June 22, 1981

File: NG-3514(B) Serial No.: NO-81-1076

Office of Nuclear Reactor Regulation
ATTENTION: Mr. T. A. Ippolito, Chief
Operating Reactors Branch No. 2
United States Nuclear Regulatory Commission
Washington, D C. 20555

BRUNSWICK STEAM ELECTRIC PLANT UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324
LICENSE NOS. DPR-71 AND DPR-62
CONTROL OF HEAVY LOADS

Dear Mr. Ippolito:

This letter is in response to an NRC request dated December 22, 1980 concerning the control of heavy loads at nuclear power plants. Carolina Power & Light Company has assembled the information requested in Section 2.1 of Enclosure 3 to your letter. This information is in the attachment to this letter.

We have not identified any changes or modifications that are necessary as a result of this review. We are continuing with our review in order to respond to your request for additional information which is due to you by September 22, 1981. We will advise you of our schedule for making any changes or modifications that may result from this additional review as a part of our September 22, 1981 response.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply and
Engineering & Construction

SDF/jc (9656)
Attachment

A033
S1/1

Send Oversize Encl
To: F. Clemenson

8106260174

BRUNSWICK STEAM ELECTRIC PLANT UNITS 1 & 2
CONTROL OF HEAVY LOADS

RESPONSE TO REQUEST BY
NRC FOR ADDITIONAL INFORMATION

PART I

DUE 6-22-81

Prepared by: G. G. Ward
Date: 6-10-81

PART I

RESPONSE TO REQUEST FOR ADDITIONAL
INFORMATION ON
"CONTROL OF HEAVY LOADS"

The following report constitutes CP&L's response to the NRC regarding their request for additional information on "Control of Heavy Loads", As requested in the December 22, 1980 NRC letter; Part I, answers those questions identified in Section 2.1, "General Requirements for Overhead Handling Systems" of Enclosure 3.

2.1 General Requirements for Overhead Handling Systems

Request: 2.1 (1)

"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".

Response to 2.1 (1)

The overhead handling systems identified during the review of plant are listed by building as follows:

Reactor Building

Cranes

Reactor Building Crane - 125-ton Whiting Overhead Traveling Bridge
Refueling Platform - Stearns-Rodgers
Refueling Jib Crane - 1000 lbs. @15'R

Hoists-Monorails

MR-2	10-Ton	Hand Operated Chain Hoist
MR-3	2-Ton	Hand Operated Chain Hoist
MR-4	10-Ton	Hand Operated Chain Hoist
MR-7	10-Ton	Hand Operated Chain Hoist
MR-10	5-Ton	Hand Operated Chain Hoist
MR-11	5-Ton	Hand Operated Chain Hoist
MR-12	5-Ton	Hand Operated Chain Hoist
MR-13	5-Ton	Hand Operated Chain Hoist
MR-20	20-Ton	Hand Operated Chain Hoist
MR-21	20-Ton	Hand Operated Chain Hoist

Diesel Generator Building

Cranes

5-Ton Single Bridge Crane Hand Operated D/G "1"
5-Ton Single Bridge Crane Hand Operated D/G "2"
5-Ton Single Bridge Crane Hand Operated D/G "3"
5-Ton Single Bridge Crane Hand Operated D/G "4"

Hoists-Monorails

5-Ton Hand Operated Chain Hoist

Intake Structure

Cranes

Intake Structure Crane - 30-Ton P&H Traveling Gantry

Request: 2.1 (2)

"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".

Response to 2.1 (2)

Reactor Building

Monorail-Hoists

	MR-1	2-Ton	Hand Operated Chain Hoist for Vacuum Breakers
	MR-5	5-Ton	Hand Operated Chain Hoist for CRD Pump A
	MR-6	5-Ton	Hand Operated Chain Hoist for CRD Pump B
	MR-8	10-Ton	Hand Operated Chain Hoist for Valve Removal
	MR-9	10-Ton	Electrical Motor Hoist & Trolley for Steam and F. W. Valves
	MR-14	1-Ton	Electrical Motor Hoist & Trolley for Contamination Equipment Room
	MR-15	1-Ton	Hand Operated Chain Hoist for Gamma Scan Lead Plug
	MR-16	10-Ton	Electrical Motor Hoist & Trolley for Access Covers
	MR-17	2-Ton	Hand Operated Chain Hoist for Removable Platform
	MR-18	1-Ton	Hand Operated Chain Hoist for Neutron Monitoring Equipment
	MR-19	10-Ton	Hand Operated Hoist for Hatch Covers
(6)	ST-4	2-Ton	Hand Operated Chain Hoist & Davit for Relief Valves

The above hoists are either removed or physically secured during non-use periods. A physical inspection confirmed that no safe shutdown or decay heat removal components are adjacent to the monorails and/or davit arm load paths; therefore, no safe shutdown or decay heat removal component could be damaged by a load drop.

Turbine Building

Cranes

Turbine Building Crane	188-Ton Whiting Overhead Traveling Bridge

Auxiliary Bay Crane — 100-Ton Whiting Semi Gantry

Hoists

8-Ton Hand Operated Chain Hoist for Recirculation Pump M.G., Set A

8-Ton Hand Operated Chain Hoist for Recirculation Pump M.G., Set B

5-Ton Hand Operated Chain Hoist for Condensate Booster Pumps

1-Ton Hand Operated Chain Hoist for Air Compressor

The above cranes and hoists have been omitted from Item 2.1 (1) since no system or component required for plant shutdown or decay heat removal is located in the Turbine Building.

Intake Structure

Monorail-Hoist

The 5-ton electric hoist used at the intake structure is over 200 feet from any safety-related system or component and therefore has been precluded from being considered as a hazard with regard to handling loads near safety-related systems and components.

Radwaste Building

Monorail-Hoists

MR-1	4-Ton	Electric Motor Hoist & Trolley for Backwash Air Blower
MR-2	12-Ton	Electric Motor Hoist & Trolley for Filter Demineralizer Tank
MR-3	8-Ton	Electric Motor Hoist & Trolley for Fuel Pool Filter and Waste Collector Filter
MR-4	12-Ton	Electric Motor Hoist & Trolley for Filter Demineralizer Tank
MR-5	8-Ton	Electric Motor Hoist & Trolley for Floor Drain Filters
MR-6	2-Ton	Hand Operated Chain Hoist for Centrifuge
MR-7	2-Ton	Hand Operated Chain Hoist for Centrifuge
MR-8	3/4-Ton	Hand Operated Chain Hoist for HVAC Equipment

The radwaste monorails/hoists are not included in Item 2.1 (1) above since they are completely separate from the area of safe shutdown or decay heat removal systems and/or components. The separation is established by concrete walls as well as distance.

Shop Cranes & Miscellaneous Hoists

Cranes

5-Ton Hot Machine Shop Crane
5-Ton Clean Machine Shop Crane

Monorail-Hoists

5-Ton Electric Motor Hoist & Trolley for Floor Plug and Off-Gas Filter

2-Ton Hand Operated Chain Hoist for Pumps and Valves

1-Ton Hand Operated Chain Hoist for HVAC Equipment

5-Ton Hand Operated Chain Hoist for AOG Equipment

The above cranes and hoists have been excluded from Item 2.1 (1) above since no system or component required for plant shutdown or decay heat removal is located in the shop or other areas where the hoists are located.

Request: 2.1 (3)

"With respect to the design and operation of heavy load-handling systems in the containment and the spent fuel pool area and those load-bearing systems identified in 2.1-1 above, provide your evaluation concerning compliance with the guidelines of NUREG-0612, Section 5.1.1. The following specific information should be included in your reply".

Repo. e to 2.1 (3) Summary

Our review of NUREG-0612, Section 5.1.1, indicates that BSEP is substantially in compliance. There are several minor points of exception or deviation. These points are commented on below:

1. Section 5.1.1 (1) of NUREG-0612, Safe Load Paths, requires that load paths should be "clearly marked on the floor in the area where the load is to be handled".

