UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
LONG ISLAND LIGHTING COMPANY	)	Docket No. 50-322 (OL)
	)	
(Shoreham Nuclear Power Station, Unit 1)	)	
	)	

LILCO'S FURTHER RESPONSE TO SUFFOLK COUNTY INTERROGATORIES

On April 1, 1982, Suffolk County filed "Suffolk County Motion to Compel Answers to Interrogatories." Pursuant to an agreement between counsel, LILCO agreed to answer modified interrogatories, or to expand its previous answers. This document contains LILCO's further response to Suffolk County interrogatories. Affidavits are attached.

SC Contention 1

Interrogatory 18

Identify all indicators related to the RHR, RBCLCW and service water systems at remote equipment locations to be used by operators in the field assisting in remote shutdown, and identify the range displayed by each such indicator.

Response

LILCO reiterates its earlier answer. Specifically, with regard to the RHR, service water and RBCLCW systems, no instruments or other indicators, other than those on the RSP, are needed to shut down the plant under the RSP design basis. Under the design basis for the RSP, there are no procedures -- operating or emergency -- which call for the use of operators in the field to assist the remote shutdown operator by reading instruments or other indicators related to the RHR, service water or RBCLCW systems at remote locations.

SC Contention 3

Interrogatory 29

With respect to each response to Interrogatory No. 28, describe how the degree of accuracy was determined and identify all documents concerning such determination.

Response.

See Attachment 1.

SC Contention 4

Interrogatory 35

Does LILCO intend to evaluate, or has LILCO in fact evaluated, any problems identified at other General Electric BWR Mark II plants (U.S. or Caorso) to determine their relevance to Shoreham and to determine whether Shoreham's pre-operational testing program for water hammer should be modified? If yes, identify all documents which evidence or concern this matter.

Response

No, but LILCO is considering such evaluations.

SC Contention 13-15

Interrogatory 11

State how many LILCO QA/QC personnel will be present during each operating shift at Shoreham when the plant is in operation. Explain the basis for LILCO's selection of this number and outline their respective duties.

Response

LILCO Operational Quality Assurance will be staffed with an Operating QA Engineer, QA Engineer, QC Engineer and 5 QC Inspectors during the regular work day. The selection of this number of LILCO QA/QC personnel was determined from surveying QA/QC manpower at operating single unit Boiling Water Reactors.

As workload requires (i.e., during scheduled, major maintenance overhauls or scheduled fuel outages) OQA personnel will work scheduled overtime as necessary. During any emergency work at the station, OQA personnel will be on call to provide QA/QC coverage. It is expected that during station refueling outages, OQA may require outside QA/QC contractor assistance. Outside QA/QC contractor personnel will be qualified and certified to the LILCO QA program.

The respective duties of the Operating QA Engineer, QA Engineer, QC Engineer and QC Inspectors are described in detail in the following documents:

LILCO Quality Assurance Manual

SP #12.003.01 Personnel Qualifications and Responsibilities

QAP-S-01.1 Operational Quality Assurance Organization

FSAR, Section 13.

These documents have been made available previously for the County's review.

SC Contention 13-15

Interrogatory 12

Describe the QA/QC support to Shoreham operations which is now being provided, or will be provided in the future, by general office personnel employed by LILCO.

Response

The LILCO Quality Assurance Department, located off-site, will be available to provide QA/QC support to the Shoreham operations. The current authorized personnel strength of this department includes 17 professional personnel and 3 technical/clerical personnel. Services provided by this department include:

Maintaining the QA Program current with on-going events and regulations.

Performing Procurement QA/QC such as review of LILCO procurement documents; evaluation of potential suppliers; and survey, audit and inspection of suppliers and their facilities.

Review off-site organizations' procedures and audit of their activities.

Review of OQA procedures and audit of OQA Section and certain station activities.

Administration of the LILCO NDE program including training and certification of NDE personnel.

Participation in the LILCO welding program.

SC Contention 13-15

Interrogatory 22

Please identify "those applicable elements of the QA Program in which quality-based related activities are more intensive and impacting upon daily operation" (FSAR Section 17.2) which shall be audited at least annually (i.e., what are the "applicable elements" and what are the "quality-related activities" referred to).

