hole Cleaning Nozzle 67
5/8/96		NPE-96-00260	White paper that deals with control rod drive nozzle cracking with distribution to the Senior Management Team. Focus on crack aspects (doesn't address wastage issue).
6/1/96		Cycle History	End 10RFO
7/16/96		NEN-96-10179	DB responds to IN 96-11. RCS water chemistry sampled every day of the week for sulfate intrusion and action will be taken immediately if RCS sulfate concentration exceeds allowable limits.
7/16/96		PCAQR 96-1018	IN 96-032 Augmented Examination of Reactor Vessel.

1/7/97		DBPRC Meeting History	MOD 94-0025 approved schedule change to 12RFO at PRG. No further industry information was available since it was last reviewed. Comments made include no work done to allow an opportunity to obtain indications of boron leaks, PCAQ last outage on nozzle boron leakage, and PCAQ not answered as there was a problem in quantifying the amount of boron.
2/20/97		DBPRC Meeting History	MOD 94-0025 approved schedule change to 12RFO at WSC due to no further industry information available since last reviewed by WSC.
4/7/97		GL 97-01	DB receives GL 97-01 Degradation of CRDM/CEDM Nozzle and other Vessel Closure Head Penetrations.
4/23/97		Serial 2439a	DB provides initial response to GL 97-01. DB plans to submit the requested information by July 29, 1997.
7/25/97			B&WOG submitted its integrated program and Topical BAW-2301 regarding GL 97-01.
7/28/97		Serial 2472	DB provides response to GL 97-01. Topical Report BAW-2301 provides the justification and schedule for an integrated vessel head penetrations inspection program representative of the B&WOG plants. Inspections will be performed based on the B&WOG plants determined to be most susceptible to CRDM nozzle cracking. The Topical Report concludes that there have been no conductivity excursions indicative of resin intrusions at any of the B&WOG plants.
9/3/97		DBPRC Meeting History	MOD 94-0025 re-classified from capital to O&M at WSC. Design Basis Engineering Manager explained that section of the reactor vessel head cannot be inspected and or cleaned. This poses a risk to system maintenance efforts.
Dec-97		BAW-10190P	B&WOG Materials Committee issues BAW-10190P Addendum 2
4/10/98		Cycle History	Begin 11RFO
4/17/98		Video	CRDM Inspection
4/18/98		PCAQR 98-0649	Inspection of the reactor vessel head identified existence of boric acid residue. There were indications that CRDM D-10 had past leakage.
4/25/98		PCAQR 98-0767	Video inspection where the CRDM nozzles enter the reactor vessel head indicate several "fist" size clumps of boric acid.
5/2/98		PCR 98-1124	Recommends adding B&WOG Materials Committee Report Number 51-1229638-00, "Boric Acid Corrosion Data Summary and Evaluation" as a Reference in NG-EN-00324, Boric Acid Corrosion Control, for determining boric acid corrosion rates.
5/4/98		Video	Reactor Head Cleaning
5/19/98		DB-PF-03065	Test RC01L and RC02 (completed test date 5/26/98 1200) identified no leakage for CRD nozzles.
5/23/98		Cycle History	End 11RFO
6/24/98			DB tornado event
9/1/98		CR 1998-0020	RC-2 body-to-bonnet nut #2 found missing (boric acid corrosion because nut not stainless steel).
9/1/98		DBPRC Meeting History	MOD 94-0025 recommended for approval to 13RFO at PRG. There is less than 50% accessibility to the reactor vessel head, which does not allow for complete inspection or cleaning of potential boric acid deposits. The MOD resolves PCAQ 96-0551, one of ten oldest open PCAQs. The MOD also addresses plant life extension issues. It is desired to implement the MOD in 12RFO to establish a baseline of potential past boric acid corrosion on the reactor head. On-going industry concern of acid leakage from CRDM reactor vessel head nozzles could be better assessed. The committee concurred that the MOD should be approved but discussed various issues related to scheduling the modification in 12RFO.
9/9/98		CR 1998-0020	RC-2 body-to-bonnet nut #4 found missing (boric acid corrosion because nut not stainless steel).