   Comment

   Safe load paths have been defined on the drawings referenced in Response 2.1 (3)a. Loads are moved by the safest and shortest paths in accordance with the above drawings and written procedures. Due to the number of paths and their configurations, it is felt that marked load paths could possibly cause confusion and therefore not contribute to assuring the safe handling of loads.

2. Section 5.1. (4) requires that "special lifting devices should satisfy the guidelines of ANSI N14.6-1978 'Standard for Special Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More for Nuclear Materials'. This standard should apply to all special lifting devices which carry heavy loads in areas as defined above".

Comment

The lifting devices identified in Table 3-1 are designed in accordance with accepted industry standards and good engineering practices. ANSI N14.6-1978 was not in existence during Brunswick Steam Electric Plant design. Further discussion regarding adequacy of design is located in Response 2.1 (3)d.

3. Section 5.1.1 (5) requires that "lifting devices not specially designed should be installed and used in accordance with the guidelines of ANSI B30.9-1971 'Slings'" and that "in selecting the proper sling the load used should be the sum of the static and maximum dynamic load".

Comment

Non "Special" lifting devices such as slings, shackles and fittings are in compliance to ANSI B30.9-1971 or other applicable standards such as Federal Specification RR-C-271 for shackles; however, components were sized using only static load. Additional comments regarding design adequacy are located in Response 2.1 (3)d.

Request: 2.1 (3)a

"Drawings or sketches sufficient to clearly identify the location of safe load paths, spent fuel and safety-related equipment".

Response to 2.1 (3)a

The following drawings identify safe load paths for loads identified in Response 2.1 (1) above. A copy of each drawing is attached to this report.

81020-M-001 SH.1, SH.2, & SH.3	Safe Load Paths Reactor Building Elevation 117'-4"
81020-M-002 SH. 1 & SH. 2	Safe Load Paths Diesel Generator Building
81020-M-003	Safe Load Paths Intake Structure
81020-M-004	Safe Load Paths Reactor Building Elevation 50'-0"

81020-M-005	Safe Load Paths Reactor Building Elevation 20'-0"
81020-M-006	Safe Load Paths Reactor Building Elevation 17'-0"

Request: 2.1 (3)b

"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".

Response to 2.1 (3)b

The safe load paths indicated on the drawings listed in Response 2.1 (3)a above are referenced in various plant operating procedures. These procedures are identified in the tabulation of heavy loads which is Table 3-1. The procedures refer maintenance and operations personnel to the applicable load path drawing. The load paths follow the safest and shortest routes with consideration given to going around fuel and safety-related equipment. In addition, reference to safe load paths is made in Procedure MP-6 "Operation and Inspection of Cranes and Material-Handling Equipment". During crane operator training and requalification, crane operators are instructed regarding these load paths. The work is performed in accordance with the written approved procedures by experienced personnel and supervised by competent foremen. Prior to initiating the work activities in the procedure, the foreman critiques the procedure with his men to assure each one knows the correct methods to be followed. Electrical interlocks, as well as written instructions in the plant procedures, prevent loads from being handled over the spent fuel and reactor except during specific operations.

To summarize, loads are handled along established safe load paths under the control of qualified and experienced personnel in accordance with written and approved procedures.

Request: 2.1 (3)c

"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)".

Response to 2.1 (3)c

Table 3-1 lists by crane the loads normally handled. Included in the Table are load weights, designated lifting devices, and reference to procedures which govern the activities being performed. The procedures generally include sections for purpose, responsibility, precautions, special equipment and descriptions, references, and step-by-step instructions. The procedures in use at Brunswick Units 1 and 2 meet the intent of NUREG-0612, Section 5.1.1 (2).

Request: 2.1 (3)d

"Verification that lifting devices 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".

Response to 2.1 (3)d

The "cask redundant lifting yoke" and the work basket redundant lifting rig are of redundant design, and the crane on which they are used is single-failure-proof. Therefore, a load drop with regard to equipment handled by the above systems is not considered credible.

Load-handling devices at BSEP identified in Table 3-1 (other than those discussed above) were designed in accordance with accepted industry standards and good engineering practices.

Our preliminary review indicates that "Special" lifting devices were designed for a minimum safety factor of 3 based on yield strength, considering only static load. When a dynamic load of 25% is considered, the safety factor is reduced to 2.4. We are in the process of confirming the design criteria used for these special lifting devices; this confirmation will be formalized in our September 22, 1981, reply.

"Non-special" lifting apparatus such as slings, shackles, and fittings are sized to maintain a minimum safety factor of 5, based on ultimate strength and considering only static load.

Lifting devices are inspected and maintained in accordance with the requirements of ANSI B30.9, B30.10, and N14.6. The existing BSEP inspection, testing and maintenance procedures are considered an extremely important segment for assuring safe load-handling operations.

Request: 2.1 (3)e

"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".

Response to 2.1 (3)e

The crane inspection, testing, and maintenance program at BSEP is in conformance with ANSI B.30.2-1976, Chapter 2-2 and the Occupational

Safety and Health Standards, Section 179,29CFR, Part 1910. Various written procedures are in effect which implement the requirements of the above standard and regulation. These procedures are reviewed during crane operator training to familiarize the operators with these requirements. Maintenance personnel responsible for performing inspection, testing and maintenance are qualified and experienced with regard to the above standards.

Request: 2.1 (3)f

Verify 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.

Response to 2.1 (3)f

All of the cranes and hoists used at the BSEP except the refueling bridge were purchased in accordance with UE&C specifications as discussed below:

1. The Reactor Building crane is of single-failure-proof design. Details of the crane were provided to the NRC by letter on June 18, 1976 and July 26, 1976.

   The Reactor Building overhead cranes were purchased in accordance with United Engineers and Constructors, Inc., Specification No. 9527-01-257-2. The Specification requires that these "cranes shall conform to the latest editions of CMAA, Specification No. 70 for Electric Overhead Traveling Cranes and ANSI B30.2 for Overhead and Gantry Cranes unless otherwise specified or noted".

2. The Intake Structure crane was purchased in accordance with United Engineers and Constructors, Inc., Specification No. 9527-01-257-10. The Specification requires that "cranes furnished under this specification shall conform to the requirements of American National Standard Safety Code for Overhead Gantry Cranes, ANSI B30.2 and the Crane Manufacturers Association of America, Inc., Specifications for Electric Overhead Traveling Cranes, CMAA Specification No. 70".

3. The Refueling Jib Crane was purchased in accordance with United Engineers & Constructors, Inc., Specification No. 9527-01-257-6. The Specification required that the "jib crane shall conform to applicable portions of the following codes" AISC, NFPA, NEMA, ASA-Safety Codes for Cranes, Derricks and Hoists, AWS, SSPC, ASTM, and ASME Boiler and Pressure Vessel Code. Section VIII, Division 1, and that the hoist shall be designed to the requirements of NEMA and NEC as they apply to a hoist. The jib crane and its components were designed to withstand seismic events (while fully loaded) to the extent that a static

loading of 1.0g applied in the direction of least resistance to that loading will not cause any part of the unit to be overstressed and also will not result in a loss of control of load.

4. The remainder of cranes and hoists identified in Response 2.1 (1) above except the refueling bridge were purchased in accordance with United Engineers & Constructors, Inc., Specification No. 9527-01-257-5. The Specification requires that the hoists and cranes "shall be furnished and designed in accordance with the Occupational Safety and Health Administration Standard 29CFR which includes ANSI B30.2-1967. Overhead and Gantry Cranes and electrical equipment shall conform with the National Electric Code". Welding procedures and personnel qualification are required to be in conformance with AWS D14.1.

   In addition, the equipment was specified to be designed such that "all equipment shall be secured in such a manner as not to fall during a seismic reaction while in an unloaded condition", and that 90% of the yield stress shall not be exceeded. Seismic coefficients for vertical and horizontal were specified in the equipment list ranging from .24g to .50g.

