

Timeline for Cook Containment Issue

Date	Description	Ref.
Early 1970s'	D.C. Cook containment structures designed using uncertainty factors of up to 1.5 under various load combinations.	1
03/10/1973	Atomic Energy Commission approved Version 4 of the Westinghouse Transient Mass Distribution (TMD) computer code for D.C. Cook.	5
09/10/1973	Atomic Energy Commission approves the compressibility model portion of the Westinghouse TMD computer code for D.C. Cook.	5
1977 & 1978	Licensee personnel applied nodalized analytical methods to better define steam generator enclosure pressure load distribution. Uncertainty factors were not applied to the pressure parameter. Instead, an uncertainty factor of 1.5 was used in the calculation of the ultimate capacity for the steam generator enclosure.	1
02/1998	Licensee personnel discovered degraded grout in the Unit 2 containment that was only considered to be a cosmetic issue.	31
04/17/1998	Manual Chapter 0350 Restart Panel established for D.C. Cook.	37
10/20/1998	Unit 1 steam generator enclosure preliminary stress analysis results indicated that a postulated steamline break could result in stresses in excess of Code allowable stresses.	1
03/02/1999	Licensee personnel reported via 50.72 a condition outside the design bases of D.C. Cook Unit 1 based upon the steam generator enclosure stress analysis results.	1
04/01/1999	Licensee personnel submitted LER 50-315/1999-007-00 based upon the steam generator enclosure stress analysis results.	1
11/22/1999	Licensee personnel identified structural deficiencies while performing repairs to Unit 2 for the degraded grout identified in February 1998..	31, 41
03/2000	Licensee personnel identified concrete that had been removed from the top of some lower containment walls as well as other concerns regarding grout strength, cut rebar, and rebar location for D.C. Cook Unit 1 and Unit 2.	3
02/2000-03/2000	Manual Chapter 0350 Restart Panel monitored the investigation status of the containment wall structural deficiencies.	31
04/14/2000	Licensee personnel initiated a design change to add grout to the containment wall and completed calculations concluding that the wall would not fail under worst case postulated loading.	41
04/24/2000	Manual Chapter 0350 Restart Panel identified the containment wall structural issues as a D.C. Cook restart item.	31
04/27/2000	Westinghouse letter recommended at least a 40 percent pressure margin since pressure inputs in design calculations were not precise.	44
05/01/2000	Region III submitted TIA 2000-05 which requested NRR support in evaluating Unit 2 containment structural issues.	41
05/04/2000	A public meeting was held to discuss containment wall structural issues. The licensee's presentation included a "degraded but operable" approach for Unit 2 restart.	31
05/09/2000	Region III supplemented TIA 2000-05 to focus on determining an appropriate definition for operability of containment walls.	42

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05/29/2000	Licensee personnel determined that some Unit 2 containment internal concrete subcompartment structural elements did not meet the uncertainty factor of 1.5 as described in the UFSAR.	3, 21
06/01/2000	A public meeting was held to discuss the results of the D.C. Cook operability determination of containment structures. NRC disagreed on two details in the supporting calculations, but agreed with the licensee's overall technical approach.	9, 24, 44
06/05/2000	In a public Manual Chapter 0350 meeting, NRC agreed that the containment wall was degraded but operable by Generic Letter 91-18.	44
06/06/2000	Ross Landsman filed a Differing Professional View (DPV) concerning the restart of D.C. Cook.	2
06/07/2000	Region III memorandum directed the Manual Chapter 0350 Restart Panel to address non-conservatisms in the D.C. Cook containment wall operability evaluation.	46
06/09/2000	NRR issued their safety assessment of the D.C. Cook containment wall operability evaluation which included a response to TIA 2000-05. NRR concluded that D.C. Cook had provided a reasonable technical basis to demonstrate the operability of containment structures for Unit 2 restart.	10, 46
06/09/2000	Licensee personnel submitted evaluations assuring that the Unit 2 Control Rod Drive Missile Shield would perform its design function.	15
06/12/2000	NRC released a summary of the June 1, 2000 public meeting. The meeting minutes documented an NRR proposal to close the restart item associated with containment structural issues.	24
06/13/2000	NRC letter summarized the inspection and assessment activities for Unit 2 restart.	38
06/15/2000	NRR memorandum responded to the June 7, 2000 memorandum.	45
06/28/2000	Licensee personnel submitted LER 316/2000-003-00, "Containment Internal Concrete Structures Do Not Meet Design Load Margins." The licensee committed to determine the extent of condition, reconstitute critical calculations and repair structural elements for Unit 1 and to determine the course and schedule of corrective actions for both units prior to Unit 1 startup.	21
Early 07/2000	Cook Unit 2 restarted.	38
07/26/2000	NRR memorandum concluded that the use of GL 91-18 guidance could be applied to containment and the licensee may proceed with a plant startup under certain conditions. In response to additional questions from the TIA 2000-05 assessment issued on June 9, 2000, NRR also stated that the restart of D.C. Cook would be on the basis of safety, not the fact that a DPV was filed.	12
08/22/2000	Region III directed the Manual Chapter 0350 Restart Panel to establish a corrective action schedule for CEQ Fan Room Degraded Wall issues.	31
09/27/2000	NRC communicated to D.C. Cook at a public meeting its expectations regarding the resolution of non-conforming conditions as stated in GL 91-18 and requested a schedule for final resolution of containment wall issues.	16, 31
10/04/2000	Manual Chapter 0350 Restart Panel charter was revised.	37