9/17/98		DBATS	MOD 94-0025 budget approval.

9/17/98		DBPRC Meeting History	MOD 94-0025 recommended for approval to 13RFO at WSC. There is less than 50% accessibility to the reactor vessel head, which does not allow for complete inspection or cleaning. The MOD resolves PCAQ 96-0551, one of ten oldest open PCAQs. The MOD will address ongoing industry concern of boric acid leakage from CRDM reactor vessel head nozzles. Plant manager (confirm) asked what was the basis for the 13RFO schedule. Response included issue has been around since 1994, there are no failures in the industry, Engineers voice they were comfortable with the 13RFO schedule, RCS leakage source is known and it is not on the head, we have inspected any boric acid sitting on the head, boric acid has been in a dry condition and corrosion attack is not an issue, delay in schedule to 13RFO does not add risk, however aging is a factor and the MOD should be addressed.
9/17/98		Log 5339	NRC request additional information (RAI) to GL 97-01.
10/17/98		CR 1998-0020	Remains of a carbon steel nut found when the RC body-to-bonnet location 4 removed.
10/17/98		TM 98-0036	TM 98-0036 installed to functionally remove the pressurizer code safety valve rupture disks and severed the drain line to the quench tank.
10/19/98		CR 1998-1895	Performance of DB-OP-03006 showed a CTMT normal sump leakage in excess of 1 gpm. A portion of the leakage is suspected to be originating from the pressurizer code safety valve leakage was originally channeled to the pressurizer quench tank and classified as identified leakage. Implementation of a TM that severed the discharge rupture disks and disconnected the drain lines, allowed the leakage to escape into the CTMT atmosphere.
11/12/98		PCAQR 98-1980	CAC plenum pressure decreasing for 3.0"H2O in early September to 2.0"H2O.
11/19/98		CAC SPB	CAC #2 & #3 cleaning
11/19/98		Serial 2569	DB provides RAI response to GL 97-01. Draft responses to the RAI questions are being developed by the Owners Groups, EPRI, NSSS vendors, and contractors and integrated into a single response by NEI.
11/30/98		CAC SPB	CAC #2 & #3 cleaning
12/10/98		CAC SPB	CAC #2 & #3 cleaning
12/21/98		CAC SPB	CAC #2 & #3 cleaning
12/29/98		CAC SPB	CAC #2 & #3 cleaning
1/8/99		CAC SPB	CAC #2 & #3 cleaning
1/14/99		Serial 2581	DB provides RAI response to GL 97-01. NEI submitted response on 12/11/98. Enclosure 3 to the NEI provides the NRC RAI items applicable to the B&WOG members.
1/18/99		CAC SPB	CAC #2 & #3 cleaning
1/27/99		CAC SPB	CAC #2 & #3 cleaning
2/5/99		CAC SPB	CAC #2 & #3 cleaning
2/17/99		CAC SPB	CAC #2 & #3 cleaning
2/25/99		CAC SPB	CAC #2 & #3 cleaning
3/4/99		CAC SPB	CAC #2 & #3 cleaning
3/6/99		PCAQR 99-0372	Receiving computer point R297 CTMT Rad RE4597AA/AB high.
3/15/99		CAC SPB	CAC #2 & #3 cleaning
3/25/99		CAC SPB	CAC #2 & #3 cleaning
3/30/99		CR 1998-0020	Final RC2 packing leak management root cause report issued.
4/1/99		CAC SPB	CAC #2 & #3 cleaning
4/10/99		CAC SPB	CAC #2 & #3 cleaning
4/21/99		CAC SPB	CAC #2 & #3 cleaning
4/24/99		Mid-Cycle Log	Begin Cycle 12 mid-cycle outage

4/27/99		PCR 98-1124	Incorporated PCR 98-1124 (see 5/2/98) to include B&WOG Materials Committee Report Number 51-1229638-00, "Boric Acid Corrosion Data Summary and Evaluation" as a Reference in NG-EN-00324, Boric Acid Corrosion Control, for determining boric acid corrosion rates.
