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SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards 6-month response to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants." Procedures for overhead handling sys include precautions & guidelines to be observed while operating sys.

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... response to ... "Control of Heavy Loads at Nuclear Power Plants," Procedures for overhead handling sys include precautions & guidelines to be observed ... operating sys.

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... Control of Heavy Loads Near Spent Fuel (USI A-36)

05000388

PP&L Pennsylvania Power & Light Company
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Norman W. Curtis
Vice President-Engineering & Construction-Nuclear
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JUL 22 1983

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
NUREG-0612 - UNIT 2 SIX-MONTH RESPONSE
ER 100508 FILE 842-06
PLA-1752 Docket No. 50-388

Dear Mr. Schwencer:

Enclosed is a copy of the Susquehanna Steam Electric Station, Unit 2, Six-Month Response for NUREG 0612, "Control of Heavy Loads at Nuclear Power Plants."

Should you have any questions regarding this response please contact W. W. Williams at (215) 770-7856.

Very truly yours,

N. W. Curtis
Vice President-Engineering & Construction-Nuclear

Enclosure

cc: R. L. Perch - NRC

B030
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SUSQUEHANNA STEAM ELECTRIC STATION - UNIT 2

NUREG 0612 - "CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS"

SIX-MONTH RESPONSE

SUSQUEHANNA STEAM ELECTRIC STATION - UNIT 2

NUREG-0612 - "CONTROL OF HEAVY LOADS AT NUCLEAR POWER PLANTS"

SIX-MONTH RESPONSE

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1.0 INTRODUCTION

This document contains PP&L's response to each requirement contained in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" for Susquehanna Steam Electric Station Unit 2. This document is divided into sections which correspond directly to Sections 2.1, 2.2, and 2.3 of Enclosure 3. "Request for Additional Information on Control of Heavy Loads," to the Staff's letter of December 22, 1980[1]. Our responses to NUREG-0612 will be submitted in two parts as requested in the December 22, 1980 letter and as modified by the Staff's letter of February 3, 1981. The first part, contained herein, is the response to Section 2.1; the second part which is to be submitted by August 15, 1983, will contain the responses to Sections 2.2 and 2.3.

This document is very similar to the 6-month submittal for Unit 1. Many sections are simply repeated for continuity sake. The major differences are the omission of the Engineered Safeguard Service Water Pumphouse and Diesel Generator Building Cranes which are common to both units and the consideration of the non-single-failure-proof Unit 2 Reactor Building Crane. Comments generated during the review of previous submittals have also been incorporated.

PP&L's basic objective in responding to NUREG-0612 is to insure that the handling of the overhead loads at SSES is performed in a safe and efficient manner by providing operators with the proper training, operating procedures, and the equipment safeguards necessary, and by insuring that as many overhead operations as possible are performed along defined safe load paths. Where loads must be handled in the vicinity of new or spent fuel, or nuclear safety related equipment, the ultimate objectives are to insure:

1. radioactive release as a result of potential load drop is less than 25% of the requirements of 10 CFR Part 100,

2. damage to fuel will not result in a K_{eff} greater than 0.95.

3. damage to the RPV or spent fuel pool will not uncover fuel, and

4. damage to equipment will not result in the loss of safe shutdown capability nor the capability to remove decay heat.

For the purposes of this response, a heavy load was considered to be any load in excess of one thousand pounds. This was the most realistic weight limit to evaluate because many cranes, monorails and hoists were rated in units of 1/4, 1/2, or 1 ton units. In addition, the weight of some loads was estimated and a convenient unit (1/2 ton) was conservatively used for relatively small loads.

1 On December 22, 1980, the NRC requested all applicants for operating licenses to implement NUREG-0612, reference letter from Darrell G. Eisenhut, Director, Division of Licensing.

2.0 INFORMATION REQUESTED FROM LICENSEE

2.1 General Requirements

NUREG-0612, Section 5.1.1 identified several general guidelines related to the design and operation of overhead load-handling systems in the areas where spent and new fuel is stored, in the vicinity of the reactor core, and in other areas of the plant where a load drop could result in damage to equipment required for safe shutdown or decay heat removal. The information supplied in Sections 2.1.1 through 2.1.3 of this response is intended to provide the Staff with the results of our reviews and identify any potentially hazardous load-handling operations which would require special procedures or equipment modifications to insure the intent of NUREG-0612 is met.

