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June 03, 2002

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station, Units 1, 2 and 3
Docket Nos. 50-269, -270, -287
Draft Report on Potential Risk and Consequences of Heavy Load Drops in
Nuclear Power Plants

Gentlemen:

Thank you for the opportunity to review the draft NUREG report dated April 1, 2002, for the accuracy of data and information collected at Oconee, which help support this draft NUREG. Attached are Oconee Nuclear Station's comments from our review of the draft NUREG.

If you have any questions or need additional information, please call Julian Davis at (864)885-4150.

Very truly yours,

W. R. McCollum, Jr., Site Vice President
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Enclosure

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U.S. Nuclear Regulatory Commission

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NRC Generic Issue 186 (Draft Report)
Potential Risk and Consequences of Heavy Load Drops
in
Nuclear Power Plants
Comments on Draft Report
By
Duke Energy Oconee Nuclear Station
Dated April 1, 2002
Prepared by ONS/MC

Index of sections:

1. Summary Comments and ONS Conclusions
2. General Comments
3. ONS Data Verification or Additions

SECTION 1

Summary comments and ONS's conclusions and questions:

1. The Staff has done a thorough research on the issue and presented excellent points. The crane data search presents some interesting points.
2. The report should answer the following questions:
 - 2.1 Are the seven (7) Guidelines in NUREG-0612 being followed at the nine (9) plants reviewed?
 - 2.2 Does the Data indicate the seven Guidelines are being followed overall since 1981?
 - 2.3 Have plants maintained or added to the commitments by individual actions that continue the intent of NUREG-0612? How about findings from the plants surveyed?
 - 2.4 Are there changes or improvements needed to NUREG-0612 Guidelines?
 - 2.5 Are plants safer after NUREG-0612 implementation?
 - 2.6 Can the addition of each change further improve plant safety and how?
 - 2.7 What recommended improvements would the staff make to each plant to prevent events?
 - 2.8 What recommendations does the staff have for the NRC to guide the plants to give an effective return in preventing events?
 - 2.9 Is it correct to have the plants that need to upgrade cask handling cranes design for the heavy load of a cask combined with a Design Basis Earthquake (DBE) or a Safe Shutdown Earthquake (SSE)?
 - 2.10 When is a single failure proof crane required? Should there be a lower limit when a single failure proof hoist (say < 15 tons) is required?
 - 2.11 Review the "Synopsis of Issue on NUREG-0612" letter listed in these comments and update the NRC position.
3. Main point #1: The report demonstrates that each plant should take improved interest in mobile crane use around the plant to prevent the interruption of normal and emergency power sources. The six (6) events in the report caused each plant to challenge their reactor operators and in some cases rely on emergency power sources from a few minutes up to five hours.

4. Main point # 2: NUREG-0612 has increased the equipment handling and crane operation safety at the plants by requiring licensee to examine the seven (7) areas in controlling work activity around System, Structure, or Component (SSC) vital to safe shutdown.
5. Main point #3: The report demonstrated the value for each plant to follow the original seven (7) Guidelines in NUREG-0612 could prevent events.
6. Main point #4: The report demonstrates that each plant should review and update their program to expand items not in the original commitments in the area of mobile crane use, operator training for rigging equipment users and hoist equipment design and maintenance. Contractors (including cranes, crane operators, rigging equipment and rigging equipment users) working around the plants should be included in the requirements.
7. Main point #5: The report shows that in the area of using the equipment, having practical procedures, and training on the procedures, and following the procedures is approximately 75% of the issue.
8. Main point #6: The report shows that with the proper preventive maintenance and upgrading aging equipment, the probable events are in the hands of the operator or rigging personnel. ONS refers to this as "Below the Hook Operation." The plant must assure training, procedures and performance control "Below the Hook Operations."
9. Main point #7: Has the NRC had a team do an analysis to support the value of a single failure crane and combining the earthquake conditions with short term maximum loading of a crane? The plants are spending lots of effort supporting these concerns and spending less on the seven guidelines. Logic does not support this approach to nuclear safety. The report supports the argument that correct use of the products is the nuclear safety issue.
10. Abstract & pg. 1: Paragraph #2 leads us to believe the issue is after 1980. Is this a POST NUREG-0612 issue and/or post License issue? Take out any pre NUREG-0612 and construction data or place the data in separate tables but not in the whole. Pg 25 reinforces this suggestion that the Generic Issue is "Licensed Operating Nuclear Power Plants."
11. Many plants have concentrated on the issue of single failure proofing and have not emphasized the importance of the seven (7) generic risk reduction Guidelines in NUREG-0612. ONS believes that these are the most important items that each plant should "self assess." ONS recommends the report place more emphasis on following the original commitments and constantly reviewing and finding methods to improve above the original commitments. In the original commitment and Franklin reports, there was no emphasis on mobile crane use. ONS added this area in recent years and improved and restricted areas of mobile crane operation. ONS noted in the report that Palo Verde added a mobile crane use procedure to prevent mobile crane events. OSN add a procedure in 1997 to replace verbal directions to the mobile crane operators after reviewing industry events, and answering questions from the site residents.

