REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8211020637 DOC.DATE: 82/10/28 NOTARIZED: NO DOCKET #
FACIL:50-397 WPPSS Nuclear Project, Unit 2, Washington Public Powe 05000397
AUTH.NAME AUTHOR AFFILIATION
BOUCHEY,G.D. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards marked-up Section 8.3 to FSAR Amend 23,clarifying electrical separation issues,per 821006 meeting.Changes will be incorporated into future FSAR amend.

DISTRIBUTION CODE: B001S COPIES RECEIVED:LTR 1 / ENCL 1 / SIZE: 11
TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES:

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
	NRR/DL/ADL		1	0	NRR LB2 BC		1	0
	NRR LB2 LA		1	0	AULUCK,R.	01	1	1
INTERNAL:	ELD/HDS2		1	0	IE FILE		1	1
	IE/DEP EPDS	35	1	1	IE/DEP/EPLB	36	3	3
	NRR/DE/AEAB		1	0	NRR/DE/CEB	11	1	1
	NRR/DE/EQB	13	3	3	NRR/DE/GB	28	2	2
	NRR/DE/HGEB	30	2	2	NRR/DE/MEB	18	1	1
	NRR/DE/MTEB	17	1	1	NRR/DE/QAB	21	1	1
	NRR/DE/SAB	24	1	1	NRR/DE/SEB	25	1	1
	NRR/DHFS/HFEB	40	1	1	NRR/DHFS/LQB	32	1	1
	NRR/DHFS/OLB	34	1	1	NRR/DHFS/PTRB	20	1	1
	NRR/DSI/AEB	26	1	1	NRR/DSI/ASB	27	1	1
	NRR/DSI/CPB	10	1	1	NRR/DSI/CSB	09	1	1
	NRR/DSI/ETSB	12	1	1	NRR/DSI/ICSB	16	1	1
	NRR/DSI/PSB	19	1	1	NRR/DSI/RAB	22	1	1
	NRR/DSI/RSB	23	1	1	NRR/DST/LGB	33	1	1
	REG FILE	04	1	1	RGN5		2	2
	RM/DDAMI/MIB		1	0				
EXTERNAL:	ACRS	41	6	6	BNL(AMDTS ONLY)		1	1
	DMB/DSS (AMDTS)		1	1	FEMA-REP DIV	39	1	1
	LPDR	03	1	1	NRC PDR	02	1	1
	NSIC	05	1	1	NTIS		1	1

TOTAL NUMBER OF COPIES REQUIRED: LTTR 55 ENCL 49

[illegible]

[illegible]

Subject: [illegible] to [illegible] relativity
electrical [illegible] with
[illegible] future [illegible]

[illegible]
Title: [illegible] correspondence

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Washington Public Power Supply System
P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

Docket No. 50-397

October 28, 1982
G02-82-874
SS-L-02-PLP-82-075

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

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
FINAL SAFETY ANALYSIS REPORT
SECTION 8.3 CORRECTIONS

Reference: Letter G02-82-800, G.D. Bouchey to A. Schwencer, Same Subject, dated September 22, 1982.

The referenced letter provided corrections and clarifications to section 8.3 of Amendment 23 to the WNP-2 FSAR. At a subsequent meeting with NRC personnel on October 6, 1982, Supply System representatives described the present effort to resolve electrical separation issues for WNP-2. During that meeting, additional needed clarifications were identified. The attached Amendment 23 marked up pages provide the clarification for those items. These clarifications will be included in a future FSAR Amendment.

Should you have any questions with regard to these clarifications, please contact Mr. R. M. Nelson, Manager, WNP-2 Project Licensing.

Very truly yours,

GD Bouchey

G. D. Bouchey
Manager, Nuclear Safety and
Regulatory Programs

GDB/jw
Attachment
cc: R Auluck - NRC
WS Chin - BPA
R Feil - NRC Site
ND Lewis - NRC
V Stello - NRC

B001

8.3.1.4.2 General Separation Criteria

The criteria in this section provides sufficient physical independence of Class 1E electrical systems so safety-related systems can perform their engineered safety function during any design basis accident and bring the reactor to a cold shutdown condition.

8.3.1.4.2.1 Cable Separation

Cable separation is achieved by segregating electrical circuits by voltage level and service it performs (such as power, control, or signal) by engineered system designations, by power supply and divisional separation categories, and by routing (see Tables 8.3-8, 8.3-20 and 8.3-21).