Request: 2.1 (3)g

Exceptions, if any, taken to ANSI B30.2-1976 with respect to operator training, qualification and conduct.

Response to 2.1 (3)g

All crane operators are trained in accordance with the requirements of ANSI B30.2-1976. No exceptions are taken.

Crane operators are required to receive classroom instruction and gain practical operating experience under the direction of other qualified operators for each crane on which they are to become qualified. In addition to a physical examination by a medical doctor, each operator trainee must pass a written examination. Crane operators are required to requalify annually. The crane operator training program plays an important part in assuring safe handling of loads at BSEP and therefore is carefully administered by the maintenance supervisor or his designee.

TABLE 3-1

TABULATION OF HEAVY LOADS FOR BRUNSWICK STEAM ELECTRIC PLANT

June 3, 1981

CRANES	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	PROCEDURE
Reactor Building Crane	Shielding	117 Tons	Slings (2 braided 3/4"x8 parts)	MP-8, MP-6
Whiting Overhead Traveling	Drywell Head	85 Tons	Head Strongback	MP-8
125 Ton Main	Reactor Vessel Head	70 Tons	Head Strongback	FH-3, MP-7
5 Ton Aux.	Steam Dryers	~75,000 #	Dryer & Separator Sling	FH-3, MP-9
	Moisture Separators	~102,000 #	Dryer & Separator Sling	MP-9
	RPV Service Platform	7 Tons	Service Platform Sling 14,000#	FH-3, PT 18.2, FH-5
	RV Head Insulation	4,00 lbs	Head Strongback	MP-7
	Head Strongback		Main Hook	FH-3, MP-7
	Stud Tensioner		Tensioner Frame	MP-7, MP-8
	Access Plugs	117 Tons	Slings	MP-6
	HEPA Filter	2 Tons	Sling	MP-6
	Spent Fuel Pool Gates		Slings	MP-9
	Spent Fuel Shipping Cask	80 Tons	Redundant Lifting Yoke	MP-27, MP-29
	PWR Fuel Rack	8,720 lbs	Sling	
	BWR Fuel Rack	7,200 lbs	Sling	
	Cattle Chute	12 Tons	Slings	MP-9
	Shielded Personnel Work Basket	8,500 lbs	Redundant Lifting Rig Dryer Separator Sling & Main Hook (Partial)	MP-6
	Replacement Fuel Storage Racks	Later	Later	Later
	Fuel Grapple	5,200 lbs	Fuel Grapple Service Sling 5800#	FH-5, FH-11A
	R.V. Head Stud	600 lbs	Stud Handling Tool	FH-3, MP-7
	Head Nut & Washer Rack	600 lbs	Handling Sling 3800# (4 Leg 1/4" spreader)	FH-3, MP-7

TABLE 3-1

TABULATION OF HEAVY LOADS FOR BRUNSWICK STEAM ELECTRIC PLANT

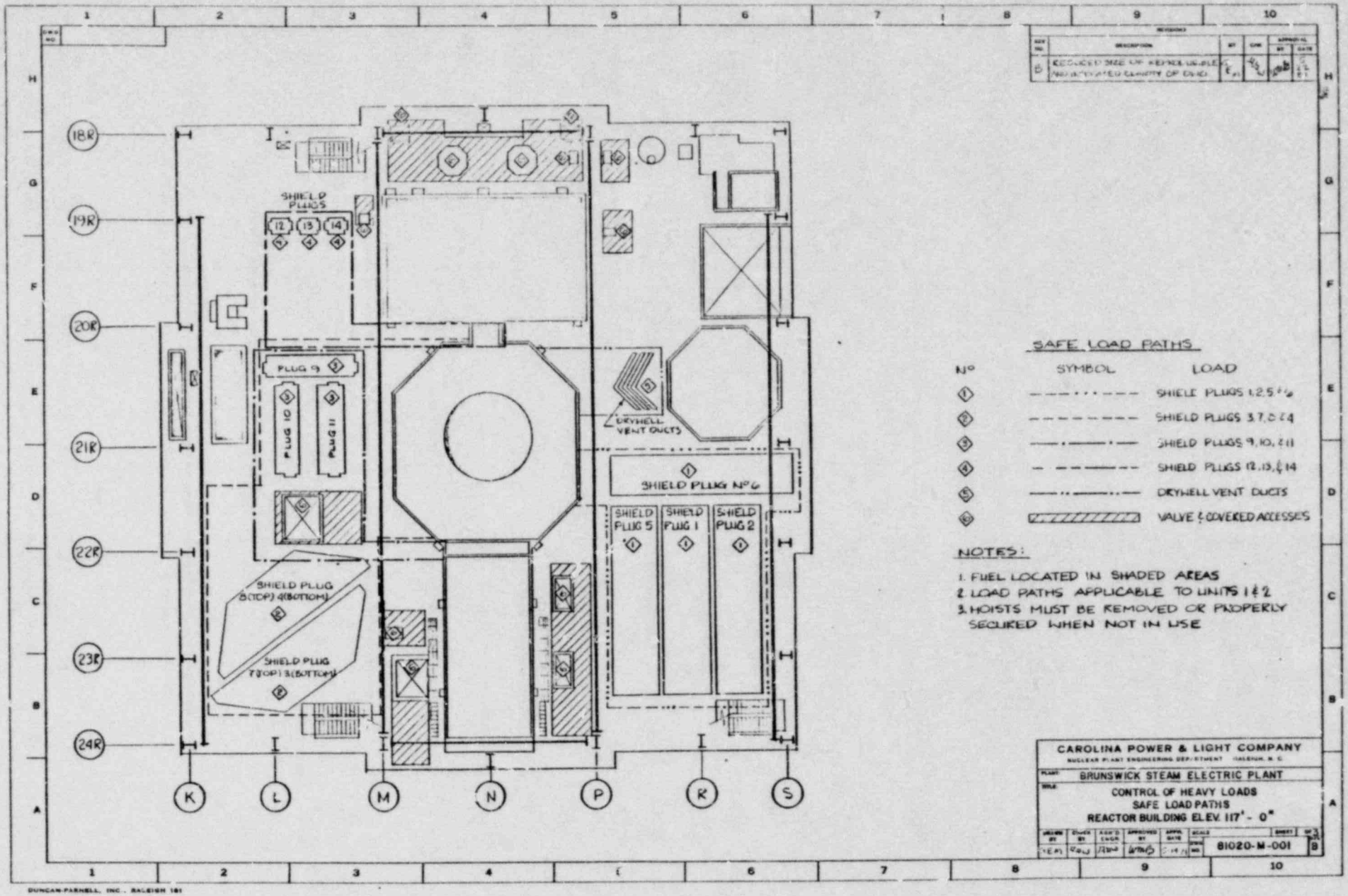
CRANES	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	PROCEDURE
Reactor Building Crane Continued	Head Stud Rack	3,000 lbs	Handling Sling	FH-3, FH-5, MP-7
	Refueling and Service Tools	.4 Tons	Various	FH-10, FH-11, FH-11A, FH-15
	New Fuel	745 lbs	General Purpose Grapple	FH-9
	Debris Cask	11 Tons	Sling	MP-6
	Invessel Service Platform	20 Tons	Strongback	MP-6
Refueling Platform	Reactor Vessel Servicing & Refueling			FH-18.1, MP-6, FH-11A
Traveling Bridge 4 Wheel Overhead	BWR Dummy Fuel Assembly	600 lbs	Fuel Grapple	FH-4
Trolley & Aux. Hoist On Separate Monorail	BWR New Fuel Assembly	745 lbs	Fuel Grapple	FH-5, FH-9, FH-10, FH-11
	BWR Spent Fuel Assembly	745 lbs	Fuel Grapple	FH-5, FH-11, FH-15
	Refueling & Service Tools	.4 Ton	Various	FH-10, FH-11, FH-11A, FH-15
	PWR Fuel	1,439 lbs	Fuel Grapple	FH-13
Refueling Jib Crane	Refueling Tools			MP-6
Hand Operated Boom w/ Trolley & Chain Hoist	Reactor Components	.5 Ton	Various	FH-4, FH-5
RB Hoists		Heaviest Load		
MR-2 Chain Hoist	RHR Pumps B & D	8,400 lbs	Slings	MP-6
MR-3 Chain Hoist	RCIC Pump & Turbine	625 lbs	Slings	MP-6
MR-4 Chain Hoist	RHR Pumps A & C	8,400 lbs	Slings	MP-6
MR-7 Elec. Motor Hoist & Trolley	HPCI Pump & Turbine	8,400 lbs	Slings	MP-6
MR-10 Chain Hoist	RHR Service Water & Booster Pump A	5 Tons	Slings	MP-6
MR-11 Chain Hoist	RHR Service Water & Booster Pump B	5 Tons	Slings	MP-6

