June 1, 2001

MEMORANDUM TO: License File Nos. DPR-19, DPR-25
Docket Nos. 050-00237, 050-00249

FROM: Bruce L. Jorgensen, Chief, Decommissioning Branch /RA/

SUBJECT: MEETING WITH EXELON REGARDING DRESDEN UNIT 2/3 REACTOR BUILDING CRANE ISSUES

Exelon Generating Company representatives, in conversations with NRC representatives, including a discussion between Marc Dapas of RIII and Rod Krich of Exelon on April 27, 2001, offered to attend a meeting to discuss issues and questions about the Dresden reactor building crane.

A meeting was held in RIII on May 23, 2001, for the purpose of clarifying the issues and to provide the licensee the opportunity to present verbal and written information to support their views regarding crane history, licensing basis and current qualification status. Minutes of the meeting are attached. These minutes reflect licensee positions; NRC conclusions regarding some of the issues discussed remain under consideration. A copy of the Agenda, a copy of the licensee's handout, and a list of attendees are also attached.

The licensee addressed each issue and question presented. Their position may be summarized as follows: As of May, 2001, the Dresden Unit 2/3 crane is a single-failure-proof crane. This is by virtue of its having been so designated and approved by the NRC in 1976 (i.e. the licensing basis for this crane is as a single-failure-proof crane) and by virtue of the licensee's having maintained or restored each and every attribute relied upon in 1976 for the designation.

Selected portions of the information presented will be verified as part of Region III's inspection program for the Dresden ISFSI project. For example, the Region plans to verify the licensee's interpretation that Technical Specifications permitted handling heavy loads while the reactor was at power, and to re-examine the meaning of the term "over-stressed," in the consultant's report on the 1981 impact event. In addition, the Region specifically requested a copy of the 50.59 evaluation for bypassing of the "load cell" and its integral overload protection function, and the Region plans to identify and review any other 50.59 evaluations done to support other modifications to the crane compared to the licensee's description in their licensing basis.

Selected information contained in the attachment may be incorporated, as appropriate, in the Region's inspection report(s).

Attachments: 1. Meeting Minutes
2. Meeting Agenda
3. Meeting Handout
4. Meeting Attendees

cc: J. Zwolinski, NRR
S. Bajwa, NRR
C. Carpenter, NRR
J. Hannon, NRR
J. E. Dyer, RIII
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DOCUMENT NAME: G:\SEC\DresCraneMeeting523.wpd

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OFFICE	RIII	E	RIII				
NAME	Jorgensen:js						
DATE	06/ t /01						

MEETING MINUTES

May 23, 2001 Meeting Between NRC RIII and Exelon Generating Company
Dresden Unit 2/3 Reactor Building Crane

INTRODUCTION

A meeting was held in the NRC RIII offices on May 23, 2001, for the purpose of clarifying the licensee's position regarding qualification status of the Dresden Unit 2/3 reactor building crane. Inspection activities conducted by NRC as part of the oversight of the Dresden Independent Spent Fuel Storage Installation (ISFSI) had generated questions and concerns about the subject crane. Some of these issues were documented as Unresolved Items in NRC Inspection Report No. 07200037/2001-001(DNMS).

An Agenda was prepared for the meeting which is attached to these minutes. All of the items on the Agenda were discussed, in a sequence which followed a handout prepared by the licensee. The handout package is also attached to these minutes, as is a list of meeting attendees.

LICENSING BASIS

The licensing basis for the Dresden Unit 2/3 reactor building crane was established in a 1976 licensing action.

The licensee discussed the regulatory history leading up to the licensing action, indicating that the original crane design (per CMAA-70, a manufacturer's standard) was identified as needing to be improved when, in about 1973-4, plans were being developed to use the crane to load spent fuel into transport casks for shipment to a fuel reprocessing facility. Special Report 41 was submitted to NRC in about early 1975 to define the crane improvements deemed necessary. Subsequently, NRC issued Branch Technical Position BTP APCSB 9-1 to address Agency expectations for cranes to be deemed adequate to ensure against load drop in the event of any single failure. The licensee's Supplement A to Special Report 41 addressed additional items derived from BTP 9-1, in mid- to late-1975, and several exchanges of correspondence followed in the form of NRC Requests for Additional Information (RAIs) and licensee responses.