8.3.1.4.2.1.1 Cable Segregation by Voltage Level and Service

Cables are assigned to one of three groups (power, control, or instrumentation) depending upon the voltage level, and service.

8.3.1.4.2.1.1.1 Power Cable

Power cables are defined as those cables that provide electrical energy for equipment motive power and heating requiring 14.4 kV, 6.9 kV, 4.16 kV, 480 volts, 240 volts, 120/208 V AC, 250 and 125 V DC (see Tables 8.3-20 and 8.3-24).

Power cables of different voltage ratings are routed in different cable trays except as follows: (a) Common tray is permitted for 480 volt, 120/208 V AC, 125 V and 250 V DC of compatible divisions; (b) Common tray is permitted for 4160 and 6900 V power cables of compatible divisions; 480, 4160 and 6900 V power cables are not to be installed in cable trays in the spreading area beneath the control room. If a run through this area is unavoidable, the power cable is installed in conduit.

Power cables are installed in raceways separate from control cables and low level signal cables and where vertically stacked, the power cables are placed in the tray with the highest position in the tray tier. Stacking of multiple power trays are such that the voltage levels decrease sequentially from the top to the bottom tray in the stack.

8.3.1.4.2.1.1.2 Control Cable

Control cables are those cables using 120 V AC (or below) or 125 V DC (or below), ~~with normal current not in excess of 30~~

Insert

~~amperes~~, whose circuits are designed to supply control power for the plant systems. Included in the category of control cables are those cables used for intermittent operation to change the operating status of a utilization device of the plant system. Control cables include all cables which have any of the following functions (see Tables 8.3-20, 8.3-21, and 8.3-24):

a. 125 V DC or 120 V AC control ~~feeds~~ to switchgear, and control room ~~panel~~ and local panel ~~control buses. Wire types are to be power cable, type GZ.~~

b. 125 V DC or 120 V AC control power ~~feeds~~ to solenoids.

c. 125 V DC or 120 V AC control and interlock circuits.

d. Annunciator circuits.

e. Space heaters including motor heaters.

8.3.1.4.2.1.1.3 Instrument Cable ~~(Low Level Signals)~~

Instrumentation cables are those cables used to carry low level analog or digital signals. Low level signal cables require a specific degree of separation or segregation to preserve the accuracy of the transmitted signal. Low level signal cables are run in raceways separate from all power and control cables, except within the control room power generation and control complex (PGCC) and as noted below. Instrument (signal) trays are of the enclosed (solid bottom and covers) type.

Analog and digital signal input cables are routed as follows:

a. Digital computer signals in the reactor building are run in divisional control trays as applicable by the device being served. Non-Class 1E digital signals in other areas are run in instrumentation trays of Division B, unless they are routed through the reactor building.

b. Analog computer signals in the reactor building are run in divisional instrumentation trays as applicable by the device being served. Non-Class 1E analog signals in other areas are run in instrumentation trays of Division A, unless they are routed through the reactor building.

(Insert Page 8.3-56e)

The largest instantaneous control circuit protection device (fuse/breaker) has a 35 amp rating. This rating (35 amp) is found only in 4KV switchgear breaker trip circuits. The majority of the control circuits are intermittent with circuit protective devices having 5 to 20 amp ratings. The circuit protective device ratings are chosen to accept initial momentary inrush currents. The actual circuit normal operating current is generally in the 0.1 to 2 amp range.

computerized cable schedule as type Z. These non-Class 1E cables are tagged in accordance with Tables 8.3-25 and 8.3-26.

The isolation of non-Class 1E circuits from Class 1E circuits or associated circuits is achieved by complying with at least one of the following requirements.

a. Non-Class 1E circuits are physically separated from Class 1E circuits and associated circuits by the minimum separation requirements specified for redundant Class 1E divisions or they become associated circuits.

b. Non-Class 1E circuits are electrically isolated from Class 1E circuits and associated circuits by the use of isolation devices, shielding and wiring techniques, physical separation, or an appropriate combination, or they become associated circuits.

c. The effects of lesser separation or the absence of isolation between the non-Class 1E circuits and the Class 1E circuits or associated circuits are analyzed to demonstrate that Class 1E circuits are not degraded below an acceptable level or they become associated circuits.