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10/13/2000	NRC issued a summary of the September 27, 2000 public meeting.	25
10/15/2000	Licensee personnel submitted their initial response to the NRC regarding the course and schedule for long-term corrective and preventative actions to restore and maintain the design pressure load factors for the internal containment concrete structural elements for both units. No specific schedule was provided.	15, 19, 26, 31
10/16/2000 to 11/16/2000	NRR conducted an audit of the licensee's calculations that supported the Operability Determination Evaluations. NRR concluded that the licensee provided reasonable assurance and evidence that the Unit 1 Containment and Ice Condenser structures and Fan Accumulator Walls were capable of performing their intended function.	39
10/26/2000	Licensee personnel identified that similar conditions existed for Unit 1 containment structures during an extent-of-condition review prompted by the Unit 2 conditions.	19
11/03/2000	NRC letter acknowledged the licensee's efforts to resolve the containment structural issues. NRC requested further clarification on the licensee's time frame for completion of corrective actions to address the containment issue.	16
11/17/2000	NRR reviewed a licensee safety assessment which concluded the Unit 1 Control Rod Drive Missile Shield would perform its intended function. The technical basis provided was used to demonstrate the operability of the containment structures for restart of Unit 1 until a final evaluation was completed to demonstrate conformance with design basis requirements.	15, 17
11/18/2000	Licensee letter provided a detailed time frame for completion of corrective actions for containment structural issues.	18
11/20/2000	Licensee personnel submitted LER 316/2000-003-01, "Containment Internal Concrete Structures Do Not Meet Design Load Margins" for Unit 2. This revision incorporated Unit 1 containment structure information.	19
11/28/2000	NRC letter acknowledged the receipt of a November 18, 2000 D.C. Cook letter regarding the resolution for containment structural issues. NRC also emphasized that delays to the schedule would be justified in licensee's deficiency tracking system.	20
11/28/2000	NRR letter to the Manual Chapter 0350 Restart Panel recommended the closure of Restart Action Matrix (RAM) items 2.3 and 8.1. <ul style="list-style-type: none"> - <i>Item 2.3</i>, Evaluate Licensee Corrective Actions for the Containment Internal Structure Walls. - <i>Item 8.1</i>, Reconstitution of Assumptions and Methodology for TMD Sub-Compartment Analysis and Containment Sub-Compartment Structural Issues. 	39
11/28/2000	The Manual Chapter 0350 Restart Panel approved the closure of RAM items 2.3 and 8.1.	37
12/04/2000	Ross Landsman filed a Differing Professional Opinion for two DPV issues regarding D.C. Cook restart.	22
12/05/2000	Region III released the minutes of the two internal 0350 Restart Panel meetings held on November 28 and December 1, 2000.	37