The licensee's Special Report 41 and Supplement, along with subsequently submitted information, were discussed. These became the licensing basis when the NRC amended the license and issued the supporting Safety Evaluation Report (SER) on June 3, 1976. The SER considered the crane rating as 125 tons, evaluated for casks weighing up to 100 tons. The design redundancies included hoist and trolley brakes, the cask lifting device and crane control components. Single element components were all specified to have safety factors of at least 7.5.

The licensee indicated that NRC had concluded the intent of BTP 9-1 was met, except for the reeving system (wire rope safety factor and fleet angles) and the protection provided against "two-blocking" (upper limit switch on travel.) Temporary waivers were approved at the licensee's request to allow for alternative means (operator at main electrical breaker) to accomplish the function of a mechanical upper travel limit switch and load travel restrictions only over a designated "safe load path." The rope safety factor issue was discussed in some detail separately - see below. Original stipulations were that an "inching motor" was to be in

operation when the crane was being used in its single-failure-proof mode (i.e. in "restricted mode"); this was replaced by a speed-limiting control circuit which ensured hoisting speed would not exceed 5 feet per minute. The hoisting speed limit was described as being in compliance with BTP 9-1.

A "load cell," which was provided to indicate load and which contained an integral overload protection, was discussed. The load cell did not function properly and was subsequently bypassed, including the overload protection feature. A design change review under 10CFR50.59 supported the bypassing of the load cell, with administrative controls to serve in lieu of the overload protection. NRC representatives requested the 50.59 review package be made available for inspection, which the licensee agreed to do. As detailed below ("DIGITAL CONTROL UPGRADE") the overload protection function has been restored.

SEISMIC DESIGN

The licensing basis was also discussed from the perspective of seismic design and NRC review of the crane and the reactor building superstructure.

The licensee identified the crane as Safety Class II (non-seismic), which they indicated had been made known to NRC and recognized as part of the licensing basis. A commitment to perform analyses of the crane bridge girders in Safe Shutdown Earthquake (SSE) and Operating Basis Earthquake (OBE) conditions was met, with the result that the girders were found to be "acceptable" with a suspended load of 125 tons. The crane trolley was said to have no seismic qualification.

The building superstructure was specified to be capable for loading combinations which included normal loads with a full crane lifted load, OBE without lifted load, and SSE without lifted load. The analyses were said to have found the superstructure "acceptable" for these load combinations. The licensee indicated the NRC understood and approved this design within the licensing basis, even though BTP 9-1 included an expectation the SSE with load would be analysed and found acceptable.

Separately, beyond-design-basis calculations were reported for the building, considering SSE plus full suspended load (125 tons), as per BTP 9-1. The result of this calculation was reported to be that all structural members met design allowables.

BULLETIN 96-02

The Bulletin and the licensee's response to the Bulletin were discussed. The licensee talked through the Technical Specifications applicable to the Dresden plant, indicating that those specifications never restricted use of the crane in "restricted mode" to refueling or outage conditions. Data on actual historic crane use for loading casks was provided. The response to the Bulletin was "generic" to address all the (then) ComEd operating reactors, and stated that there were no plans to lift heavy loads over the fuel pool or safety-related equipment with the reactor operating at power. The response indicated changes to the technical specifications would be required should such lifting be planned, and that safe shutdown capability would be demonstrated should cask movements be required.

The licensee expressed the view that, because Dresden specifically had a licensing basis as a single-failure-proof crane, the "generic" response contained an over-commitment. Dresden was considered to be within its licensing basis to perform heavy load lifts with the reactor in power

operation. Safe shutdown capability demonstration was considered to apply to cranes which could experience drop of a load, which was "not credible" for a crane classified as single-failure-proof. Thus, the commitments contained in the Bulletin response, as they applied to Dresden, were withdrawn earlier this year.