Non-Class 1E low energy (Instrumentation and control circuits)

d. ~~Low energy (see 8.3.1.4.2.1.c.3) non-Class 1E instrumentation and control circuits~~ are not required to be physically separated or isolated from associated circuits provided: (1) the non-Class 1E circuits are not routed with associated cables of a redundant division; or (2) they are analyzed to demonstrate that Class 1E circuits are not degraded below an acceptable level. As part of the analysis, consideration is given to potential energy and identification of the circuits involved.

see attached insert >

8.3.1.4.2.1.4 Cable Segregation by Routing

The physical separaton distances required between raceways external to the PGCC are identified in 8.3.1.4.3.8. The physical arrangement of the PGCC raceways are described in 8.3.1.4.3.6.3. Outside the PGCC thirty-four independent raceway systems are provided for cabling. These include dedicated raceways assigned to each of the Class 1E divisions. The raceways for Divisions 1, 2, and 3 utilize open-type ladder trays for power and control. Trays for instrumentation raceways for Divisions 4, 5, 6, and 7 are totally enclosed. Raceways exist for non-Class 1E cabling crossovers between

(Insert Page 8.3-57a)

Since power cables (see 8.3.1.4.2.1.1.1) are not considered to be low energy, the analysis applied to non-Class 1E-to-Class 1E/associated separation described above does not apply. Non-Class 1E power cables routed in open raceways (trays) dedicated to non-Class 1E power cables are physically separated from all Class 1E/associated cable trays (see 8.3.1.4.1.13) with the same requirements specified for physical separation of redundant Class 1E cable trays. For other than open raceways, additional information is provided in 8.3.1.4.4.

b. Where Class 1E equipment or cabling is located or routed in areas where there is a potential for internally generated missiles, pipe whip, or flood, a protective barrier is provided or an analysis is performed to assure that a loss of plant capability to mitigate the consequences of an accident or to bring it to a safe shutdown condition cannot occur.

c. Fire barriers are provided between redundant electrical equipment including raceways whenever the physical separation distances in 8.3.1.4 are not met. Raceways penetrating fire-rated walls, floors or ceilings, or pressure boundries are sealed with a fire-rated fire stop.

Insert

d. Refer to Appendix F for compliance with 10CFR50 Appendix R.

8.3.1.4.2.3 Administrative Controls for Ensuring Separation Criteria

The quality assurance procedures described in IEEE Standard 336-1971 are employed during the design and installation of the cable system to ensure compliance with the design criteria. Design drawings and cable lists are prepared, reviewed, and approved for construction and updated in the field. Each cable and raceway is identified in the computer program, and the identification includes the applicable separation classification. Cable routing programs ensure that cables of particular separation groups are routed through the appropriate raceways. Cables are installed in accordance with written procedures which specify quality requirements, inspection, and documentation requirements for all cable pulls. Upon completion of Class 1E cable pulling, an electrical quality control inspector initials the cable pull slip and verifies that the cables have been installed in accordance with the design documents.

~~Post cable installation procedures exist to upgrade the classification of various cables to ensure that adequate quality has been provided. These cables have been evaluated on an individual basis to be acceptable deviations from the normal installation procedures.~~

See attached insert

8.3.1.4.2.4 System Separation Criteria

8.3.1.4.2.4.1 Fail-Safe Cabling

Fail-safe (de-energized to operate) wiring outside of the main

(Insert Page 8.3-57d)

Acceptable fire barriers Include:

1. Enclosed raceways (conduit, metal tray covers and bottoms).

2. Fire rated material used as a raceway wrap such as Thermo-Lag.

3. Fire rated material used as a wire wrap inside equipment and enclosures such as Haveg Siltemp tape.

4. Metal enclosures or flexible conduit used inside equipment and enclosures.

5. At the main control room periphery a floor raceway system is not provided. To assure that redundant circuits are separated in this area both circuits are routed in grounded conduit; one circuit in flexible conduit, the other in rigid steel conduit. These conduits are arranged so that they do not physically touch.