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12/28/2000	NRC Inspection Report 2000-023 documented the inspection and evaluation of the D.C. Cook corrective actions for containment structural issues.	38, 43
02/12/2001	A D.C. Cook condition report identified that incorrect rebar yield strength had been used for missile shield calculations.	32
02/15/2001	A public meeting was held at D.C. Cook to discuss the status of the resolution of the containment structural issues.	6
02/21/2001	NRC letter to D.C. Cook provided a summary of the February 15, 2001 meeting held at D.C. Cook concerning containment structures and overall performance.	36
03/05/2001	Licensee transmitted the results of a third party engineering analysis of the missile shield margin to Region III.	30
04/02/2001	William Travers memorandum provided a response to the Landsman DPO. The DPO Panel identified inconsistencies in GL 91-18 and Manual Chapter 0350. The panel also identified issues related to the level of detail in the staff's assessment to support its determination of acceptability of the containment wall operability evaluation.	2, 27
05/09/2001	D.C. Cook letter notified the NRC of a revised containment structure project schedule and the extension of the commitment due date.	15, 40
05/17/2001	NRR memorandum provided the EDO with a plan and schedule as required by the April 2, 2001 memorandum and identified three actions NRR would address for the resolution of the subject WITS item.	35
06/11/2001	Licensee presented information related to the design and licensing basis of containment structures to NRR during a public meeting at HQ and concluded that all containment structures had adequate margins and complied with the design basis requirements.	1, 3, 4, 23
06/28/2001	NRC released a summary of the June 11, 2001 public meeting regarding containment structure issues.	23
09/2001	Licensee personnel completed walkdowns of containment structures in question and surveyed Unit 2 containment structures to obtain as-built measurements to be used in TMD calculations. Licensee personnel determined that the measurements used in the calculations prior to the walkdown were conservative and the results remained valid.	3, 15
11/2001	Licensee personnel finalized the TMD and structural calculations.	3
12/12/2001	Region III requested through TIA 2001-15 that NRR examine D.C. Cook analyses to ensure that Cook containment structures were restored to compliance with the design basis.	5
01/08/2002- 01/10/2002	NRR performed a design audit at D.C. Cook to review structural calculations and other documents of various concrete slabs and walls within the containment structures.	15
02/2002	NRC resident inspectors provided field measurements of openings in the reactor cavity. It was discovered that the licensee used larger dimensions than those dimensions measured by the resident inspectors as inputs for the TMD analysis.	15
04/04/2002	Licensee retracted LER 50-315/1999-007-00 based on revised stress analyses.	1

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04/04/2002	In response to TIA 2001-15, NRR (Plant Systems Branch) reviewed the D.C. Cook Containment Subcompartment Analysis and concluded that the analysis was consistent with Standard Review Plan guidelines.	5
04/17/2002	NRR (Mechanical & Civil Engineering Branch) reviewed D.C. Cook design records and identified two items of concern and recommended courses of action. These concerns were the use of a computer program (SOLVIA) that had not been reviewed by the NRC and the use of actual rebar yield strengths instead of a nominal code value.	11
05/31/2002	NRR issued a Request for Additional Information (RAI) to D.C. Cook to provide justification for increasing the actual containment opening dimensions used in the TMD calculations.	13
05/31/2002	NRR issued an RAI for detailed documentation validating the use of the SOLVIA code, which had not been previously reviewed by the NRC.	13
07/16/2002	Licensee personnel responded to the May 31, 2002 RAI in a letter which stated that following a design basis accident, ductwork would collapse, increasing the true opening dimensions.	14, 15, 33
07/16/2002	D.C. Cook provided benchmarking results between the SOLVIA code and the NRC approved ADINA software in response to the May 31, 2002 RAI.	15, 33
08/23/2002	D.C. Cook responded to NRR's RAI from May 31, 2002 in a letter which stated that calculation SD-010307-003 Rev. 1 had been revised using a nominal code rebar strength of 40 ksi (vs. the previous 47.7 ksi) and that the outcome remained acceptable	14, 15, 29, 34
11/18/2002	D.C. Cook letter provided the status of corrective actions related to demonstrating that Unit 1 and Unit 2 containment structures would meet design basis requirements.	15
12/12/2002	NRC letter concluded that the licensee's performance improvement initiatives had been sufficiently effective to support restart of Cook Unit 1 and the Manual Chapter 0350 Restart Action Matrix for Unit 1 was closed for all items necessary for restart.	38
01/13/2003	NRR memorandum concluded that the TMD inputs used in the 2001 analysis were consistent or more conservative than the original design and licensing basis TMD input values.	15
01/13/2003	NRR memorandum concluded that the SOLVIA code was acceptable for use at D.C. Cook.	15
01/13/2003	NRR memorandum concluded that the licensee had used acceptable analyses to confirm the original design and licensing basis of the containment structural components, with the exception of the Control Rod Drive Missile Shield. The licensee did not provide adequate justification to change the original design and licensing basis limits to allow the use of yield strength values for steel rebar obtained from certified material test reports for the Control Rod Drive Missile Shield.	15
03/21/2003	NRC letter requested that D.C. Cook detail their corrective action plans to restore the original design and licensing basis requirements for the Control Rod Drive Missile Shield.	14, 28