		Video	CRDM flange inspection (cycle 12 mid-cycle)
5/6/99		TM 98-0036	TM 98-0036 removed.
5/8/99		DBATS	MOD 97-0085 modified the pressurizer code safety valve nozzle implemented
5/10/99		CR 1999-0861	RE4597AA sample lines full of water. This is a reoccurring condition when starting up after an outage.
5/10/99		Mid-Cycle Log	End Cycle 12 mid-cycle outage
5/13/99		RE SPB	RE4597BA low flow
5/15/99		RE SPB	RE597AA low flow
5/15/99		RE SPB	RE4597BA low flow
5/17/99		RE SPB	RE597AA low flow
5/17/99		RE SPB	RE4597BA low flow
5/19/99		RE SPB	RE597AA Filter Brown, Boron Crystals
5/20/99		RE SPB	RE597AA Filter Brown, some Boron
5/20/99		RE SPB	RE4597BA Filter Brown, Significant Boron Crystals
5/21/99		RE SPB	RE597AA Filter Brown, Significant Boron
5/22/99		RE SPB	RE4597BA Filter Brown, Boron Crystals
5/23/99		CR 1999-0928	Increased frequency that the particulate and charcoal filters for RE4597BA are being changed. The particulate filter had a significant amount of boron crystals while the charcoal filter had very little.
5/23/99		RE SPB	RE597AA Filter Yellow, Boron Crystals
5/23/99		RE SPB	RE4597BA Filter Brown, Significant Boron Crystals, Low flow
5/24/99		RE SPB	RE4597BA Filter Brown, Boron Crystals
5/25/99		RE SPB	RE597AA Filter Brown, Boron Crystals
5/26/99		RE SPB	RE597AA Filter Yellow
5/26/99		RE SPB	RE4597BA Filter Brown, Some Boron Crystals
5/27/99		RE SPB	RE4597BA Filter Yellow
5/28/99		RE SPB	RE597AA Filter Brown, little Boron Crystals
5/30/99		CR 1999-0510	RE4597BA low flow alarm caused by boron buildup on the particulate filter.
5/30/99		RE SPB	RE4597AA Filter Brown, Boron Crystals, low flow
5/30/99		RE SPB	RE4597BA Filter Brown, no Boron Crystals
6/1/99		RE SPB	RE4597BA Filter Brown, no Boron Crystals
6/2/99		RE SPB	RE597AA Filter Brown, no Boron
6/2/99		RE SPB	RE597AA Filter White, No Boron (replacement for containment sample)
6/3/99		RE SPB	RE597AA Filter Brown, Boron Crystals on Filter, low flow
6/3/99		RE SPB	RE4597BA Filter Brown, minimal boron Crystals
6/5/99		RE SPB	RE4597BA Filter Brown, Boron Crystals, low flow
6/6/99		RE SPB	RE597AA Filter Brown, minimal Boron Crystals
6/7/99		RE SPB	RE4597BA Filter Brown, Boron Crystals, low flow
6/8/99		RE SPB	RE597AA Filter Brown, Boron Crystals, low flow
6/9/99		CAC SPB	CAC #1, 2, and 3 cleaning
6/9/99		RE SPB	RE4597BA Filter Brown, minimal boron crystals
6/10/99		RE SPB	RE4597BA Filter Brown, some Boron Crystals

6/12/99		RE SPB	RE597AA Filter Brown, no Boron, low flow
6/12/99		RE SPB	RE597AA Filter Yellow, no Boron, Chemistry Sample
6/12/99		RE SPB	RE4597BA Filter Brown, some Boron Crystals, low flow
6/13/99		RE SPB	RE597AA Filter Brown, no Boron
6/14/99		RE SPB	RE597AA Filter Yellow, no Boron
6/15/99		RE SPB	RE4597BA Filter Brown, some Boron Crystals
6/22/99		RE SPB	RE4597BA Filter Brown
6/23/99		RE SPB	RE597AA Filter Brown, low flow
6/23/99		RE SPB	RE4597BA Filter Yellow, no Boron
6/28/99		RE SPB	RE597AA low flow
6/28/99		RE SPB	RE4597BA Filter brown, boron crystals, low flow