The 1976 T/S which pertained to inspection and surveillance requirements for the wire rope were deleted in 1996 in an action unrelated to the Bulletin, and the equivalent requirements were placed into station procedures, where they remain.

The question of "safe load paths" was discussed, and the licensee went over the diagram contained in their handout which illustrates the paths so designated.

CRANE DAMAGE IN 1981

The implications of a 1981 incident were discussed. The Unit 2/3 reactor building crane was damaged in 1981, during a lift involving the reactor vessel head lift "strongback" (approximately a 10-ton load), when the strongback struck the under side of the crane bridge girders. The inside web and the bottom flange of each girder were deformed. The licensee presented information to support their view that the damage incurred and the repairs to restore the crane girders to "design" were not "extensive." This was an issue because ANSI/ASME B30.2.0 - 1967, to which the licensee was committed, specified a 125% rated load test be performed on "new, extensively repaired or altered" cranes.

Calculations were presented to define the "overstress" experienced by the girders. In that the licensing basis for the crane was Safety Class II, the licensee maintained that restoration of the crane was not mandatory by regulation. Rather, the restoration was to regain margin of safety which was established in beyond-design-basis calculations. Specifically, one girder was found to have experienced 22% overstress for OBE with full load. Thus, the margin represented in meeting a 0.6 Fy criterion was reduced, but all stresses were less than yield.

The repair consisted of cutting out the deformed section of each girder web and welding a new plate over the area, and welding a plate over the deformed section of each flange. An expert consultant's assessment of the damage and the repair were presented in support of the licensee's position that the repairs were not "extensive."

Information was also provided to address the performance of the crane since the repair, which indicated that loads up to 125 tons had been lifted at least 42 times. No indication of stress or distortion has been observed in the repaired or adjacent sections, although no focused inspection has been performed with the specific intent of looking for such stress or distortion.

DIGITAL CONTROL UPGRADE

Modifications to the crane controls in 2001, to replace the control, indication and protection systems with a new digital system were discussed. The licensee indicated the design, installation and testing of the new system were specifically aimed at restoring each and every feature of the original system captured in the 1976 licensing basis. Specific examples of features provided included a variable speed drive controller for the hoist function, to limit the hoist speed to 5 feet/min, an overload protection feature, and limits to control upper lift limit and safe load path. The licensee maintained that, as installed and tested, the new digital system conforms with the licensing basis.

WIRE ROPE

The licensing basis, performance, inspection and replacement of the wire rope were discussed. The rope was last replaced in 2000 in accordance with the inspection program, and was described as in good condition, not requiring replacement.

The licensee indicated that in 1976, the NRC was aware of the fact the wire rope had a safety factor of 7.798 (for a 125 ton load) and that, while BTP 9-1 specified a safety factor of 8 (by limiting load to 12.5 % of rope yield), the rope was reviewed and approved. As part of the approval, technical specifications were put in place for limiting conditions for operation and for surveillance and inspection of the wire rope, to ensure the rope did not degrade from the "original design" condition.

The licensee concluded the wire rope has been and remains as approved by the NRC in the licensing basis. Future replacements, as necessary, will continue to be like-for-like, as a minimum.

CONCLUSION

The licensee indicated the crane was certified and licensed as a single-failure-proof crane in 1976. The NRC recognized and accepted certain identified conditions which did not literally meet all of the expectations set forth in BTP 9-1. In some cases, the conditions noted were allowed only on a temporary basis, and permanent upgrades were put into place as required. In other instances, exceptions were made on a permanent basis. The licensee's objective, in proceeding with planned use of the crane for the upcoming ISFSI cask loading activities, was to restore the crane to the 1976 licensing basis, restoring it to single-failure-proof classification. They indicated that they have achieved this objective.