12. In our discussion with vendor crane personnel, ONS recommends the industry maintain and upgrade the control systems and inspect for the electrical, mechanical and civil aging of cranes. ONS was improving the aging inspections and this supported the relicense commitments.
13. Special controls equal to site controls should be administrated on contractor cranes and rigging personnel that are temporarily on site working around SSC vital to plant safety.
14. Incidents that are during construction should not be included in the report. They present unrelated data to operating concerns and may cause confusion of the real issues. This recommendation applies through out the draft report.
15. In our review of the report, we could not determine that a single failure proof crane could have prevented any accident or incident. There should be better guidance when single failure is required. Some later licensed plants applied single failure rules to small hoists. Is this correct? The equipment becomes more complicated and has more shutdown time and higher maintenance cost without really improving safety.
16. A number of the incidents are related to "below the hook" problems. Each plant must be diligent in the correct application of rigging equipment and training of those using rigging and cranes. Plants should not allow the equipment Safety Factor (SF) to go below five (5) except where permitted by the code. There are no reductions in the SF of five (5) for components used below the hook of a crane or hoist. During ONS upgrade work in 1996-98 we found some shop made "Below the hook" lift devices that had been around for years that did not consider a SF of five (5). These were replaced or strengthened. The Duke Lift Program introduced the standard of ANSI B30.20 for these devices.
17. We suggest "up front" stating the original seven (7) Guidelines that each license was required to follow to development commitments. State that each license did not make the same commitment but each was reviewed on a plant-by-plant basis. It is difficult to determine for each plant the exact commitment meaning so each plant should "self assess" the original commitment and follow their assessment with actions to maintain the commitments within the seven Guidelines. A generic letter was submitted to some licensees to help parallel the issued and reach some equality. The letter from the NRC Elinor Adensam, Licensing Branch 4, dated May 4, 1983 to Duke Power Company; Mr. H.B. Tucker for the McGuire plant includes a report titled "Synopsis of Issues on NUREG-0612" may be listed as a reference to all licensees. The staff preparing this report may review the applicability of the letter and an update would be helpful to the licensee.
18. We suggest the incidents and figures in the report should state which Guideline in NUREG-0612 was not followed. Example: Figure 2, Pg 8 indicates that 36% of crane reported events were the failure to have or follow Load Handling Procedures (Guideline #2).

19. There was a not a summary that we could evaluate. What conclusions did the staff reach from the study? We are interested where this issue may be leading, and if any actions should start, should we be preparing for inspections, or evaluating commitments?

SECTION 2

General comments:

1. Pg 1, Sect. 1.2, Crane: The definition should be expanded to include all cranes and hoist including mobiles, since the word “crane” is used in the report to mean any type of lift device. On page 2, the word Hoist should mean only the part that does the lifting. ANSI standards distinguish between all three (3)
2. Pg. 1: add “Below the Hook” and definition: the rigging equipment attached to the hook of a crane or hoist. Also add: “Below the Hook Lift Device: A special fabricated lift beam or structure made to attach to the crane or hoist hook for a special lift.
3. Pg. 2: Recommend the addition of a definition: Risk Reduction. One method or a combination of methods that can be used to reduce either the possibility of a load drop or the selection of a reduced impact path (safe load path), minimizing the impact area affected, protecting the impact area or other methods.
4. Pg 3. Very heavy load: 30 tons is listed except that the handling of a spent fuel assembly is considered critical. We would recommend a definition be added: **Critical Irradiated Fuel load (or new fuel if the staff thinks applicable)**: Irradiated fuel and any load over 1500 lbs handled above open spent fuel. (In the report individual fuel incidents are listed).
5. Pg 5 Phase II: ONS continues to accept that phase II was not needed and would not have contributed to the safety of the plants. The report continues to support this conclusion. We recommend plants evaluate the Guidelines in NUREG-0612 and upgrade their programs to support the seven (7) Guidelines.
6. The recommended additions to the Guidelines in NUREG-0612 are: (list in front of the report for reference later)
 - 6.1. Safe Load Paths (include mobile cranes)
 - 6.2. Load Handling Procedures (include crane and hoist operation and lift planning for critical loads)
 - 6.3. Crane Operator Training (should expand to rigging training, hoist use training, and crane maintenance training)
 - 6.4. Special Lift Devices (Revise to divide into three (3) groups: (1) Lift Devices not used around fuel or the reactor vessel or in the reactor building design and maintain to B30.20. (2) Lift devices used around fuel, lifting the vessel components or used in the reactor building should be to ANSI N14.6 with an In Service Inspection (ISI- like process pipe) program based on 10 years with annual (or when used) visual inspections. (3) Devices used to handle the fuel cask to ANSI N14.6 with annual ISI.