6/29/99		RE SPB	RE4597BA Filter brown, boron crystals, low flow
6/30/99		RE SPB	RE597AA Filter Brown, low flow
6/30/99		RE SPB	RE4597BA Filter brown, boron crystals, low flow
7/1/99		CAC SPB	CAC #1, 2, and 3 cleaning
7/1/99		RE SPB	RE4597BA Filter brown, no boron, low flow
7/2/99		RE SPB	RE4597BA Filter brown, no boron, low flow
7/2/99		RE SPB	RE4597BA Filter Brown
7/3/99		RE SPB	RE597AA Filter Brown
7/3/99		RE SPB	RE597AA Filter Brown
7/3/99		RE SPB	RE4597BA Filter Brown
7/4/99		RE SPB	RE4597BA Filter Brown
7/4/99		RE SPB	RE4597BA Filter Brown
7/5/99		RE SPB	RE597AA Filter Brown
7/5/99		RE SPB	RE4597BA Filter Brown
7/6/99		RE SPB	RE597AA Filter Brown
7/9/99		RE SPB	RE597AA Filter Brown
7/9/99		RE SPB	RE4597BA Filter Brown
7/11/99		RE SPB	RE4597BA Filter Brown, Black Particulate
7/12/99		RE SPB	RE4597BA Filter Brown
7/14/99		RE SPB	RE597AA Filter light brown
7/14/99		RE SPB	RE4597BA Filter Brown, Boron Crystals, Maintenance replacement
7/15/99		RE SPB	RE4597BA Boron
7/16/99		RE SPB	RE4597BA Filter Brown
7/19/99		RE SPB	RE597AA Filter brown
7/20/99		RE SPB	RE597AA Filter brown, Maintenance replacement
7/21/99		RE SPB	RE4597BA Filter Brown
7/22/99		RE SPB	RE597AA Filter brown
7/22/99		RE SPB	RE4597BA Filter Brown
7/24/99		RE SPB	RE597AA Filter Orange, erratic flow
7/24/99		RE SPB	RE4597BA Filter Tan
7/26/99		RE SPB	RE597AA Filter Brown, Incorrect Orientation
7/26/99		RE SPB	RE597AA Filter Yellow, Maintenance replacement

7/27/99		RE SPB	RE4597BA Filter Brown, Correct Orientation
7/28/99		RE SPB	RE597AA Filter Brown, Correct Orientation
7/29/99		RE SPB	RE597AA Filter Orange, erratic flow
7/29/99		RE SPB	RE4597BA Filter Brown, Correct Orientation
7/30/99		CR 1999-1300	Several filters from the CTMT radiation monitors and a sample from the White Bird used for CTMT pressure releases were sent to Southwest Research Institute for analysis. The RE4597BA filter from 7/3/99 contained primarily iron oxide (10-100 microns with some smaller particles down to 1 micron). There was also some measurable chlorine. The iron oxide particles had a granular appearance indicating the source is from corrosion. The RE4597BA filter from 7/9/99 also had three darker spots on it which were analyzed to contain potassium and chlorine. A sample from the White Bird also contained iron oxide. No boron was detected, however, there would have to be a large quantity to detect it.
7/31/99		RE SPB	RE597AA Filter Brown
7/31/99		RE SPB	RE4597BA Filter Brown
8/1/99		RE SPB	RE597AA Filter Brown
8/1/99		RE SPB	RE597AA Filter Yellow, Replaced prior to calibration
8/1/99		RE SPB	RE4597BA Filter Brown
8/10/99		CR 1999-1300	TM 99-0022 installed four portable HEPA filtration units in containment (WO 99-005029-000) to reduce the particulate concentration.
10/1/99		NG-EN-00324 CATS	NG-EN-00324 Boric Acid Corrosion Control revision 2 became effective. Revision 2 implements corrective actions from the RC2 event.
10/8/99		WO 99-005029-001	TM 99-0022 removed.