NRC representatives expressed appreciation for the licensee's efforts in researching dated records and in organizing them for the presentation. The licensee was informed that NRC will consider the information and we will inform them of our conclusions in the near future.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

AGENDA

NRC/Exelon Meeting - Dresden ISFSI
(Unit 2/3 Crane - History/Status)

Opening/Purpose

Licensing Basis
- Design Features
(licensing basis; modifications; SE & OBE plus load)
- Operating MODE Restraints (TS restrictions)
- 2001 Equivalence

Bulletin 96-02
- Defined Safe Load Paths
- Safe Shutdown Capability/Plans/Procedures
- T/S history & current Admin Procedures without MODE

ASME/ANSI B30.2.0
- "Extensive repair"
- "Equivalent degree of protection " for exception(s)
  - crane performance history (#/size of lifts)
  - inspection history

Alterations to controls/limits/indications/alarms
- Scope
- Testing

Wire Rope
- Inspection/performance history (decision processes)
- Replacement plans/schedules

Open Forum

Closing

Meeting with NRC
Unit 2/3 Reactor Building Crane

Exelon Generation Company, LLC

Dresden Nuclear Power Station

May 23, 2001

Meeting Objective

- Review licensing basis, history, and current status of the Reactor Building Crane to show that:
  - Crane is single failure proof and rated to 125 tons
  - Original licensing basis is maintained
  - Repairs and modifications have been sufficiently tested

Topics

- Licensing Basis
- NRC Bulletin 96-02
- 1981 Crane Repair
- 2001 Modifications
- Wire Rope

Licensing Basis

Licensing Basis

- Licensing basis is described in two primary documents
  - ComEd Special Report 41 and Supplement A
  - NRC Safety Evaluation, June 1976
- Single failure proof features of Reactor Building Crane
  - Dual load path through gear train, reeving system, and load block

Licensing Basis

- Single failure proof features (cont'd)
  - Redundancy
    - Hoist and trolley brakes
    - Cask lifting device
    - Crane control components
  - Dual element stresses comply with CMAA-70
  - Single element components minimum safety factor of 7.5

Licensing Basis

- Restricted load path
  - Limit switches
  - Administrative controls on operation with failed control area limit switches (DFP 800-45)
- NRC Safety Evaluation states that crane meets intent of BTP APCSB 9-1, except for
  - Reeving system
  - Protection against "two blocking"

Licensing Basis

- NRC Safety Evaluation accepts compensating features
  - Wire rope inspection and replacement program compensates for reeving system (DMS 5800-01)
  - Mechanical limit switch provides for "two blocking" protection

Modifications and Waivers

- Electrical interlocks for safe load path temporarily waived until testing could be completed
- Mechanical limit switch for "two blocking" waived until it could be installed
- Installation of a slow speed drive motor

Modifications Status

- Electrical interlocks were installed and tested; have remained in place
- Mechanical limit switch was installed and has remained in place
- In lieu of slow speed drive motor, modified electrical circuit of main hoist to limit maximum lift speed to 5 feet per minute in restricted mode operation
  - Consistent with BTP APCSB 9-1
  - Accepted by NRC in June 3, 1976 Safety Evaluation

Spent Fuel Cask Handling Technical Specifications

- Covered restricted mode operation and wire rope inspection
  - Original Technical Specifications (TS) issued June 3, 1976
  - TS upgrade relocated restricted mode description to UFSAR
  - Surveillance requirements implemented by DMS 5800-01 and DOS 0800-06

Licensing Basis Conclusion

- The licensing basis approved for the Reactor Building Crane and cask handling in the June 3, 1976, NRC Safety Evaluation has been maintained

Licensing Basis - Seismic

- Reactor Building Crane is Safety Class II (non-seismic) (UFSAR Sections 9.1.4.2.2 and 3.8.5)
- Crane bridge girders have been evaluated for both OBE and SSE conditions with 125 ton load and found acceptable

Licensing Basis - Seismic

- Reactor building superstructure
  - Licensing basis (UFSAR Section 3.8)
    - Loading combinations
      - Normal loads with full crane lifted load
      - OBE without crane lifted load
      - SSE without crane lifted load