- 6.5. Lift Devices (Not Specifically Designed). The devices should include generic lift beam to ANSI B30.20 and all rigging to maintain a SF of 5/1 ultimate or 3/1 yield. The users should perform a visual inspection before, during, and after use.
- 6.6. Cranes (Inspection, Testing, and Maintenance) (Crane be expanded to include ANSI mobile cranes, and electrical and manual hoist standards)
- 6.7. Crane Design (should include ANSI hoist and mobile cranes standards)
7. Charts by "Events by Guideline" would be a good order to consider to help reach conclusions. Some references are that the major contributor for events is failure to follow Guideline #2 procedure. Crane and rigging equipment is heavy and durable if maintained correctly. The team that developed the 7 Guidelines did a superior job of dividing lifting into parts for commitments and emphasis. If the 7 Guidelines are followed there will be few incidents and reduce the possibility of a significant event. ONS believes that INCIDENT prevention leads to "0" events. An INCIDENT is a rigging component used incorrectly. Any EVENT can be traced to a number of INCIDENTS that line up together at the correct time.
8. Another area that should be a separate group is "events outside the Guidelines of NUREG-0612" where a crane was involved. Like an OSHA violation, scaffolds or personnel access **not** caused by a crane, rigging, or operator actions.
9. Pg 6: Deduct construction issues and separate issues before NUREG-0612. State clearly that each chart is based on the sample of ___ issues (final number after removing construction events). This was not clear until we added up the numbers on the chart. Suggest the charts be by Guideline (1-7) or "OSHA NO NUREG-0612 crane event."
10. Pg 6, Sect. 2.1, Table 2: General Event Category: add Portable Hoist and rigging equipment used independent of a crane or below the hook of a crane.
11. Pg 6 Sect. 2.1: Event Sub category (crane type) Polar crane, Bridge crane, Fuel manipulator crane, Fuel cask handling overhead crane, mounted hoist, Jib cranes, and mobile cranes. (Suggest leaving off tower cranes. They were only during construction. The one listed in the report at River Bend was a special mobile crane that dropped the dome during construction. The crane belonged to the Lamson Corporation. The owner/engineer reported that the wind was not considered when the subcontractor was making the lift.)
12. Pg 6: Sect. 2.2: "Inadequate Maintenance" should be added. Remove any references to construction work before fuel loading. Last sentence should add "or Critical fuel load.
13. Pg 7: Sect. 2.2.1, Last sentence, Add: Plants have been encouraged and required to report all incidents in the last decade. Improved databases tying to the industry have improved the data available.

14. Pg 8: title "Failure to Follow **Guideline # 2 Procedures**"
15. Pg 10: title "Failure to Follow **Guideline #6 Crane Maintenance**"
16. Pg. 11, Sect.2.2.5: This section would be better to follow the 7 Guidelines that are programmatic with in specific Guidelines. Examples: failure to provide proper ventilation is a Guideline # 2 procedure issue in NUREG-0612.
17. Pg. 13: Deaths? Are any deaths failures to Guidelines after NUREG-0612. Example: The death at McGuire was an OSHA violation where the individual and others to got on and off a moving crane. We could not fit it into a NUREG-0612 failure. Was there an NRC violation issued? This was an OSHA issue.
18. Pg. 14: Construction events are included.
19. Pg. 15: Adjust chart "heavy load or fuel." Fermi would be "fuel." List the Guideline number that was not followed. Examples: Palisades: # 2 procedure and #7 design philosophy for having a bypass. (Bypass of limits has introduce of crane operator errors), Dresden #7 design and #6 inspecting/testing.
20. Pg. 15: River Bend should be deleted.
21. Pg. 16: Quad Cities is a new fuel event. Revise the definition of critical fuel if this light significant load is to be included.
22. ONS did not report any fuel handling events since the loads of ~1500# were less than 30 tons. ONS has two (2) fuel events. One event was during the handling of a new fuel assembly when the incorrect calibration of the fuel mast load cell by procedure lead the team to bend the new fuel assembly in the up ender. The other event was caused by no procedure when an operator made a mistake and left a spent fuel assembly suspended in the fuel handling mast following a special assembly inspection request from engineering.
23. Pg 18 Susquehanna: I find "routine inspection of slings" as the real problem with a SF of 5/1. Guideline # 3 rigging training.
24. Pg. 19 par 1, sentence 3: add "Except Fuel events"
25. Pg. 19: Question for discussion. Discuss fuel assembly design and load drop assumption to protect the public. Also, discuss the philosophy of the NRC relative to limiting the movement of item over fuel. Discuss where a cask is carried directly over fuel or safe shutdown equipment. The NRC has requested upgrades of the crane to be single failure proof. Discuss the position of the fuel being protected inside the vessel and not subjected to direct damage where as in an open fuel pool the fuel exposed. Discuss the BWR situation.
26. Pg. 22: Good paragraph following the table.