~~8.3.1.4.4.1.6 Analysis for Category 3A Non-Class 1E Circuits~~

~~The cables in this category consist of data logging type instrumentation circuits such as inputs to the analog process computer. These circuits are low energy circuits and are connected to Class 1E signal circuits through Class 1E current limiting resistance units such that a fault in the non-Class 1E circuit does not affect operation of the Class 1E circuit.~~

~~8.3.1.4.4.1.7 Analysis for Category 3B Non-Class 1E Circuits~~

~~The non-Class 1E cables in this category are connected to Class 1E power and supply important to non-Class 1E loads (such as emergency lighting) and are not identified or separated as prime circuits. The justification for this Category is similar to Category 2B. Additional protection is provided by isolating the circuit through two Class1E overcurrent devices in series. See 8.3.1.2.1.1~~

~~8.3.1.4.4.1.8 Analysis for Category 3C Non-Class 1E Circuits~~

~~The non-Class 1E cables in this category connect to non-Class 1E loads and are powered by inverters (1N-1 and 1N-2) which are fed from Class 1E batteries. The cables of this category are not designated as prime circuits and are not separated as associated circuits. Protection of the Class 1E power supply feeding the inverter is provided by Class 1E overcurrent devices (see 8.3.1.2.1.1 and 8.3.2.2.1.1) and the current limiting characteristic of the inverter.~~

Insert

8.3.1.4.4.2 Categories of Associated Circuits Treated as Class 1E

The following categories of associated circuits exist and are illustrated in Figures 8.3-43D and 8.3-43E.

Category 4A: Associated instrumentation and control circuits that are connected to non-Class 1E power and routed in Class 1E raceways and/or enclosures and may have a continuing section in a non-Class 1E raceway (Category 1A).

Category 4B: Associated power circuits that are connected to non-Class 1E power and routed in Class 1E raceways and/or enclosures and may have a continuing section in a non-Class 1E raceway (Category 2A).

Category 4C: Associated instrumentation and control circuits that are supplied Class 1E power are routed in Class 1E raceways, are not isolated on accident

(Insert Page 8.3-60b)

8.3.1.4.4.1.6 Analysis for Category 3A Non-Class IE Circuits

The cables in this category consist of data logging type instrumentation circuits such as inputs to the analog process computer. These circuits are low energy circuits that are connected to Class IE signal circuits through Class IE current limiting resistance units such that a fault in the non-Class IE portion of the circuit does not affect operation of the Class IE circuit. These circuits are not identified or separated as prime circuits downstream of the resistance units. Downstream of the resistance units these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, the justifications for category 1A apply.

8.3.1.4.4.1.7 Analysis for Category 3B Non-Class IE Circuits

The non-Class IE cables in this category are connected to Class IE power and supply important non-Class IE loads such as emergency lighting. Protection is provided by isolating the circuit through two series Class IE overcurrent devices. These circuits are not identified or separated as prime circuits downstream of the second overcurrent device. As in 3A above, these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, justifications b, c, d, e, f, and g of category 1A apply.

8.3.1.4.4.1.8 Analysis for Category 3C Non-Class IE Circuits

The non-Class IE cables in this category connect to non-Class IE loads and are powered by inverters (IN-1 and IN-2) which are fed from Class IE batteries. The cables of this category are not designated or separated as prime circuits downstream of the inverter. Protection of the Class IE power supply feeding the inverter is provided by a Class IE overcurrent device and the current limiting characteristic of the inverter. As in 3A above, these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, justifications b, c, d, e, f, and g of category 1A apply.