Licensing Basis - Seismic

- Reactor building superstructure (cont'd)
  - Calculation of record (DRE98-0020) documents design basis
    - Normal case: all except one member meet design allowables; roof girder had 3% overstress
      - Small overstress acceptable considering conservative support assumptions
      - Normal practice to accept overstress of up to 10%
    - OBE case: all members meet design allowables
    - SSE case: all members meet design allowables
    - Performed "beyond design basis" case of SSE plus full crane load: all members meet design allowables

NRC Bulletin 96-02

NRC Bulletin 96-02

- Bulletin requests
  - Review of plans and capabilities for handling heavy loads with reactor at power
  - Determine whether activities are within licensing basis
  - If outside licensing basis, get NRC approval prior to handling heavy loads

NRC Bulletin 96-02

- ComEd May 13, 1996 response
  - No plans for movement of dry storage cask over spent fuel, fuel in the core, or safety related equipment at power
  - Would demonstrate safe shutdown capability should cask movements be required

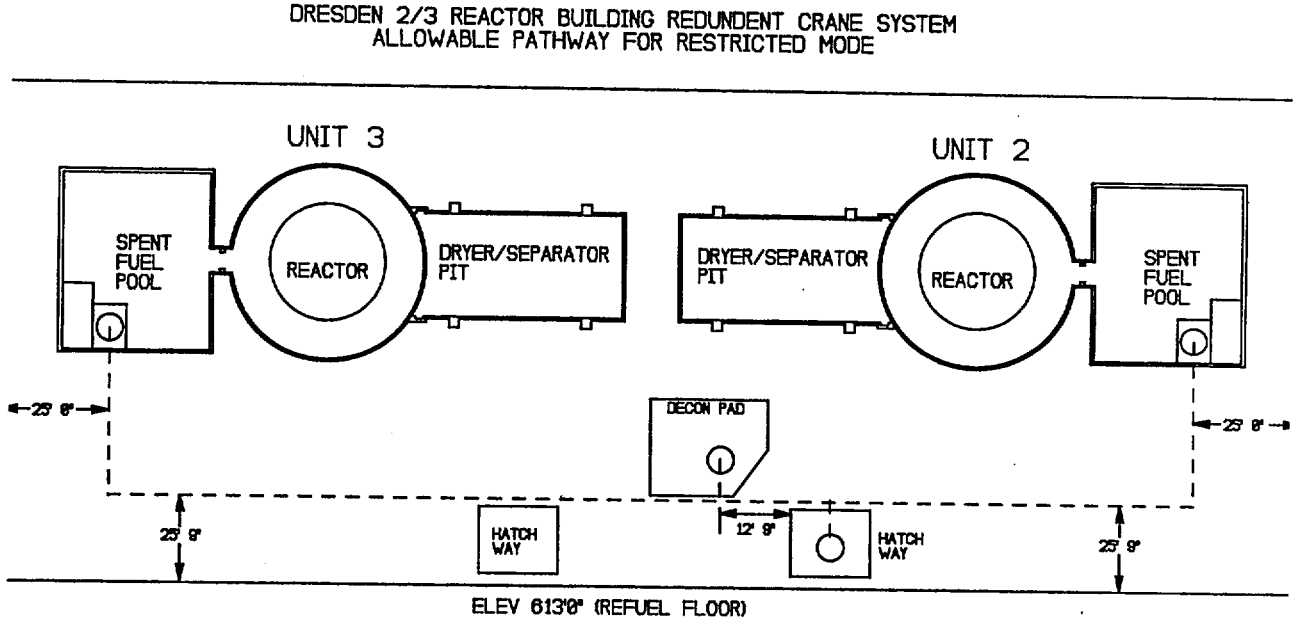
NRC Bulletin 96-02

- Commitment changed in 2001
  - Original response was an over-commitment and was not required if cask moves were within licensing basis
  - Single failure proof crane means that load drop accident is not credible

