

ORGANIZATION: BURNS AND ROE, INCORPORATED
ORADELL, NEW JERSEY

REPORT NO.: 99900503/82-02	INSPECTION DATES 6/7-11/82	INSPECTION ON-SITE HOURS: 38
CORRESPONDENCE ADDRESS: Burns and Roe, Incorporated ATTN: Mr. T. A. Hendrickson Assistant to the President 550 Kinderkamack Road Oradell, NJ 07649		
ORGANIZATIONAL CONTACT: Mr. W. P. Rausch, Director of QA TELEPHONE NUMBER: (201) 265-9351		
PRINCIPAL PRODUCT: Architect Engineering and Consulting Services		
NUCLEAR INDUSTRY ACTIVITY: The total effort committed to domestic nuclear activities is approximately 36% of the 2500 employee staff. Major projects include the design of Washington Public Power Supply System, Unit 2, Clinch River Breeder Reactor, post accident conditions update for Three Mile Island, Unit 2, and design verification for Oyster Creek.		
ASSIGNED INSPECTOR:	<u>C. J. Hale / for</u> D. F. Fox, Reactor Systems Section (RSS)	<u>7/29/82</u> Date
OTHER INSPECTOR(S):		
APPROVED BY:	<u>C. J. Hale</u> C. J. Hale, Chief, RSS	<u>7/29/82</u> Date
INSPECTION BASES AND SCOPE:		
A. <u>BASES</u> : 10 CFR Part 50, Appendix B and Topical Report B&ROE-COM4-1-NP.		
B. <u>SCOPE</u> : Determine the status of previous inspection findings and a design inspection (validation of computer codes).		
PLANT SITE APPLICABILITY: WNP-2, Docket No. 50-397.		
DESIGNATED ORIGINAL Certified By: <u>Rheanne Jantz</u>		

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A. VIOLATIONS:

None.

B. NONCONFORMANCES:

1. Contrary to Burns and Roe (B&R) Topical Report, paragraph 2.1 of Chapter VI, superseded revision 0 of procedure (Computer) "Program Approval and Certification," was not removed by the designated coordinator from the controlled copy of the Corporate Operations Manual assigned to the B&R Woodbury facility library.
2. Contrary to B&R Topical report and implementing procedure "Abstracts of Available Programs," the latest issue of the Computer Program Index did not list: (1) all engineering and design programs available to B&R computer users; (2) the advisor's name for all programs that were listed in the index.
3. Contrary to B&R Topical Report and implementing procedure "Program Approval and Certification," none of the currently available vendor-supplied programs listed in the latest issue of the Computer Program Index were designated as "Certified-V" even though they were available for use by B&R computer users.
4. Contrary to B&R Topical Report and committed ANSI N45.2.11, procedures were not available, or not employed to:
 - a. Control the distribution of computer program manuals to appropriate users activities;
 - b. Maintain and retain documents needed to provide traceability and to support "certified" computer programs with the status of a QA record;
 - c. Require independent verification/validation of computer programs;
 - d. Determine the cause of significant deficiencies in computer programs and implement corrective actions in the QA program to prevent their recurrence;
 - e. Disseminate computer program experience reports to cognizant design personnel;

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- f. Assure that the impact of changes to computer programs are considered and that the changes be subjected to design control measures that were, or should have been, applied to the original computer program.

C. UNRESOLVED ITEMS:

None.

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

1. (Closed) Nonconformance (82-01): Procedure WNP-2-ED-003, "Reporting of Defects and Noncompliance - Nuclear Projects," did not include the latest issue of 10 CFR Part 21 regulations as required.

B&R revised Project Instruction WNP-2-ED-003 on March 5, 1982, to reflect the current issue of 10 CFR Part 21 as committed. The B&R Licensing Department was advised to monitor the daily Federal Register for changes in the 10 CFR Part 21 regulations and to notify the B&R projects of any changes therein. Quality Assurance stated that they will review procedure WNP-2-ED-003 semiannually to assure that it is current.

2. (Open) Nonconformance (82-01): The B&R Richland, Washington, office controlled set of WNP-2 Project Instructions contained superseded revision 4 of WNP-2-ED-010.

Action on this item was deferred pending receipt of the B&R response to the Notice of Nonconformance transmitted by NRC Inspection Report 99900503/82-01.

3. (Open) Nonconformance (82-01): Certain subanalyses of design calculation 5.51.053 were not identified as to status, not checked, nor verified as required by procedure WNP-2-ED-010.

Action on this item was deferred pending receipt of the B&R response to the Notice of Nonconformance transmitted by NRC Inspection Report 99900503/82-01.

E. OTHER FINDINGS OR COMMENTS:

Design Inspection (Validation of Computer Codes) - The B&R Topical Report, Corporate Quality Assurance Manual, and implementing procedures were reviewed to determine the commitments and requirements relative to the development, control, and utilization of digital computer codes developed by B&R, or

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supplied by a vendor, that are used in the design or analysis of safety-related structures, systems, and components.