TABLE 3-1

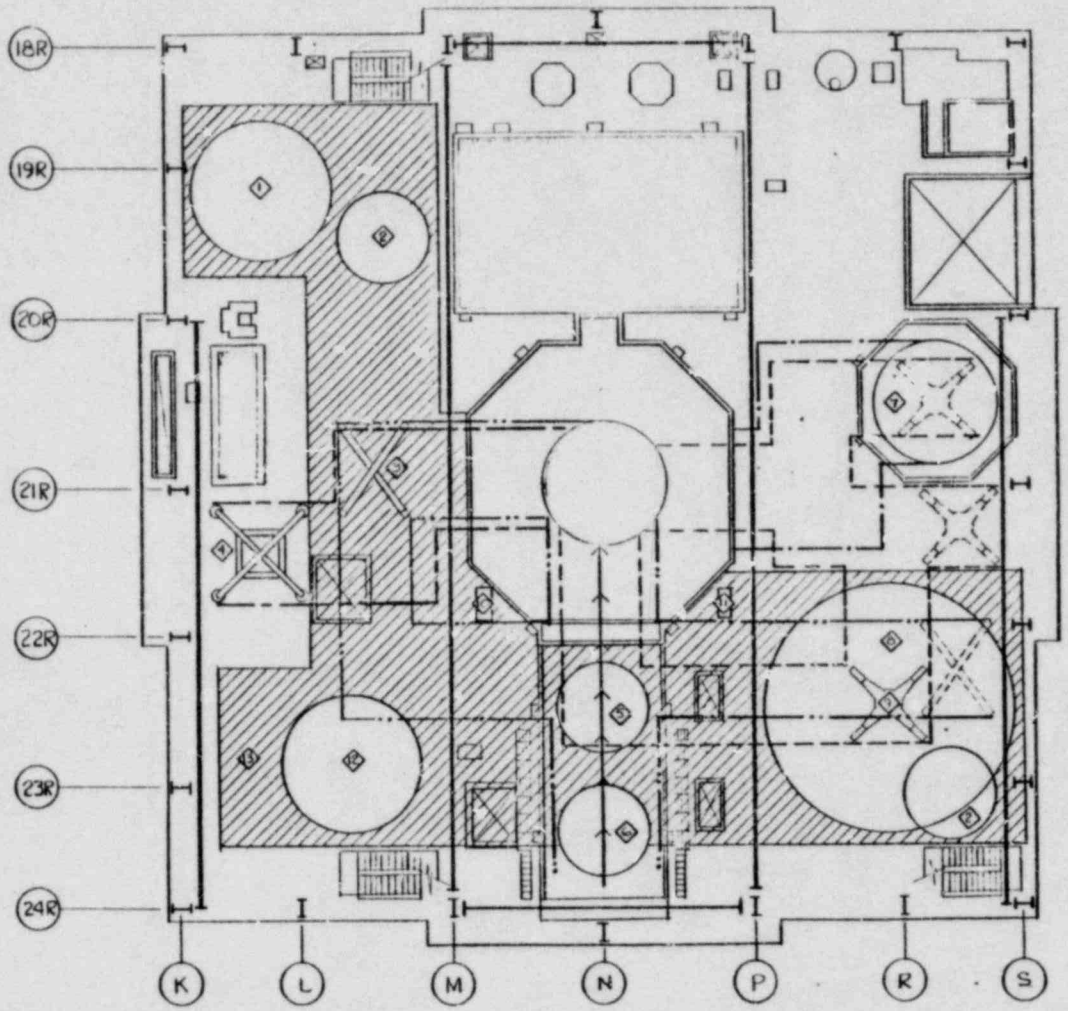
TABULATION OF HEAVY LOADS FOR BRUNSWICK STEAM ELECTRIC PLANT

June 3, 1981

CRANES	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	PROCEDURE
MR-12 Chain Hoist	RHR Service Water & Booster	5 Tons	Slings	MP-6
MR-13	RHR Service Water & Booster Pump D	5 Tons	Slings	MP-6
MR-20 Chain Hoist	Recirc. Pump Motor A	34,000 lbs	Slings	MP-6
MR-21 Chain Hoist	Recirc. Pump Motor B	34,000 lbs	Slings	MP-6
Intake Structure Crane	Service Water Pumps	6,284 lbs	Sling	MP-6
P&H Traveling Gantry	Service Water Motors	3,600 lbs	Sling	MP-6
	Circ. Water Pumps	56,000 lbs 34,000 lbs	Sling	MP-6
	Circ. Water Motors	45,000 lbs	Sling	MP-6
	Traveling Screens			
	Circ. Water	54,000 lbs	Strongback (28 tons)	MP-6
	Service Water	21,100 lbs	Slings	MP-6
Diesel Building Cranes				
Single Bridge	D/G 1 Components	3,300 lbs	Sling	MP-6
Hand Operated	D/G 2 Components	3,300 lbs	Sling	MP-6
Chain Hoist & Trolley	D/G 3 Components	3,300 lbs	Sling	MP-6
	D/G 4 Components	3,300 lbs	Sling	MP-6
Hoists				
Chain Hoist & Trolley	Switchgear	5 Tons	Sling	MP-6



POOR ORIGINAL



REVISIONS					
REV NO.	DESCRIPTION	BY	CHK	APPROVED BY	DATE
B	REVISED SIZE OF REMOVABLE AND INCREASED CLARITY OF DWG.	G.E.M.	[illegible]	[illegible]	[illegible]

NOTES

1. SHADED AREA SHOWS FUEL LOCATIONS
2. LOAD PATHS APPLICABLE TO UNITS 1 & 2
3. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE.

SAFE LOAD PATHS

NO	SYMBOL	LOAD
1		RVP SERVICE PLATFORM & SUPPORT
2		INVESSEL SHIELDED PLATFORM
3		DRYER & SEPARATOR SLING
4		STUD TENSIONER
5		STEAM SEPARATOR
6		STEAM DRYER
7		RPV HEAD
8		DRYWELL HEAD
9		HEAD STRONGBACK
10		NUT RACKS
11		STUD RACKS
12		HEAD INSULATION
13		VESSEL PIPING SPOOLS

CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT - RALEIGH, N. C.