11/5/99		Project #10294-033	Memorandum on analysis by Southwest Research Institute regarding RE4597 filters (CR 99-1300). The fineness of the iron oxide particulate, would indicate it probably was formed from a very small steam leak. The particulate was likely originally ferrous hydroxide in small condensed droplets of steam and was oxidized to ferric oxide in the air before it settled on the filters. The steam leak is likely at a high elevation in containment as it is reported there is a uniform settlement of iron oxide particulate on horizontal surfaces. The presence of concentrated chemicals contained in the containment sump indicates the particulate came from a steam source. The presence of copper on the radiation monitor sample filters may indicate there is a water chemistry imbalance problem. The iron oxide does not appear to be coming from general corrosion of a bare metal surface in containment or from steam impingement on a metal surface.
12/6/99		Log 5585	NRC staff's assessment identifies since the additional volumetric inspections performed to date have confirmed that PWSCC is not an immediate safety concern with respect to the structural integrity of vessel head penetrations in domestic PWRs, and since we have approved the integrated program for implementation, we concluded that the integrated program provides an acceptable basis for evaluating your vessel head penetrations.
4/1/00		12R Log	Begin 12RFO
4/6/00		RWP 2000-5132	RWP written as a tool to control radiological exposure for cleaning boric acid from Rx head. Estimate 30 man hours and 100 mRem.
4/6/00		CR 2000-0782	Inspection of the reactor flange indicated boric acid leakage from the weep holes. The leakage is re/brown in color. The leakage is worst on the east side weep holes. Five leaking CRDs were identified at locations F10, D10, C11, F8, and G9. CRDM F10 (Nozzle 11) and D10 (Nozzle 31) a believed to be the major source of leakage. Boric acid corrosion control inspection checklist completed. Detailed inspection recommended because new leakage from head which was not evident during 11RFO.
4/6/00		Video	Davis-Besse 12RFO CRDM Leak Inspection (flanges and/or head?)

4/7/00		RCS SPB	There are no boron deposits on the vertical faces of the flange of G9 (nozzle 3) drive. The bottom of the flange of G9 drive is inaccessible for inspection due to the boron buildup on the head insulation, not allowing full camera insertion. Since the boron is evident only under the flange and not on the vertical surfaces, a high probability exists that G9 is a leaking CRD.
4/9/00		12R Log	Rx vessel head removed.
4/12/00		12R Log	Video inspection of reactor head
4/12/00		12R Log	Boric acid on reactor head is an Outage Issue
4/12/00		RCS SPB	Today should be called "Boron removal day". Decon people broke to the inside of the Rx head with crowbars and reported solid rock hard deposits of boron on the head. Recommendation at this time continue to remove as much boron as possible, evaluate head condition, contact B&WOG to justify not removing all the deposits, DO NOT recommend use of water or steam better to justify leaving boron on head.
4/16/00		CR 2000-0994	The RV head CRDM nozzle at location F10 has a large pit in the outer gasket groove with 2 small pits on the inner gasket.
4/16/00		CR 2000-0995	The RV head CRDM nozzle flange at location D10 has extensive pitting across the outer gasket groove. The inner gasket groove also has pitting.
4/17/00		CR 2000-1037	Inspection of the reactor head indicated accumulation of boron in the area of the CRDM nozzle penetrations through the head. Boron accumulation was also discovered on the top of the thermal insulation under the flanges. There are no boron deposits on the vertical faces of the flange of G9 drive (nozzle 3). The bottom of the flange of G9 drive is inaccessible for inspection due to the boron buildup on the reactor head insulation, not allowing full camera insertion. Since the boron is evident only under the flange and not on the vertical surfaces, there is a high probability that G9 is a leaking CRD.
4/17/00		Video	Davis-Besse 12RFO
4/18/00		12R Log	Last time boric acid on reactor head is an Outage Issue
4/20/00		12R Log	Head decon is complete
4/25/00		RWP 2000-5132	Total dose is 224 mRem. Total estimated dose was changed to 600 mRem.