Computer program development and action requests; program descriptions and their abstracts; design, users and operations manuals; source coding (program listings); job control cards, sample inputs to computer runs and their corresponding outputs; test cases, code validation/certification data; and other documentation related to the following codes were reviewed to verify implementation of topical and procedural commitments:

- (1) APEC-PIPE, used for piping friction loss analysis;
- (2) PDROP, used for pipe sizing and pressure drop analysis;
- (3) HYDRAIN, used for heater drain piping analysis;
- (4) VESA, used for earthquake vertical spectrum analysis;
- (5) VETHA, used for earthquake vertical time history analysis;
- (6) WATRAN, used for water hammer transient analysis of piping systems;
- (7) SHORTCKT, used for short circuit analysis of AC electrical systems;
- (8) DC SYSTEM, used for analysis of DC electrical systems;
- (9) ORIGEN2, used to calculate fission product source terms; and
- (10) ARMS, used to determine optimum routing of electrical cables.

Four nonconformances were identified in this area of the inspection (see B above). Further, the inspector noted that existing procedures: (1) permit computer codes classified as "Approved" to be used for production work/analyses without specifically requiring that they be validated/verified to assure that the code accurately implements the intended analytical methodology and algorithms; and (2) permits exclusion of minicomputers and stored program programmable calculators from the requirements for program approval certification, and security under certain conditions.

DOCUMENTS EXAMINED

Scope/Module DESIGN INSPECTION -
VALIDATION OF COMPUTER CODES

1	2	TITLE/SUBJECT	3	4
1	3	B&R. Corporate Operations Manual. Part II - Functional Manuals - Section III Chapter III, Sub A9 (Digital Computer Code)	7-1-82	NA
2	4	B&R Typical Report, Chapter II, Sub 6.0 Computer Codes	10-5-80	2A
3	8	B&R Engineering Systems Computer code utilization summary	1/26-5/17/82	NA
4	8	B&R Program Resource Usage Report	5-17-82	4 Wks. Interim
5	8	B&R Computer Program Index	12-31-81	Semi-Annual
6	8	B&R Computer Program Index - Program Data	6-30-82	Semi-Annual
7	9	ME 0980 "Heater Drain Piping Design" - In Process Addendum	Current	In Process
8	9	ME 0980 "Heater Drain Piping Design"	12-31-80	0
9	3	WMP-2-ED-003 "Reporting of Defects and Nonconformances (Includes Forms Operations 1/1/82, 2/1/82, 3/1/82)"	3-5-82	2
10	3	Administrative Procedure "Administration of and Changes to the Available Programs"	8-16-76	0
11	3	Administrative Procedure "Abstracts of Available Programs"	5-30-79	4
12	3	Admin. Proc. "Program Approval and Certification"	1-1-79	1
13	6	J. DeLooper to File "NRC Inspection - Preventive Corrective Action Division Power Plants"	3-1-82	NA
14	8	ANSI N45.2.11 "Quality Assurance Requirements for the Design of The following types of documents, when available to the Inspector, were reviewed with respect to the identified digital computer codes. See next page for details.	1974	NA

- Document Types:
1. Drawing
 2. Specification
 3. Procedure
 4. QA Manual

5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-If necessary)
9. Computer Code Users Manual

- Columns:
1. Sequential Item Number
 2. Type of Document
 3. Date of Document
 4. Revision (If applicable)

Inspector D. F. Fox

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Scope/Module Design Inspection -
Validation of Computer Codes

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
		Applicable procedures, computer program development and action requests, program descriptions and their abstracts, design manuals, users manuals, operation manuals, source coding (program listing) job control cards, sample inputs and their corresponding outputs, test cases, code validation data, code verification data.		
15	APEC-PIPE	ME0840 PIPING FRICTION LOSS ANALYSIS		
16	PDKOP	ME0987 PRESS. DROP. PIPE SIZING FOR 1 & 2 BRANCH LINES		
17	HYDRAN	ME0980 HEATER DRAIN PIPING DESIGN		
18	VESA	CI0555 VERTICAL EARTHQUAKE SPECTRUM ANALYSIS		
19	VETHA	CI0650 VERTICAL TIME HISTORY ANALYSIS		
20	WATRAN	CI0740 WATER HAMMER TRANSIENT ANALYSIS ON PRESSURE SYSTEM		
21	SHOATCKT	EL0200 POWER SYSTEM SHORT CIRCUIT ANALYSIS		
22	DCSYSTEM	EL0240 DC SYSTEM CALCULATION		
23	ORIGEN2	NW0410 FISSION PRODUCT SOURCE CALCULATION		

Document Types:

1. Drawing
2. Specification
3. Procedure
4. QA Manual

5. Purchase Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

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