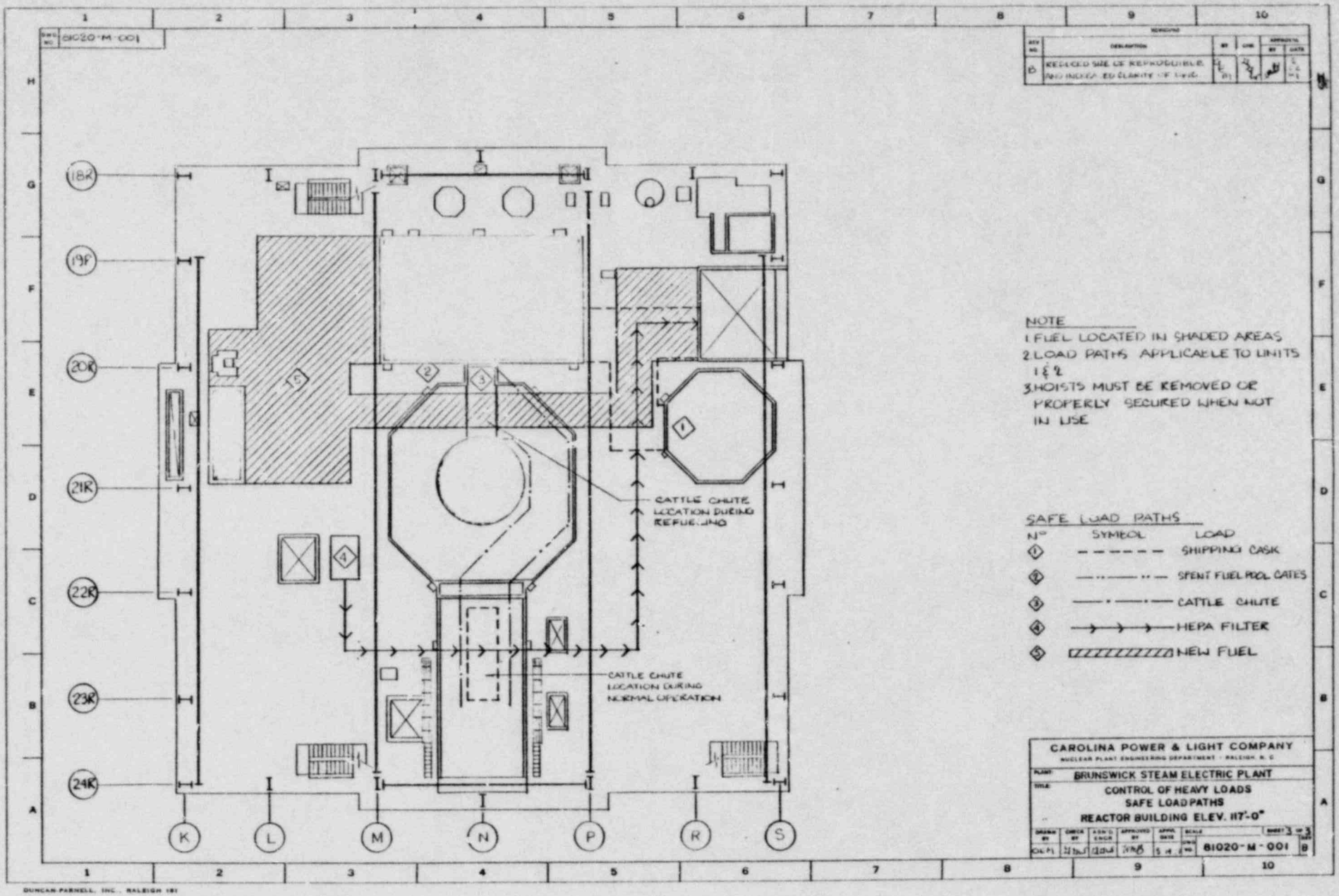
PLANT: BRUNSWICK STEAM ELECTRIC PLANT

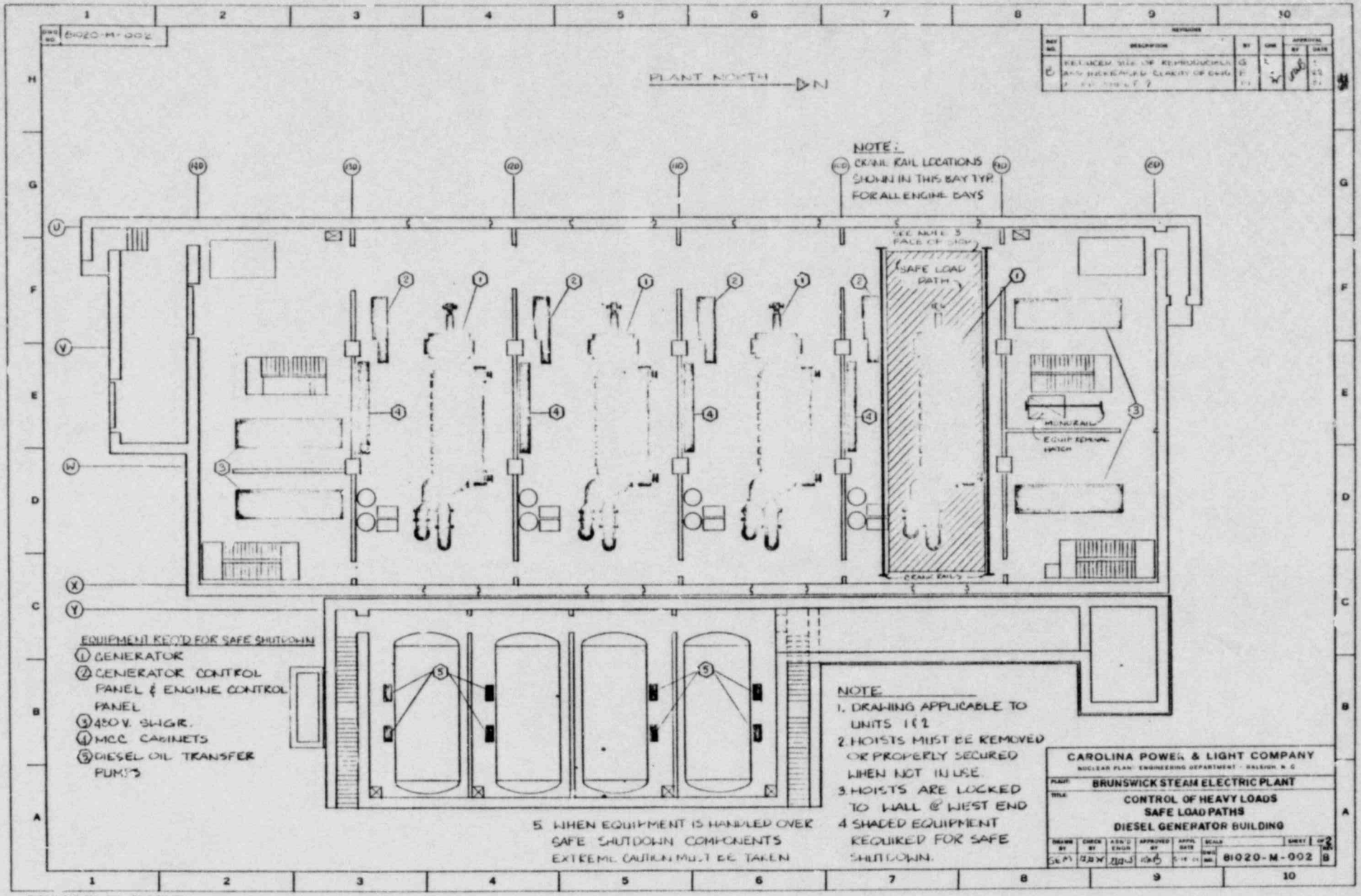
TITLE: CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
REACTOR BUILDING ELEV. 117'-0"

DRAWN BY	CHECKED BY	ASS'D ENGR	APPROVED BY	APPR. DATE	SCALE	SHEET 2 OF 3
G.E.M.	[illegible]	[illegible]	[illegible]	5-19-71	DWG. NO. 81020-M-001	REV. B