2.1.1 Plant Arrangement Review

Statement of Requirement:
Report the results of your review of plant arrangements to identify all overhead handling systems from which a load drop may result in damage to any system required for plant shutdown or decay heat removal (taking no credit for any interlocks, technical specifications, operating procedures, or detailed structural analysis).

Interpretation:
None required.

Statement of Response:
A detailed review of all overhead load handling systems was performed by PP&L for the purpose of identifying those handling systems from which a load drop may result in damage to equipment required for plant shutdown or decay heat removal. The SSES Equipment Index was utilized as a check to insure all cranes, monorails, and hoists were reviewed. Also included in the review were potential locations for rigging for the removal of miscellaneous equipment.

Figures 1 thru 10 are color coded to indicate the following: orange, location of handling systems; yellow, safe load paths; green, safe shutdown equipment, and; pink, location of fuel and vessel.

2.1.2 Exclusion of Overhead Handling Systems

Statement of Requirement:
Justify the exclusion of any overhead handling system from the above category by verifying that there is sufficient physical separation from any load-impact point and any safety-related component to permit a determination by inspection that no heavy load drop can result in damage to any system or component required for plant shutdown or decay heat removal.

Interpretation:
Table 1, "Systems Required for Safe Shutdown" lists those systems which were reviewed to verify exclusion from impact analysis. Overhead handling systems were excluded under this section using the justification stated in Table 2.

Statement of Response:
PP&L has complied with this requirement by performing a physical walkdown of all cranes, monorails and hoists located in the reactor building. Visual inspections were performed by plant engineers and maintenance engineers to insure that loads with the largest physical dimensions could be moved along defined safe load paths without impacting safety related equipment in the event of a load drop. Where cranes or monorails travel over hatches or access ways, the lower areas were also visually inspected for the potential impact of a load drop. During the walkdown consideration was also given to the lateral movement of loads due to deflections caused by the possibility of loads striking structural members. Table 2, "Cranes Excluded from Heavy Loads Analysis" is a tabulation of those overhead handling systems which were eliminated as having no potential for impact on safety related equipment. Overhead handling systems traveling over or in close proximity to safety related equipment (i.e. not excluded during this phase of the walkdown inspection) will be reviewed in detail and the results, including modifications or changes required to meet NUREG-0612, will be included in our final report. A brief discussion of these is included in Table 3.

2.1.3 Compliance with Guidelines of NUREG-0612, Section 5.1.1

With respect to the design and operation of heavy load handling systems in the reactor building and the load handling systems identified in Table 2 and 3, the following information is included to verify our compliance with NUREG-0612, Section 5.1.1.

2.1.3.a Safe Load Load Paths

Statement of Requirement:
Provide drawings or sketches sufficient to clearly identify the location of safe load paths, spent fuel, and safety-related equipment.

Interpretation:
None required.

Statement of Response:
Plant Staff engineers have reviewed the load handling systems for the purpose of identifying safe load paths relative to safety equipment and spent fuel. Figure 1 thru 10 were marked to indicate the safety related equipment, spent fuel and the paths chosen. These paths were defined for handling systems that both fell under the area of concern with respect to NUREG-0612, and were of the bridge crane type. Monorails were excluded from this analysis, since load movement is dedicated by the monorail itself. Safe load paths will be clearly marked on the refueling deck prior to initial fuel loading.

2.1.3.b Load Handling Procedures

Statement of Requirement:
Provide a discussion of measures taken to ensure that load-handling operations remain within safe load paths, including procedures, if any, for deviation from these paths.

Interpretation:
None required.

Statement of Response:
PP&L has prepared general operating procedures for overhead handling systems. These procedures include precautions and guidelines to be observed while operating the systems. In addition to crane operating procedures, PP&L has developed special handling procedures for major heavy loads. Such procedures supplement the general crane operating procedure by providing additional precautions and a safe load path for that unique load.

Generic safe load paths have been incorporated into the Reactor Building Crane operating procedure. Work instructions for specific lifts include the safe load paths for the particular loads.

The safe load paths are recorded in "quality" procedures which fall under the auspices of AD-QA-101, "Procedure Program." The provisions of this procedure allow the implementation of a temporary change which involves signature of the plant shift supervisor and one other member of the plant management prior to implementation, and review by the Plant Operational Review Committee within 14 days of the implementation of the change.

Specific procedures have been written for the following loads. This list is extracted from Table 3.1-1 of NUREG-0612.