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04/24/2003	Licensee letter provided NRC the schedule for the corrective action to restore the original missile shield design and licensing basis margins and requirements through a license amendment.	7
11/12/2003	Licensee submitted a License Amendment Request to use measured material properties in structural calculations for the missile shield.	8

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References:

1. LER 315/1999-007-01, "The Divider Between Upper and Lower Containment Volumes May be Overstressed" - Retraction, J. Pollock to USNRC, dated 04/04/2002.
2. Memo, "Differing Professional Opinion Concerning the Startup of D.C. Cook, Units 1 and 2," W. Travers to R. Landsman, dated 04/02/2001.
3. Memo, "Task Interface Agreement (TIA 2001-15), Evaluation of D.C. Cook Containment Structure Conformance to Design Basis Requirements," G. Grant to L. Marsh, dated 12/12/2001.
4. Memo, "Forthcoming Meeting with Indiana Michigan Power Company," J. Stang to C. Craig, dated 05/25/2001.
5. Memo, "Plant System Branch Review of D.C. Cook Nuclear Plant Containment Subcompartment Analyses (TAC NOS. MB3603 and MB3604)," R. Hagar to R. Lakshminaras, dated 04/04/2002.
6. Notice of Significant Licensee Meeting, "To Discuss the Status of Long Term Resolution of Containment Structural Issues," dated 01/11/2001.
7. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2, Containment Structure Conformance to Design and Licensing Basis Requirements," J. Giessner to USNRC, dated 04/24/2003.
8. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2, Docket Nos. 50-315 and 50-316, License Amendment Request to Use Yield Strength Determined From Measured Material Properties for Reinforcing Bar in Structural Calculations for Control Rod Drive Missile Shield," M. Nazar to USNRC, dated 11/12/2003.
9. Memo, "Forthcoming Meeting with Indiana Michigan Power Company," J. Stang to C. Craig, dated 05/26/2000.
10. Memo, "Safety Assessment of Operability Evaluation of D.C. Cook Unit 2 Containment and Ice Condenser Structures, and Containment Divider Barrier Seal Assembly (TACs NO. M8977 and MA8786)," K. Manoly to C. Craig, dated 06/09/2000.
11. Memo, "Response to Task Interface Agreement (TIA 2001-15) for D.C. Cook, Units 1 and 2 (TAC NO. MB3603 and MB3604)," K. Manoly to R. Lakshminaras, dated 04/17/2002.
12. Memo, "D.C. Cook - Task Interface Agreement (TIA) 2000-05: Evaluation of the Operability Determination and Supporting Calculations for a Concrete Containment Wall (TAC NO. MA8786)," S. Black to J. Grobe, dated 07/26/2000.
13. Letter, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Request for Additional Information, Regrading Containment Structure Conformance to Design-Basis Requirements (TAC NOS. MB3603 and MB3604)," J. Stang to C. Bakken III, dated 05/31/2002.
14. Letter, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Regarding Containment Structure Conformance to Design and Licensing Basis Requirements," J. Stang to C. Bakken III, dated 03/21/2003.
15. Memo, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Response to Task Interface Agreement (TIA 2001-15) Regarding Evaluation of Containment Structure Conformance to Design-Basis Requirements (TAC NOS. MB3603 and MB3604)," L. Marsh to G. Grant, dated 01/13/2003.
16. Letter, "Resolution of Containment Structural Issues at Donald C. Cook Plant Units 1 and 2," G. Grant to R. Powers, dated 11/03/2000.