4/30/00		12R Log	Reactor vessel head is on the reactor vessel
5/13/00		DB-PF-03065	Test RC001H (completed test date 6/5/00 1550), test type identified as code case N-498-1, inspect on top of service structure looking downward, identifies no leakage for CRD nozzles, flanges, and assemblies.
5/18/00		12R Log	End 12RFO
6/2/00		CR 2000-1547	CAC plenum pressure decreasing following 12RFO.
6/30/00		CAC SPB	CAC #1, 2, and 3 cleaning
8/4/00		CAC SPB	CAC #1, 2, and 3 cleaning
9/7/00		DBPRC Meeting History	MOD 94-0025 recommended for deferral to 14RFO at PRG.
10/30/00		CAC SPB	CAC #1, 2, and 3 cleaning
12/21/00		CAC SPB	CAC #1, 2, and 3 cleaning
12/29/00		CR 2000-4138	The frequency for cleaning boron from the Containment Air Cooler (CAC's) fins has increased to an interval of approximately 8 weeks. If the rate continues to remain steady we will clean the CAC's approximately 6 times for 2001, this will expend 1.2 Person Rem in Dose for 2001. An evaluation or assessment team is recommended in reviewing the following items: Station Dose Impact, Potential Plant shut down conditions due CAC's, Potential sources of boron suspension in containment, CAC cleaning (more effective methods), CAC monitoring frequency, 13 RFO Impact, and Boron Depletion.

1/5/01		CR 2001-0039	CAC plenum pressure experienced a step drop from 1.75"wg to 1.50"wg. The drop occurred from 0900 - 2000 on 1/4/01. Plenum pressure has been decreasing at a rate of 0.02"wg/day since the coils were cleaned on 12/21/00.
1/31/01		CAC SPB	CAC #1, 2, and 3 cleaning
2/2/01		DBPRC Meeting History	MOD 94-0025 RCS system engineer assigned as project manager.
2/14/01		CAC SPB	CAC #1, 2, and 3 cleaning
2/20/01		CR 2001-0487	Temperatures inside the CTMT (SG 1 area) for the year 2000 are seeing higher temperatures (10 to 40F) than the previous worst case years.
3/29/01		CR 2001-0890	Unidentified RCS leak rate varies daily by a much as 100% of the value. The data is not consistent and averaging method is presently used to determine the "true" value of the leak.
3/31/01		CAC SPB	CAC #1, 2, and 3 cleaning
Apr-01		51-5011603-01	B&WOG Materials Committee issue RV Head Nozzle and Weld Safety Assessment
4/23/01		CR 2001-1110	Chemistry changing the filters on RE4597BA more frequently due to low flow. All filters contained boron crystals.
4/27/01	0240	CR 2001-1110	Sample point for RE4597BA swapped from top of the east D-ring to personnel hatch area. Filter frequency reduced from once per 3 days to once per 14 days.
4/30/01		IN 2001-05	NRC issues IN 2001-05 Through-wall Circumferential Cracking of Reactor Pressure Vessel Head Control Rod Mechanism Penetration Nozzles at Oconee Nuclear Station, Unit 3
5/2/01		CR 2001-1191	A project plan with team members needs developed to prepare DB for a cracked CRDM J-groove weld. All three units at Oconee and one unit at ANO have inspected for and found cracked J-groove welds around their CRDM nozzles.
5/30/01		CAC SPB	CAC #1, 2, and 3 cleaning
5/30/01		CR 2001-1191	Individual assigned by Outage Management Team as 13RFO Project Manager responsible for activities associated with the inspection and repair of CRD nozzles.
7/11/01		RCS SPB	MRP Plant-Specific Data Verification Form updated at MRP request to QA data. Update included identifying previous inspections were partial and detected boric acid accumulation which was attributed to a CRDM flange leak.
7/23/01		CR 2001-1822	Frequency at which the RE4597BA filters are being changed out is increasing (frequency between 2 to 7 days). There were boric acid crystals on the particulate filter.
7/25/01		CR 2001-1857	RCS unidentified leakage has been about 0.125 to 0.145 gpm over the past few weeks. About every 7 to 10 days the unidentified leakage jumps to about 0.25 for a day or two and then returns to the average value.