	Load	Written Procedure	Remark
1.	Reactor Wall Shield Plugs	Yes	-
2.	Drywell Head	Yes	-
3.	Vessel Head	Yes	-
4.	Steam Dryer	Yes	-
5.	Steam Separator	Yes	-
6.	Pool Gates	Yes	-
7.	Dryer/Separator Pit Shield Plugs	Yes	-
8.	Slot Plugs	Yes	-
9.	Spent Fuel Shipping Cask	No	Cask not yet purchased
10.	Vessel Service Platform	Yes	-
11.	Waste and Debris Cask	No	Cask not yet purchased
12.	Vessel Heat Insulation	Yes	-
13.	Replacement Fuel Racks	No	See note 1
14.	Crane Load Block	No	See note 1
15.	Plant Equipment	No	See note 1

NOTES: 1. The reactor building crane operating procedure, MT-99-001, includes a generic safe load path and general instructions for the handling of miscellaneous loads not covered by specific instructions.

These procedures are available at the site for audit.

2.1.3.c Tabulation of Heavy Loads

Statement of Requirement:
Provide a tabulation of heavy loads to be handled by each crane which includes the load identification, load weight, its designated lifting device, and verification that the handling of such load is governed by a written procedure containing, as a minimum, the information identified in NUREG-0612, Section 5.1.1(2).

Interpretation:
The tabulation of heavy loads includes only those loads which, if dropped, could impact safety-related equipment, new or spent fuel or fuel pool cooling equipment.

Statement of Response:
Table 3, "Cranes Requiring a Detailed Review" lists the heavy loads associated with each handling system from which a load drop could potentially impact safety-related equipment or fuel. The table includes: crane identification, crane location (building and elevation), load identification and weight, safety-related equipment that could be impacted, and hazard elimination category.

2.1.3.d Verification of Design of Lifting Devices

Statement of Requirement:
Verification that lifting devices for loads identified in 2.1.3.c, above, comply with the requirements of ANSI N14.6-1978, or ANSI B30.9-1971 as appropriate. For lifting devices where these standards, as supplemented by NUREG-0612, Section 5.1.1(4) or 5.1.1(5), are not met, describe any proposed alternatives and demonstrate their equivalency in terms of load-handling reliability.

Interpretation:
None Required.

Statement of Response:
SSES Unit 2 will employ the same special lifting devices which are used at Unit 1. Sling selection for loads which do not have special lifting devices will be governed by the same procedures as previously reviewed for Unit 1.

2.1.3.e Verification of inspection, testing and maintenance

Statement of Requirement:
Provide a verification that ANSI B30.2-1976, Chapter 2-2, has been invoked with respect to crane inspection, testing, and maintenance. Where any exception is taken to this standard, sufficient information should be provided to demonstrate the equivalency of proposed alternatives.

Interpretation:
None Required.

Statement of Response:
PP&L has developed a preventative maintenance program to include all cranes and hoists. This program will include requirements for inspection, testing, and maintenance in accordance with the guidelines of Chapter 2-2 of ANSI B30.2-1976 with the exception that tests and inspections will be performed prior to use where it is not practical to meet the frequencies of ANSI B30.2 for periodic inspection and test, or where frequency of crane use is less than the specified inspection and test frequency. The diesel building cranes (OH501, A,B,C and D) and the reactor building crane (2H213) have been used during plant construction. The construction group has performed the necessary inspecting, testing, and maintenance requirements of Chapter 2-2, ANSI B30.2-1967.

2.1.3.f Verification of Crane Design

Statement of Requirement:
Provide verification that crane design complies with the guidelines of CMAA Specification 70 and Chapter 2-1 of ANSI B30.2-1976, including the demonstration of equivalency of actual design requirements for instances where specific compliance with these standards is not provided.

Interpretation:
None Required.

Statement of Response:
Design requirements, for those cranes from which a load drop could impact safety related equipment or fuel, are in accordance with the Crane Manufacturers Association of America (CMAA) Specification 70 and ANSI B30.2. The reactor building crane (2H213) and the diesel building cranes (OH501A,B,C and D) are designed in accordance with CMAA-70 Class C and ANSI B30.2-1967. The design requirements for the refueling platform hoists (2H201, 2H203, and 2H214) which are supplied by the NSSS vendor were included in PP&L's 9-month response for Unit 1. The monorail hoists are designed in accordance with ANSI B30.16. The design of the jib crane is in accordance with ANSI B30.2-1976 and CMAA-70.