Safe Load Paths

- Crane bridge and trolley movement is restricted to ensure the crane remains within a predefined pathway
- Governed by station procedures (DFP 0800-20 and DFP 0800-45)
  - Fuel cask handling above 545-foot level is "Restricted Mode"
  - Only permitted outside "Restricted Mode" in emergency or due to equipment failure to place the load in safe condition
- Reinforced by crane design
- Visual aid for crane operator

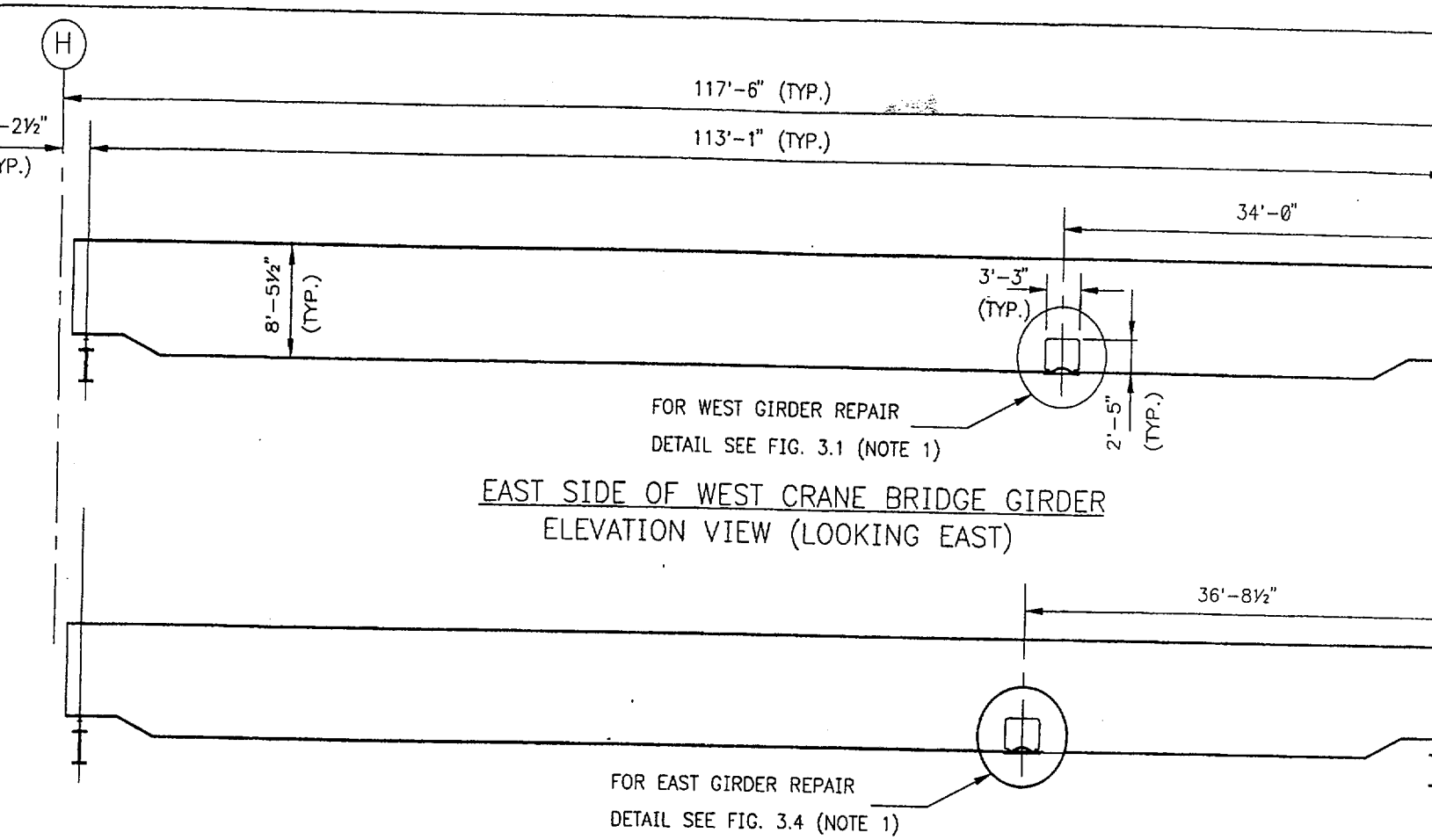
Restricted Mode Path



1981 Crane Repair

1981 Crane Girder Damage

- Bottom of girders damaged by a 10 ton lifted load
- Damage affected 2' x 2'2" lower section of inside web and bent bottom flange on each girder (0.3% of total bridge girder surface area)



EAST SIDE OF WEST CRANE BRIDGE GIRDER
ELEVATION VIEW (LOOKING EAST)

WEST SIDE OF EAST CRANE BRIDGE GIRDER
ELEVATION VIEW (LOOKING EAST)

FOR REFERENCE

TE (1): INFORMATION TAKEN FROM "NUTECH" DESIGN REPORT NO. COM-21-011 REV. 0 DATED SEPTEMBER 1981, AND FIELD WALKDOWN.

CRANE BRIDGE GIRDERS
(LOCATION OF GIRDER REPA

Exelon Nuclear
Dresden Station 12 Unit: 2

SCALE	:1/8"=1'-0"
DATE	:
DRAWN BY	:
ORC BY	:

SKETCH A

SHEET NUMBER.

Damage Assessment

- Conservative analysis of damage without repair
  - Assumes damaged material removed and not replaced
  - All stresses less than yield; no permanent deformation
    - 22% overstress for OBE with full load (.6 Fy)
    - Within allowable for SSE with full load (.9 Fy)

Evaluation of Repaired Section

- Repair was to cut out web plates and replace with cover plates along web and bottom flange in two girders
- Repaired girders are stronger than original
  - Welds visually inspected by QC inspector
- Function of crane unchanged

Conclusion - Extent of Repair

- Nutech report reviewed repairs against ANSI B30.2 and concluded that "the suggested repair work to the crane bridge girders is not in the extensive repair or major alterations category. The repair is a minor repair."