27. Pg 23: Peach Bottom? Construction injury building exterior to the plant.
28. Pg 28: State the Guideline that was missed.
29. Pg 28: Fort Calhoun event does not fit the definition of a load drop because the load did not drop "uncontrolled." The crane operator caused the event. Guideline # 3 operator error or Guideline #2 inadequate procedure.
30. Pg 28: ANO1 add component problem to reason. Guideline # 6 Maintenance
31. PG 28: CP1 hoist was hung "below the crane hook." Guideline # 6 maintenance or hoist not in the maintenance program. During the 1996-98 review ONS found some portable rigging equipment had been purchased or manufactured over the years and was not placed in an annual or user inspection plan.
32. Pg. 30 top fragment add: "or the rigging below the hook failed."
33. Pg. 30, Paragraph 1, add: Excellent event tree presentation. Should an additional event be added at the end? "The other accident mitigation train(s) has failed"
34. Pg. 30, Paragraph 3 sentence 1: add "or plant procedures or the crane is restricted from the area by design." Example: At ONS the SPF 100 ton cask handling crane cannot pass over the main spent fuel pool storage area by design. Only the cask loading area is accessible. The feature was important in answering NRC bulletin 96-02.
35. Pg. 31: Agree with your discussion that the biggest event that causes short term lots of action is a mobile crane hitting an AC power (not necessary vital AC) and causing power interrupt device to react and trip breakers.
36. ONS has special crane restrictions that start within 50 ft of power lines and special action are required by the operators. We have applied the restriction to hydraulic excavators with booms working around the site.
37. Pg. 32: add a column. Time plant was challenged: list the time to normal power was returned.
38. Pg. 30: List the load drops calculations by number per plant and group PWR & BWR plants. It may be helpful to list when the NUREG-0612 commitments were approved. Limerick was after the initial NUREG-0612 work in 1981. Separate the calculations to cask area, reactor area and other. The cask area is being watched heavily due to upgrades to the cranes. Many of the load drop calculations in the cask area have been added because of interim storage measures after NUREG-0612 initial review.
39. Pg. 34: Make two (2) tables BWR or PWR

40. Pg. 34: Oconee supplied the NRC with three (3) additional load drop calculations for the study that are not listed in the ONS table section: One load drop (draft) calculation for the Reactor head drop on an open reactor vessel with fuel and two calculations for reactor head missile shield load drops above the reactor head.
41. Pg. 49: Section 5 Paragraph 1: Is this the staff or a NUREG-0612 question? Mark in some way when the NUREG is quoted vs. the staff report.
42. Pg. 50: add your staff recommended changes.
43. Pg. 50: the area of ISFSI and shipping will automatically be reviewed as license changes.
44. Pg. 53 Wind Load: Is the report implying that the combination of SSE and wind or Tornado should be considered? This does not appear correct.
45. Pg. 54 OBE or SSE with max lifted load. Where load combination is required and is there a probable risk enough to consider? Can the safety factor be reduced if these unusual combinations are required? Review with PRA
46. Pg. 55: last sentence: add “or incorrect use of lifting hardware.”
47. Pg. 56: table adds to 102%?
48. Pg. 56: 6.4: Is the title of the data report correct? Micro-to-Host? Are there any conclusions from the California report?

SECTION 3

ONS Data Verification and Additions

1. ONS has reviewed the ONS data in the report. Three load drop calculations supplied to the NRC are omitted from Page 34 Table
 - 1 . 1 Draft RV head drop on the reactor vessel with fuel in the core
 - 1 . 2 Reactor missile shield load drop at hot shutdown Mode 4
 - 1 . 3 Polar crane main hook load drop on the reactor head missile shields at hot shutdown Mode 4.
2. ONS did not submit two (2) fuel handling events based on the initial criteria. The events are:
 - 2.1 Damage to a new fuel assembly in a fuel transfer up ender when due to a load cell calibration procedure problem.
 - 2.2 Spent fuel assembly left in the fuel handling mast after a visual inspection was performed of the fuel assembly in the spent fuel pool.
- 3 Other ONS data is presented correctly. No construction events were submitted based on the criteria supplied.