2.1.3.g Exceptions to ANSI B30.2-1976 (Operator Training)

Statement of Requirement:
Identify exceptions, if any, taken to ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

Interpretation:
None Required.

Statement of Response:
We make no exceptions to ANSI B30.2-1976. The crane operator's training program was developed to meet the requirements of chapter 2.3 of ANSI B30.2-1976 "Overhead and Gantry Cranes". A procedure has been written by plant staff mechanical maintenance section to formalize the program and furnish the necessary forms to document the training. All crane operators are qualified to this procedure.

2.2 Specific Requirements for Reactor Building (1)

2.3 Specific Requirements for Other Areas (1)

(1) Per the guidelines of Mr. D. L. Eisenhut's letter of December 22, 1981, these sections are to be submitted in PP&L's final report.

TABLE 1

SYSTEMS REQUIRED FOR SAFE SHUTDOWN

Group I - Systems Required for Both Hot and Cold Shutdown

Control Rod Drive - Manual Scram Circuits only
Main Steam Isolation Valves (manual closure functions only)
Suppression Pool Temperature Monitoring
Reactor Pressure Vessel Instrumentation

Group II - Systems required for Hot Shutdown

Division I

RCIC
ADS
ESW
ESSW Pumphouse HVAC
Diesel Generators and Auxiliaries
Diesel Generator HVAC
Containment Instrument Gas

Division II

HPCI
plus all Division II of those systems under Group II,
Division I except RCIC

Group III - Systems Required for Cold Shutdown

Division I

RHR
RHRSW
ESW
ESSW Pumphouse HVAC
Diesel Generators and Auxiliaries
Diesel Generator HVAC

Division II

All Division II of above systems under Group III, Division I.

TABLE 2

CRANES EXCLUDED FROM HEAVY LOADS ANALYSIS

Crane Equipment No.	Location (1) Building	Location (1) Elevation	Hazardous Targets (2)	H-E (3) Category
2H204	Reactor Building	719	None	B
2H207A,B	Drywell	719	Recirc. Pump	A
2H211	Reactor Building	818	Fuel	B
2H212	Reactor Building	818	Fuel	B
2H217	Suppression Pool	683	Various	A
2H239-242	Reactor Building	739	Main Steam Isolation Valves	A
2H243	Reactor Building	719	None	B
2H402A,B	Drywell	752	Feedwater Isolation Valves	A
2H403,4	Drywell	738	Main Steam Relief Valves	A
2H406-422	Drywell	738	Main Steam Relief Valves	A

NOTES: 1. Only cranes in the Unit 2 Reactor Building were considered for this report. Buildings common to both Units (Radwaste, Diesel Generator, ESSW Pumphouse, and Circulating Water Pumphouse) were covered by the Unit 1 reports. The Unit 2 Turbine Building contains no safe-shutdown equipment.

2. Hazardous Targets are those items that, if impacted by a heavy load drop, could contribute to one of the adverse consequences listed in Section 5.1 of NUREG-0612.

3. Hazardous Elimination Categories

A - These are load handling systems that could only be used during plant shutdowns.

B - The capacity of the load handling system is such that no load greater than 1000 pounds can be lifted.

TABLE 3

CRANES REQUIRING DETAILED REVIEW

2H201, 2H203, 2H214 -- Refueling Bridge

LOCATION: Reactor Building elevation 818'

LOAD IDENTIFICATION: Nuclear Fuel

DISCUSSION: The Unit 1 counterpart of this crane was evaluated and the results reported in the 9-month response. The same discussion applies to Unit 2, therefore no further evaluation is required.

2H205 -- Recirc. Pump Hoist (24 tons)

LOCATION: Reactor Building elevation 719'

LOAD IDENTIFICATION:

Recirculation Pump	27,200 lbs.
Recirculation Pump Stator	21,860 lbs.
Recirculation Pump Rotor	10,315 lbs.

DISCUSSION: There are various "Q" conduit, piping, and electrical panels in the vicinity of this hoist. A complete evaluation of the consequences of impacting these, or whether they could in fact be impacted, will be included in the 9-month report.

2H206 A,B -- Equipment Access Door with Personnel Lock Hoist (16 tons ea.)

LOCATION: Reactor Building Elevation 719'

LOAD IDENTIFICATION:

Access Door	64,000 lbs.

DISCUSSION: See 2H205 above.

2H208 A,B -- RHR Heat Exchanger Hoists (12 tons ea.)