DUNCAN-PARNELL, INC., RALEIGH NC

POOR ORIGINAL





DUNCAN-PARNELL, INC., RALEIGH NC

POOR ORIGINAL

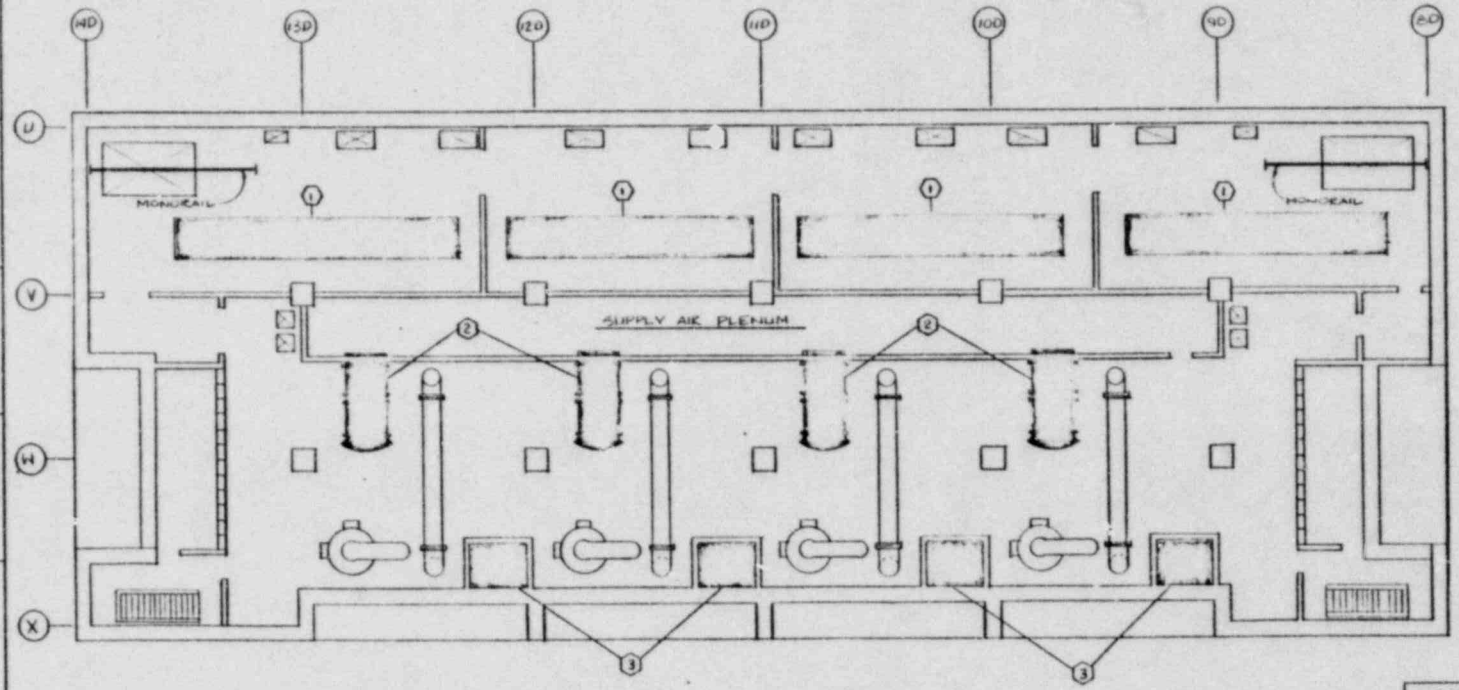
EQUIPMENT REQUIRED FOR SAFE SHUTDOWN

1. 4160 SWGR
2. SUPPLY AIR FANS
3. EXHAUST FANS

NOTE

1. [illegible] APPLICABLE TO UNITS 1 & 2
2. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE.
3. SHADED EQUIPMENT REQUIRED FOR SAFE SHUTDOWN.
4. NO EQUIPMENT IS TO BE LIFTED OVER SAFE SHUTDOWN EQUIPMENT UNLESS NECESSARY AND THEN W/EXTREME CAUTION

REV. NO.	DESCRIPTION	BY	CHK	APPROVAL BY	APPROVAL DATE
B	REDUCED SIZE OF REMOVABLE AND INCREASED QUANTITY OF SWGR [illegible]	G	G	[illegible]	3-12-81



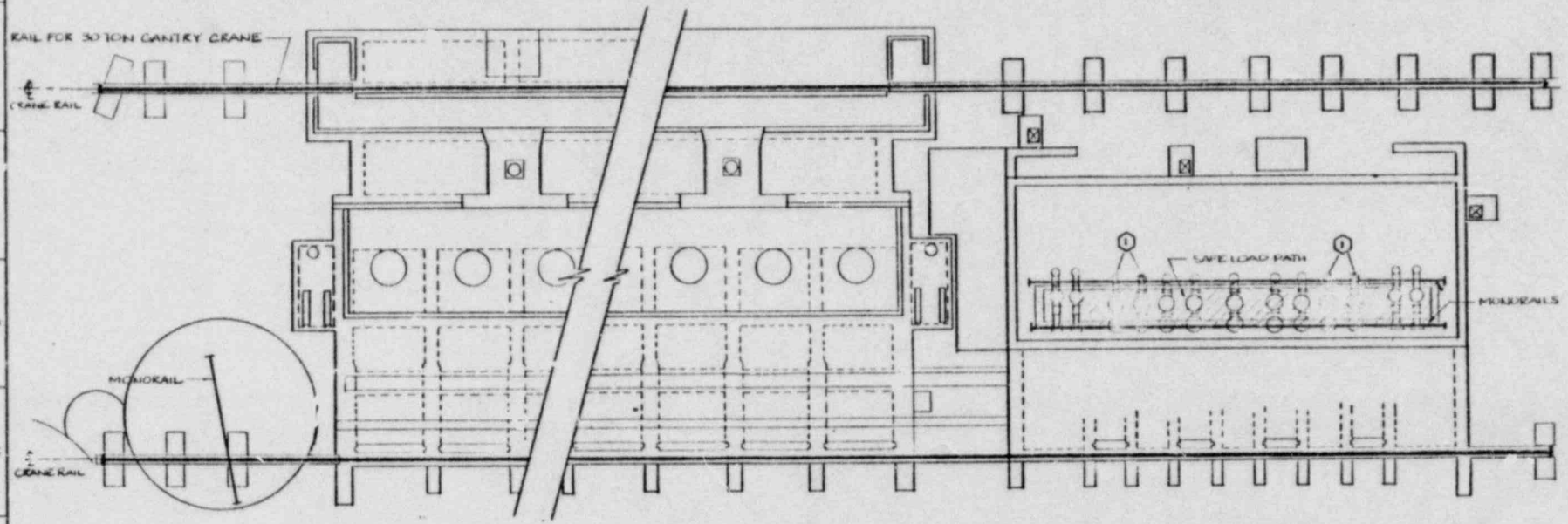
CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT - RALEIGH, N. C.

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

TITLE: CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
DIESEL GENERATOR BUILDING

DRAWN BY	CHECK BY	AS-BUILT CHK'D	APPROVED BY	APPR. DATE	SCALE	SHEET 2 OF 2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NONE	DWG. NO. 81020-M-002 REV. B

DUNCAN-PARNELL, INC., RALEIGH NC



EQUIPMENT REQUIRED FOR SAFE SHUTDOWN

① NUCLEAR SERVICE WATER PUMPS

NOTE

1. DRAWING APPLICABLE TO UNITS 1 & 2
2. NO EQUIPMENT IS TO BE LIFTED OVER SAFE SHUTDOWN EQUIPMENT UNLESS NECESSARY AND THEN W/E EXTREME CAUTION
3. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE
4. OTHER EQUIPMENT NOT AFFECTING SAFE SHUTDOWN EQUIPMENT MAY NOT BE SHOWN IN THIS DRAWING