- This certified design report was approved by two qualified Professional Engineers and reviewed and certified by an independent Registered Professional Engineer from State of Illinois

Conclusion - Extent of Repair

- Conclusion confirmed by independent expert
  - Stephen N. Parkhurst
    - Crane and Equipment Handling Specialist
    - Chairman and Member of ASME Committee on Cranes for Nuclear Facilities (CNF)
  - Summary of Findings
    - Concurs with the original findings of NUTECH engineers that the repairs performed were not extensive
    - Does not recommend re-load testing the crane based upon the localized girder repairs
    - Re-load testing only required if crane modified or re-rated, where a modification included an item such as girder extension

History Since Repair

- Reactor Building Crane has lifted up to 125 tons at least 42 times since 1982. No distress or distortion observed at the repaired section or adjacent sections

2001 Modifications

- Purpose - improve reliability and replace obsolete equipment
- Added variable speed drive controller
- Installed digital crane controls
  - Not an extensive alteration
    - Does not affect single failure proof capability
  - Functional testing completed
    - No-load and load testing of controllers
- Crane design remains consistent with licensing basis

Wire Rope

- Last replaced in 2000 in accordance with inspection program
- No current need to replace
- When replacement is required, will be like-for-like as a minimum

Conclusion

- The licensing basis, history, and current status of the Reactor Building Crane has shown that:
  - Crane is single failure proof and rated to 125 tons
  - Original licensing basis is maintained
  - Repairs and modifications have been sufficiently tested

Exelon Attendees

K. A. Ainger
Dale F. Ambler
Tom Luke
David Schupp
Pat Simpson
M. Molaei
C. Chhablani
P. F. Scardigno
Timothy P. Heisterman
John Zappia

NRC Attendees

Marc Dapas
Mark Ring
Bruce Jorgensen
Ross Landsman
Paul Pelke