LOCATION: Reactor Building Elevation 683'

LOAD IDENTIFICATION:

RHR Heat Exchanger	48,000 lbs.

DISCUSSION: See 2H205 above.

2H209 -- HPCI, RCIC, and RHR Pump and Turbine Hoist (12 tons)

LOCATION: Reactor Building Elevation 683'

LOAD IDENTIFICATION:

Core Spray Pump Motor	6,330 lbs.
Core Spray Pump Rotor	1,379 lbs.
Core Spray Pump Stator	2,700 lbs.
Core Spray Pump	7,115 lbs.
High Pressure Coolant Injection Pump	6,200 lbs.
HPCI Booster Pump	3,900 lbs.
HPCI Gear Reducer	1,260 lbs.
HPCI Stop Valve	2,900 lbs.
HPCI Turbine Upper Head Case	7,500 lbs.
HPCI Turbine Rotor	1,400 lbs.
Reactor Core Isolation Cooling Pump	5,275 lbs.
Reactor Core Isolation Cooling Turbine	3,490 lbs.
Residual Heat Removal Pump	20,650 lbs.
RHR Pump Motor	18,020 lbs.
RHR Pump Rotor	4,690 lbs.
RHR Pump Stator	6,960 lbs.

DISCUSSION: See 2H205 above

2H210 -- Core Spray Pumps and RBCCW Heat Exchanger Hoist (12 tons)

LOCATION: Reactor Building Elevation 683

LOAD IDENTIFICATION:

RBCCW Heat Exchanger	24,715 lbs.
Core Spray Pump	7,115 lbs.
Core Spray Pump Motor	6,330 lbs.
Core Spray Pump Rotor	1,379 lbs.
Core Spray Pump Stator	2,700 lbs.

DISCUSSION: See 2H205 above

2H213 -- Reactor Building Crane

LOCATION: Reactor Building Elevation 818'

LOAD IDENTIFICATION:

Aux. Hoist: (5 tons)

Head Holding Pedestal	1,450 lbs.
Dryer/Separator Sling	3,500 lbs.
Stud Tensioner	1,500 lbs.
Vessel Head Strongback	6,500 lbs.
Jib Crane	5,200 lbs.
Hatch Covers	6,000 lbs.
Support Beams	3,000 lbs.

Main Hoist: (125 tons)

Reactor Cavity Shield Blocks	71.5-98.5 tons
Drywell Head	104.5 tons
Reactor Head Insulation	18.2 tons
Reactor Head	91.8 tons
Steam Dryer	40.0 tons
Steam Separator	73.3 tons
Fuel Pool Plugs	12.0 tons
Water Tight Gates	3.0-4.5 tons
Equipment Pool Plugs	63.0 tons
Reactor Head Carousel	5.0 tons
Service Platform	6.5 tons

DISCUSSION: This crane is not single-failure-proof as its Unit 1 counterpart. This crane lifts shield blocks and reactor components over the reactor, refueling deck, and equipment pool. Load drop analyses are being performed to assure that the Section 5.1 guidelines will be met. The results of these analyses will be reported in the 9-month response.

2H215 -- Equipment Shaft Crane (24 tons)

LOCATION: Reactor Building Elevation 799'

LOAD IDENTIFICATION:

Miscellaneous	48,000 lbs.

DISCUSSION: This crane travels over the Unit 2 truck bay. There is one "Q" conduit located where it could be impacted by a load drop. Also due to the capacity and lift height, the deck below was examined. Piping for Emergency Service Water Loop A and several conduits are located such that a deck failure could generate missiles that could damage them. These will be evaluated in the final report.

2H216 -- Truck Bay Jib Crane (2 tons)

LOCATION: Reactor Building Elevation 670'

LOAD IDENTIFICATION:

Miscellaneous	4,000 lbs.

DISCUSSION: The single "Q" conduit listed above may also be impacted by a postulated drop from this crane. An evaluation will be included in the final report.

2H218, 2H219 -- Reactor Building Concrete Shielding Block Hoists

LOCATION: Reactor Building Elevation 719'

LOAD IDENTIFICATION:

Concrete Shield Blocks	20,000 lbs.

DISCUSSION: See 2H205 above.

1HXXX -- Floor Plug Hoist

LOCATION: Reactor Building Elevation 818'

LOAD IDENTIFICATION:

Resin Bed Shield Covers	30,500 lbs.
Equipment Access Plugs	27,200 lbs.

DISCUSSION: An evaluation of this hoist was included in the 9-month response for Unit 1.