8/3/01		Bulletin 2001-01	NRC issues Bulletin 2001-01 Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles.
8/7/01		CR 2001-2012	Regulatory Affairs initiates for NRC Bulletin 2001-01 Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles.
8/13/01		Bulletin 2001-01	DB receives NRC Bulletin 2001-01 Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles.
9/4/01		Serial 2731	DB responds to NRC Bulletin 2001-01.
10/17/01		Serial 2735	DB provided supplemental information response to NRC Bulletin 2001-01.
10/18/01		CR 2001-2769	CTMT wide range radiation element RE2387 spiked above the ALERT and high setpoints for approximately three days. There were no indications of this condition at the radiation monitor panel. Probable cause unknown.
10/19/01	0541	Unit Log	Generator output breakers open
10/20/01	1435	Chem Log	RE4597BA filter has abnormally dark brown discoloration.
10/20/01	0039	Unit Log	Generator output breakers closed
10/22/01		CR 2001-2795	RE4597BA alarming on saturation on high activity. The filter was change less than 19 hours previous to receiving the alarm. The frequency of filter changeout has been increasing for several months.
10/24/01		Log 5881	Drop-in visit with NRC regarding NRC Bulletin 2001-01.

10/25/01		CR 2001-2862	Calculated unidentified leakage for the RCS has indicated an increasing trend following the scheduled October 20 downpower.
10/27/01	1935	Chem Log	RE4597AA and RE4597BA filters had some boric acid crystals and it was rust color.
10/30/01		Serial 2741	DB provided responses to RAI concerning NRC Bulletin 2001-01.
10/30/01		Serial 2744	DB provided transmittal of results of RPV CRDM nozzle penetration examinations.
11/1/01		Serial 2745	DB provided transmittal of risk assessment of CRDM nozzle cracks.
11/2/01		CR 2001-2795	TM 01-0018 and 01-0019 installed removing the iodine filter cartridge from RE4597AA and BA and replacing it with a cartridge housing with its internal charcoal removed. The higher iodine level in CTMT atmosphere is a known condition.
11/3/01		CR 2001-2936	RE4597BA/BB monthly functional test could not be performed due to the inability to clear the particulate channel 2 alert and high alarms. The airborne activity in containment had increased as identified on the DAAS monitor following the containment down power on Oct 19 and Nov. 17. The unidentified leakage and normal sump had also been identified as an increase following the containment down powers. The reduction in power twice within 30 days and plant configuration had created an airborne transient in containment. The monitors in question functioned as designed and calibrated, alerting operations and RP to the increasing airborne activity in containment. As plant conditions have stabilized, the transient has abated and containment activity has equilibrated at a level below the set points.
11/8/01		Log 5885	Meeting with NRC to discuss NRC Bulletin 2001-01.
11/9/01		Log 5883	Meeting with NRC to discuss NRC Bulletin 2001-01.
11/10/01		CR 2001-3025	Moderator Temperature Coefficient test performed.
11/12/01		CR 2001-3025	Increase in RCS unidentified leakage that occurred over the weekend.
11/14/01		Log 5880	Meeting with NRC to discuss NRC Bulletin 2001-01.
11/15/01		Log 5879	Conference call with NRC to discuss NRC Bulleting 2001-01.
11/16/01	2038	Unit Log	Begin down power to 55%
11/17/01		CR 2001-2862	Walkdown CTMT "targets" to determine potential sources of unidentified RCS leakage failed to reveal a solid contributor.
11/19/01	1109	Unit Log	Return to 100% power
11/27/01		Log 5902	Meeting with NRC to discuss NRC Bulletin 2001-01.
11/28/01		Serial 2747	Meeting with NRC to discuss NRC Bulletin 2001-01.
11/30/01		Serial 2747	DB provided supplemental information in response to November 28 meeting regarding NRC Bulletin 2001-01.
12/13/01	2025	Unit Log	Commenced Tave reduction from 582F to 574F.
12/15/01	1245	Unit Log	Completed Tave reduction to 574F.