TABLE 8.3-25

DIVISION MARKERS FOR EQUIPMENT, RACEWAYS, & CABLES EXTERNAL TO PCCC

DIVISIONAL SEPARATION CLASS	SAFETY CLASS: CLASS IE	SAFETY CLASS: ASSOCIATED	SAFETY CLASS: NON CLASS IE	REPRESENTATIVE CABLE NUMBER	CABLE DIVISION MARKING CHARACTER	RACEWAY TYPE (CABLE COMPATABILITY FROM ESSO/ESSI DRAWINGS)	REPRESENTATIVE TRAY DIVISION MARKING CHARACTERS	RACEWAY/ EQUIP. MARKER BACKGROUND COLOR	REPRESENTATIVE CABLE MARKER BACKGROUND COLOR	CHARACTER COLOR	PRIME CABLES (NON-CLASS IE CABLES POWERED FROM CLASS IE SOURCES) HAVE AN ADDITIONAL ~~CHECKED~~ checkered MARKER ALSO ON RACEWAYS USED.	PRIME CABLES ARE IDENTIFIED IN THE S/TY CLR FLD OF DWG ESSO/ ESSI	CLASS IE OR PRIME CABLES THAT "INTRUDE" IN PANELS ARE IDENTIFIED (1)
1	X			11PCS-5	DIV. 1	H,P,C,S	CDIV1	YELLOW	YELLOW	BLACK	NA	NA	YEL./WHITE
		X		A1PCS-9001	DIV. 1				SILVER/YELLOW		RED/WHITE	A*1	YEL./WHITE
2	X			2RPS-10	DIV. 2	H,P,C,S	CDIV2	ORANGE	ORANGE	BLACK	NA	NA	BL./WHITE
		X		B2RPS-9001	DIV. 2				GOLD/ORANGE		GREEN/WHITE	B*2	BL./WHITE
3	X			3PCS-14	DIV. 3	P,C,S	CDIV3	RED	RED	BLACK	NA	NA	GR/WHITE
4	X			4RPS-17	CHA1	R,C,S	RCHA1	LT. BLUE	LIGHT BLUE	RED	NA	NA	YEL./WHITE
5	X			5RPS-17	CHA2	R,C,S	RCHA2	GREEN	GREEN	RED	NA	NA	BL./WHITE
6	X			CRPS-17	CHB1	R,C,S	RCHB1	DRK. BLUE	DARK BLUE	RED	NA	NA	YEL./WHITE
7	X			7RPS-17	CHB2	R,C,S	RCHB2	BROWN	BROWN	RED	NA	NA	BL./WHITE
A			X	ANTA-102	DIV. A	H,P,C,S	CDIVA	SILVER	SILVER	BLACK	RED/WHITE	A*1	YEL./WHITE
			X	A5E53-9075	DIV. A				SILVER/YELLOW			~~(NOTE 11~~	
B			X	B012C-105	DIV. B	H,P,C,S	CDIVB	GOLD	GOLD	BLACK	GREEN/WHITE	B*2	BL./WHITE
			X	B947-9126	DIV. B				GOLD/ORANGE			~~NOTE 11~~	

RACEWAY TYPES NOTE: THE RACEWAY TYPE CORRESPONDS TO THE CABLE COMPATIBILITY ON THE ESSO/ESSI DRAWINGS.

H = POWER 6.9/4.16 KV
P = POWER 1000/600 V AC
250 VDC, 125 V DC/120/208/240 V AC
C = CONTROL 120 V AC/125 V DC
S = SIGNAL
R = RPS 50HM 50V RACEWAY

CABLE MARKER

THE CABLE MARKER INCLUDES BOTH THE CABLE NUMBER AND THE DIVISION MARKING CHARACTERS

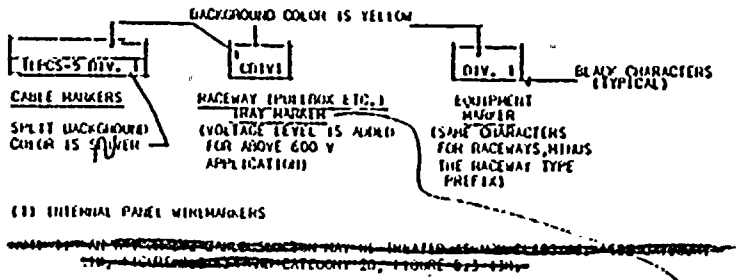
PRIME CABLES:

A*1 SIGNIFIES DIV. 1 POWER/DIV A NON-CLASS IE FUNCTION
B*2 SIGNIFIES DIV. 2 POWER/DIV B NON-CLASS IE FUNCTION
A*2 & B*1 ARE PROHIBITED

NON-IE 9000 SERIES CABLE NUMBER

A NON-CLASS IE CABLE IDENTIFIED BY A CABLE NUMBER BETWEEN 9000 & 9999 AND IS ROUTED PARTIALLY OR WHOLLY IN A DIVISIONALIZED RACEWAY OR IS NOT PHYSICALLY SEPARATED FROM A CLASS IE CABLE WITHIN ITS EQUIPMENT OF ORIGIN OR DESTINATION.

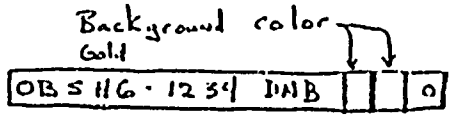
TYPICAL DIVISION MARKERS



(1) INTERNAL PANEL WIREMARKERS

~~WIRE TYPE ALL SPECIFICATIONS THAT ARE INSTALLED WITHIN ENCLOSURES CONTAINING CLASS IE CIRCUITS~~
~~TYPE 1 CABLE SPECIFICATION CATEGORY 20, 1 FOOT 0.5 MIL~~

(4 rigid conduit)



Metal Tag Conduit
Marker (When required)