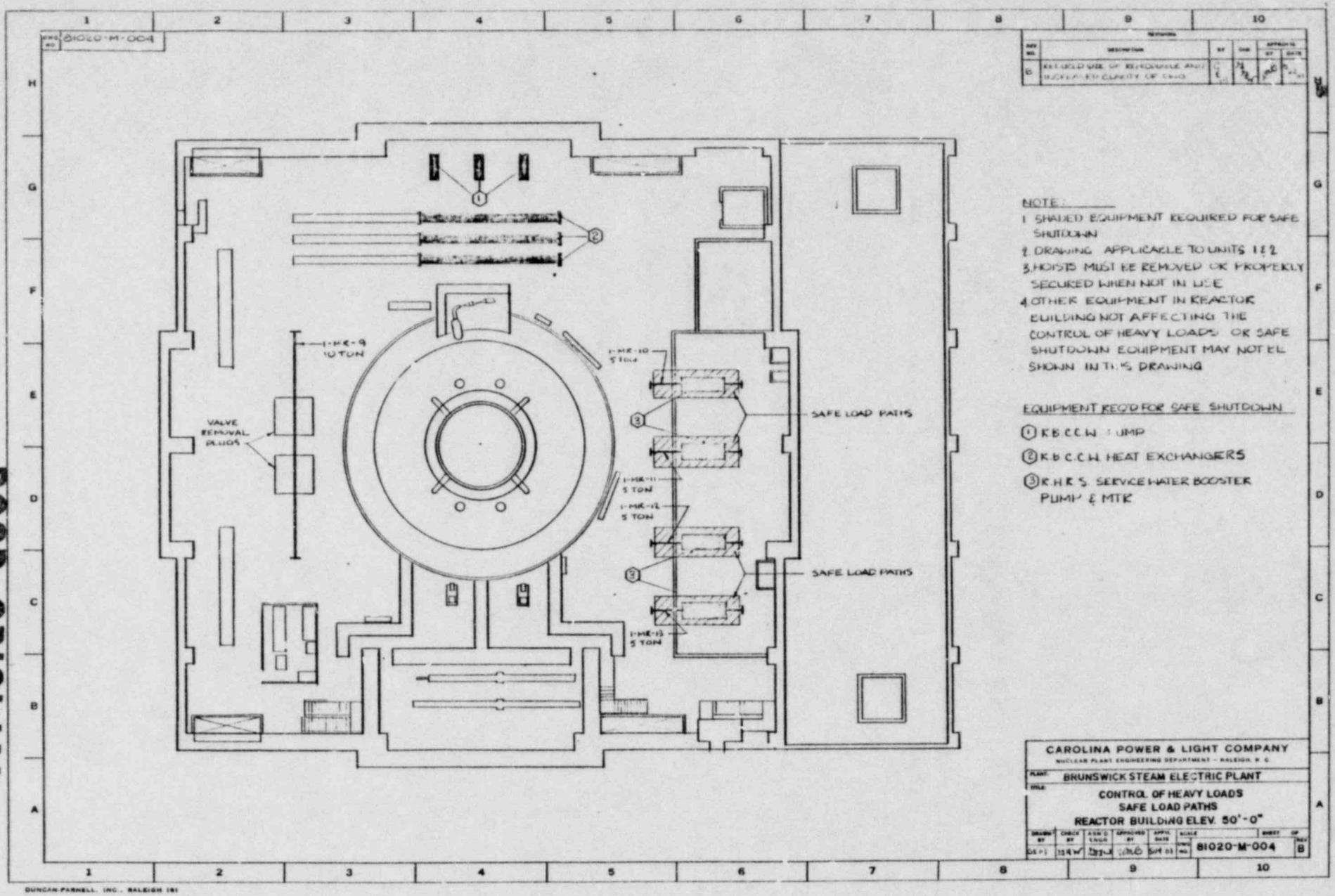
CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT - RALEIGH, N. C.

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

TITLE: CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
INTAKE SERVICE WATER STRUCTURE

DRAWN BY	CHECKED BY	ASS'D ENGR	APPROVED BY	APPR. DATE	SCALE	SHEET OF
SEM	[illegible]	[illegible]	[illegible]	5-14-76	DWG. NO. 81020-M-003	REV. 8

DUNCAN PARNELL, INC., RALEIGH, NC



NOTE:

1. SHADED EQUIPMENT REQUIRED FOR SAFE SHUTDOWN
2. DRAWING APPLICABLE TO UNITS 1 & 2
3. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE
4. OTHER EQUIPMENT IN REACTOR BUILDING NOT AFFECTING THE CONTROL OF HEAVY LOADS OR SAFE SHUTDOWN EQUIPMENT MAY NOT BE SHOWN IN THIS DRAWING

EQUIPMENT REQ'D FOR SAFE SHUTDOWN

(1) R.B.C.C.W. PUMP

(2) R.B.C.C.W. HEAT EXCHANGERS

(3) R.H.R.S. SERVICE WATER BOOSTER PUMP & MTR.

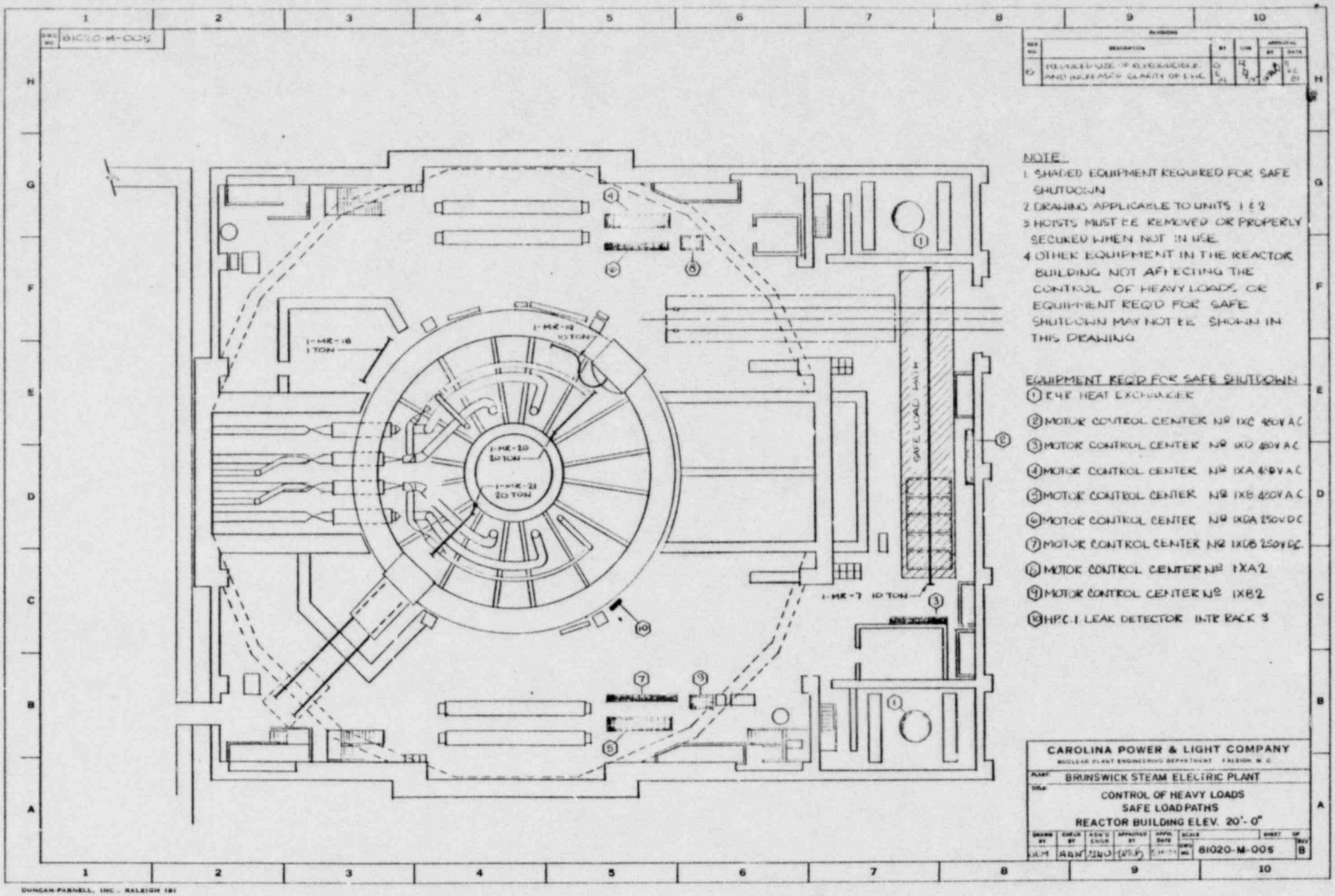
CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT – RALEIGH, N. C.