12/18/01		CR 2001-3411	Received equipment fail alarm the detector saturation while performing check source on RE4597BA channel 2.
Feb-02		CD	Davis-Besse Bare Head Video Inspection 13RFO
2/16/02		13R Log	Begin 13RFO
2/21/02		CR 2002-00685	As part of FTI's reactor vessel head work it was identified that there was loose boron 1-2" deep 75% around the circumference hard baked 3-4" thick on southeast quadrant (x-y axis). The large boron accumulation is in the same region as seen in 12RFO, but not as deep.
2/25/02		Video	Davis-Besse RFO13 Nozzle Visual Inspection Tape 1
2/25/02		Video	Davis-Besse RFO13 Nozzle Visual Inspection Tape 2
2/25/02		Video	Davis-Besse RFO13 Nozzle Visual Inspection Tape 3
2/25/02		Video	Davis-Besse RFO13 Nozzle Visual Inspection Tape 4
2/25/02		Video	Davis-Besse RFO13 Nozzle Visual Inspection Tape 5
2/26/02		CR 2002-00846	During performance of the video inspection of the reactor vessel head, more boron than expected was found on the top of the head.

2/27/02		CR 2002-00891	Ultrasonic testing (UT) performed on the #3 Control Rod Drive Mechanism (CRDM) nozzle (location G9) revealed indications of through wall axial flaws in the weld region. (See report for nozzle #3 per procedure 54-ISI-100-08, M.G. Hacker, dated 2/27/02) These indications represent potential leakage paths. Further characterization will be performed per the Reactor head nozzle action plan using the "top-down" UT tooling.
2/28/02		CR 2002-00932	There are indications of cracks on 5 nozzles: NOZZLE #1 (location H8): Axial cracks, some with pressure boundary leakage. NOZZLE #2 (location G7): Axial cracks, some with pressure boundary leakage, and a partial depth circumferential crack of approx. 30 degrees. (Note: this crack is sufficiently small that there was no risk of nozzle failure - stresses had substantial margin before reaching ASME code allowable values.) NOZZLE #3 (location G9): Axial cracks, some with pressure boundary leakage (CR 02-00891) NOZZLE #5 (location K7): Small axial cracks, predominantly below the weld, no leakage but requiring repair NOZZLE #47 (location D12): Small axial cracks, predominantly below the weld, no leakage but requiring repair Nozzles #1, 2, and 3 have leakage paths apparent on UT, which is corroborated by boric acid deposits on the reactor head. UT results with the "top-down" tool also provide some evidence of carbon steel base metal corrosion at nozzles 2 and 3. Nozzle 2 also exhibits channeling of the alloy 600 material to a maximum depth of approximately 0.050 inches to form part of the leakage flow path.
3/5/02		CR 2002-01053	While machining reactor vessel head nozzle number 3 the nozzle machining tool moved approximately 15 degrees. This is an unexpected equipment movement.
3/8/02		CR 2002-01128	Evaluation of bottom up ultrasonic test data in the area of reactor pressure vessel head nozzle number 3 shows significant degradation of the reactor vessel head pressure boundary.
3/8/02		Video	Post Inspection of Nozzles 1, 2, & 3
3/10/02		CD	Davis-Besse CRDM Nozzles
3/10/02		CR 2002-01159	During a video tape review by the Technical Services Director and the Design Engineering Manager, an indication was found on the newly machined face on the mid-span of the CRDM nozzle. The indication appears to be throughwall in the immediate vicinity of the base metal indications. Further review and potentially additional NDE is required. This CR will document that review.
3/14/02		Video	Root Cause Video of Nozzle #3 and Adjacent Nozzles
		CD	Davis-Besse Reactor Head Video Inspection 11RFO and 12RFO
		Video	Nozzle #2 Crevice Inspection Tape #10
		Video	12RFO Reactor Head Inspection

Service Structure	BA on Head	Head Inspection	BACC	CRDM Nozzles	CRDM Flanges	CAC	RE4597	CTMT Environment	Plant	RCS Leakage onto Head	Other RCS Leakage	ISI	PWSCC Alloy 600	
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