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17. Memo, "Safety Assessment of Operability Evaluation of D.C. Cook Unit 1 Containment and Ice Condenser Structures (TAC NOS. MB0286 and MB0287)," K. Manoly to C. Craig, dated 11/17/2000.
18. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2, Resolution of Containment Structural Issues," M. Rencheck to G. Grant, dated 11/18/2000.
19. LER 316/2000-003-01, "Containment Internal Concrete Structures Do Not Meet Design Load Margins," M. Rencheck to USNRC, dated 11/20/2000.
20. Letter, "Resolution of Containment Structural Issues at Donald C. Cook Plant Units 1 and 2," G. Grant to R. Powers, dated 11/28/2000.
21. LER 316/2000-003-00, "Containment Internal Concrete Structures Do Not Meet Design Load Margins," M. Rencheck to USNRC, dated 06/28/2000.
22. Memo, "Differing Professional Opinion Concerning the Startup of D.C. Cook, Units 1 and 2," R. Landsman to W. Travers, dated 12/04/2000.
23. Meeting Summary, "Donald C. Cook Nuclear Power Plant - Summary of June 11, 2001, Public Meeting Regarding Containment Structural Issues," dated 06/28/2001.
24. Letter, "Donald C. Cook - Summary of June 1, 2000, Public Meeting Regarding Containment Subcompartment Walls," J. Stang to R. Powers, dated 06/12/2000.
25. Letter, "Donald C. Cook - Summary of September 27, 2000, Public Meeting Regarding Update on Containment Structures," J. Stang to R. Powers, dated 10/13/2000.
26. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2, Resolution of Containment Structural Issues," M. Rencheck to USNRC, dated 10/15/2000.
27. Memo, "Follow-up Activity to Differing Professional Opinion Concerning the Start-up of D.C. Cook, Units 1 and 2," W. Travers to S. Collins, dated 04/02/2001.
28. Email, "Re: Status of Issue Regarding Containment Structure Conformance to Design/Licensing Basis," B. Kemker to E. Duncan, dated 07/29/2003.
29. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2, Supplement to Nuclear Regulatory Commission Request for Additional Information Regarding Containment Structure Conformance to Design Basis Requirements (TAC Nos. MB3603 and MB3604)," S. Greenlee to USNRC, dated 08/23/2002.
30. Fax, "Missile Shield Analysis - Effect of Reduced Rebar Strength," B. Kovarik to J. Gavula, dated 03/05/2001.
31. FOIA Request 2001-0324, "Follow-up FOIA Request Regarding Differing Professional View on D.C. Cook Reactor Containment Integrity," dated 07/26/2001.
32. D.C. Cook Condition Report 01043058, dated 02/12/2001.
33. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2 Response to Nuclear Regulatory Commission Request for Additional Information Regarding Containment Structure Conformance to Design Basis Requirements (TAC Nos. MB 3603 and MB 3604)," S. Greenlee to NRC, dated 7/16/2002.
34. Memo, "Cook Containment Walls," J. Craig to N. Chokshi, dated 10/02/2001.
35. Memo, "Closeout of WITS Item200100030 - Differing Professional Opinion Concerning the Start-up of D.C. Cook Units 1 and 2," S. Collins to W. Travers, dated 06/25/2001.
36. Letter, "Summary of the February 15, 2001, D.C. Cook Public Meetings," G. Grant to R. Powers, dated 02/21/2001.
37. Memo, "Minutes of Internal Meeting of the Donald C. Cook Nuclear Plant Manual Chapter 0350 Panel," G. Grant to 0350 Panel, dated 12/05/2000.
38. Letter, "Closure of NRC Inspection Manual Chapter 0350 Restart Action Matrix for Restart of the Donald C. Cook (D.C. Cook) Nuclear Plant - Unit 1," J. Dyer to R. Powers, dated 12/12/2000.

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39. Memo, "Donald C. Cook Nuclear Plant Unit 1 - Closeout of Restart Action Matrix Issue 2.3/8.1 Dealing with Generic Letter 91-18 Operability Evaluations (TAC Nos. MB 0286 and MB 0287), J. Stang to G. Grant, dated 11/28/2000.
40. Letter, "Donald C. Cook Nuclear Plant Units 1 and 2 Notification of Extension of Commitment Due Date," M. Rencheck to NRC, dated 05/09/2001.
41. Memo, "Request for Technical Assistance (TIA No. 2000-05)," J. Grobe to S. Black, dated 05/01/2000.
42. Memo, "Supplement to Request for Technical Assistance TIA No. 2000-05," J. Grobe to S. Black, dated 05/09/2000.
43. Letter, "D.C. Cook Nuclear Power Plant - NRC Inspection Report 50-315/00-0023(DRP)," NRC to R. Powers, dated 12/28/2000.
44. Memo, "Resolution of Degraded CEQ Fan Room Wall," J. Dyer to J. Grobe, dated 06/07/2000.
45. Memo, "Resolution of Degraded CEQ Fan Room Wall," J. Dyer to J. Grobe, dated 06/12/2000.
46. Memo, "Donald C. Cook Nuclear Plant, Unit 2 - Closeout of Restart Action Matrix Issues Dealing with Generic Letter 91-18 Operability Evaluations," S. Black to J. Grobe, dated 06/09/2000.