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

TITLE: CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
REACTOR BUILDING ELEV. 50'-0"

DRAWN BY: DEH | CHECK BY: JHW | APPROVED BY: [illegible] | APPR. DATE: 5/19/83 | SCALE: | SHEET OF | DWG. NO. 81020-M-004 | REV. B

DUNCAN-PARNELL, INC., RALEIGH, NC



REV NO	DESCRIPTION	BY	CHK	APPROVAL BY	APPROVAL DATE
B	REVISED SIZE OF EQUIPMENT AND INCREASED CLARITY OF ENG.	[illegible]	[illegible]	[illegible]	[illegible]

NOTE

1. SHADED EQUIPMENT REQUIRED FOR SAFE SHUTDOWN
2. DRAWING APPLICABLE TO UNITS 1 & 2
3. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE.
4. OTHER EQUIPMENT IN THE REACTOR BUILDING NOT AFFECTING THE CONTROL OF HEAVY LOADS OR EQUIPMENT REQ'D FOR SAFE SHUTDOWN MAY NOT BE SHOWN IN THIS DRAWING.

EQUIPMENT REQ'D FOR SAFE SHUTDOWN

1. E4F HEAT EXCHANGER
2. MOTOR CONTROL CENTER Nº 1XC 480V A.C.
3. MOTOR CONTROL CENTER Nº 1XD 480V A.C.
4. MOTOR CONTROL CENTER Nº 1XA 480V A.C.
5. MOTOR CONTROL CENTER Nº 1XB 480V A.C.
6. MOTOR CONTROL CENTER Nº 1XDA 250V D.C.
7. MOTOR CONTROL CENTER Nº 1XDB 250V D.C.
8. MOTOR CONTROL CENTER Nº 1XA2
9. MOTOR CONTROL CENTER Nº 1XB2
10. HPCI LEAK DETECTOR INTR RACK 3

CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT FAYETTEVILLE, N. C.

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

TITLE: CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
REACTOR BUILDING ELEV. 20'-0"

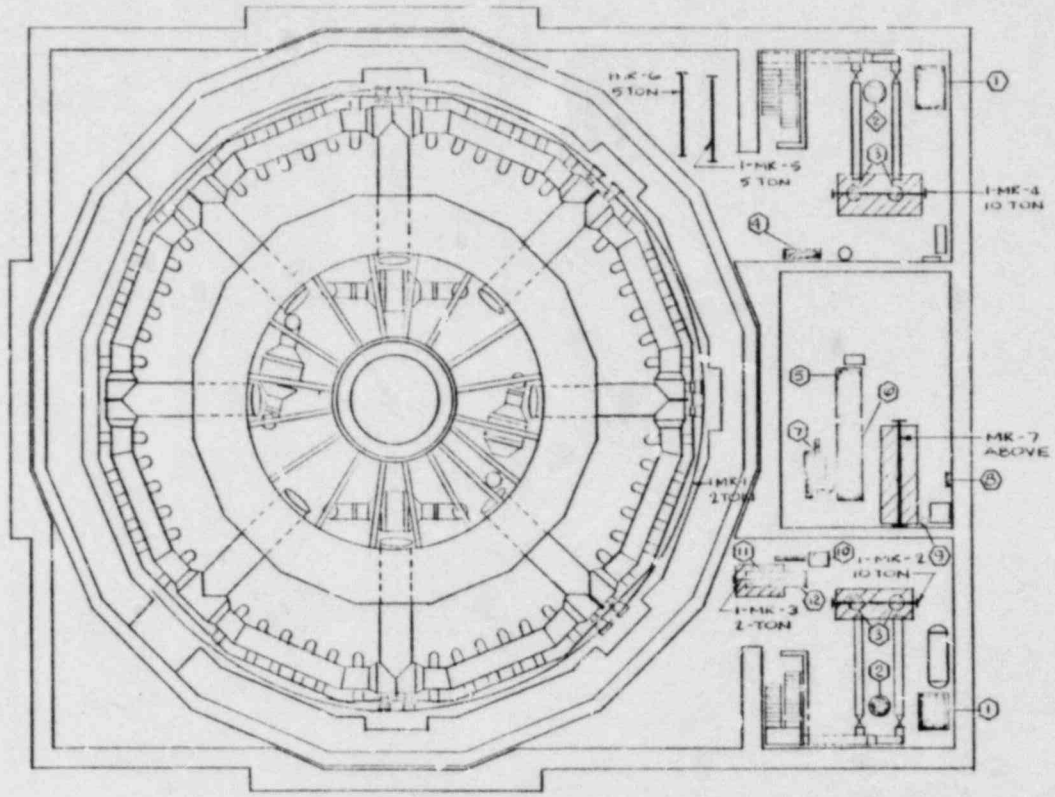
DRAWN BY	CHECK BY	ASS'D ENGR	APPROVED BY	APPR. DATE	SCALE	SHEET OF
J.E.M	A.B.N	[illegible]	[illegible]	[illegible]	1/8"=1'-0"	

DWG. NO. 81020-M-005 REV B

DUNCAN-PARNELL, INC., RALEIGH NC

DWG. NO. 81020-M-0006

REV. NO.	DESCRIPTION	BY	CHK	APPROVAL BY	APPROVAL DATE
8	REVISED SIZE REPRODUCIBLE AND REVISED QUALITY OF DWG	[illegible]	[illegible]	[illegible]	[illegible]



NOTE:

1. SHADED EQUIPMENT REQ'D FOR SAFE SHUTDOWN
2. DRAWING APPLICABLE TO UNITS 1 & 2
3. HOISTS MUST BE REMOVED OR PROPERLY SECURED WHEN NOT IN USE.
4. OTHER EQUIPMENT IN THE REACTOR BUILDING NOT AFFECTING THE CONTROL OF HEAVY LOADS OR EQUIPMENT FOR SAFE SHUTDOWN MAY NOT BE SHOWN IN THIS DRAWING

EQUIPMENT REQUIRED FOR SAFE SHUTDOWN

(1) FAN COOLING UNIT
(2) RHR S. HEAT EXCHANGER
(3) RHR PUMP
(4) H.P.C.I.S. PUMP & TURBINE INSTRUMENT RACK
(5) H.P.C.I.S. TURBINE
(6) H.P.C.I.S. PUMP
(7) H.P.C.I. GLAND EXHAUST PUMP W/ BAROMETRIC COND.
(8) H.P.C.I. LEAK DETECTOR INST. RACK A
(9) H.P.C.I. LEVEL SWITCH 1-X-LSHH-4238
(10) R.C.I.C. GLAND EXHAUST PUMP W/ BAROMETRIC COND.
(11) R.C.I.C. TURBINE
(12) R.C.I.C. PUMP

▨ DEPICTS SAFE LOAD AREA

CAROLINA POWER & LIGHT COMPANY
NUCLEAR PLANT ENGINEERING DEPARTMENT - RALEIGH, N. C.

PLANT: BRUNSWICK STEAM ELECTRIC PLANT

TITLE:
CONTROL OF HEAVY LOADS
SAFE LOAD PATHS
REACTOR BUILDING ELEV. (-) 17'-0"

DRAWN BY	CHECK BY	ASM'S ENGR	APPROVED BY	APPR. DATE	SCALE	SHEET	OF
G.M.	R.B.W.	[illegible]	[illegible]	[illegible]			

DWG. NO. 81020-M-0006 REV. 8

DUNCAN-PARNELL, INC., RALEIGH, NC