Response

The QA Program is applied to the safety-related structures, systems and components listed in FSAR Table 3.2.1-1. Activities affecting these safety-related structures are considered quality-related. The activities considered more intensive and impacting upon daily operation include operation, maintenance, modification, repair, refueling, inspection and testing of safety-related structures, systems and components. The QA Program is designed to assure that these quality-related activities are accomplished in accordance with the criteria of 10 CFR 50, Appendix B.

Respectfully submitted,

LONG ISLAND LIGHTING COMPANY

Daniel O Flanagan

W. Taylor Reveley, III
Anthony F. Earley, Jr.
Daniel O. Flanagan

Hunton & Williams
707 East Main Street
Richmond, Virginia 23212

DATED: April 9, 1982

ATTACHMENT 1

RPV LEVEL INSTRUMENTS

S&W Mark #	GE#	Loop Name	Range	Mfg. Published Accuracy	Manufacturer
B21-LIT*004A	B21-N026A	Wide Range	-150/o/+60"	See Note 1 Below	Barton
B21-XR-004A	B21-R623A	Wide Range	-150/o/+60"	0.5%	Bailey
B21-LIT*004B	B21-N026B	Wide Range	-150/o/+60"	See Note 1 Below	Barton
C61-LI-004	C61-R010	Reactor Vessel Wide Range	-150/o/+60"	1.5%	GE
B21-LIT*004C	B21-N026C	Wide Range	-150/o/+60"	See Note 1 Below	Barton
B21-XR-004B	B21-R623B	Wide Range	-150/o/+60"	0.5%	Bailey
B21-LIT*004D	B21-N026D	Wide Range	-150/o/+60"	See Note 1 Below	Barton
B21-LI-004D	B21-R604	Reactor Vessel Wide Range	-150/o/+60"	1%	Weston
B21-LIT*007A	B21-N037A	Fuel Zone	-150/o/+60"	See Note 1 Below	Barton
B21-LR-007	B21-R615	Fuel Zone	-150/o/+50"	0.5%	Bailey
B21-LIT*007B	B21-N037B	Fuel Zone	-150/o/+60"	See Note 1	Barton
B21-LI-007	B21-R610	Fuel Zone	-150/o/+50"	1%	Weston
B21-LT-005	B21-N027	Upset Range	0-400"	$\pm$ 0.25% of Calib. Span	Rosemount
B21-LI-005	B21-R605	Upset Range	0-400"	1%	Weston

NOTE 1: Accuracy is - $\pm$1.5% Outside 20% (Full Scale Differential Pressure) of the Switch Point
$\pm$2.5% Within 20% (Full Scale Differential Pressure) of the Switch Point

S&W Mark #	GE#	Loop Name	Range	Mfg. Published Accuracy	Manufacturer
C32-LT-008A	C32-N004A	Narrow Range	0 - 60"	± 0.4%	Rosemount
C32-XR-006	C32-R608	Narrow Range	0 - 60"	± 0.5%	Bailey
C32-LT-008B	C32-N004B	Narrow Range	0 - 60"	± 0.4%	Rosemount
C32-LI-008B	C32-R606B	Narrow Range	0 - 60"	1%	Weston
C32-XR-006	C32-R608	Narrow Range	0 - 60"	± 0.5%	Bailey
C32-LT-008C	C32-N004C	Narrow Range	0 - 60"	± 0.4%	Rosemount
C32-LI-008C	C32-R606C	Narrow Range	0 - 60"	1%	Weston
C32-PDT-005	C32-N017	Wide Range	0 - 180"	.0.4%	Rosemount
C32-XR-006	C32-R608	Wide Range	0 - 180"	± 0.5%	Bailey

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In the Matter of	)	
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LONG ISLAND LIGHTING COMPANY	)	Docket No. 50-322
	)	
(Shoreham Nuclear Power Station, Unit 1)	)	

AFFIDAVIT OF JOHN D. LYNCH

John D. Lynch, being duly sworn, states as follows:

1. I am a Licensing Engineer with the Nuclear Operations Support Department for the Long Island Lighting Company for preparation of material for the Shoreham Operating License.

2. Long Island Lighting Company's further response to SC's Set of Interrogatories (Contention 1, ques. 18, Contentions 13-15, ques. 11, 12, 22) were prepared under my information, knowledge and belief, the answers contained in those responses are true and correct.

John D. Lynch

Subscribed and sworn to before me this 7th day of April, 1982.

Notary Public

My Commission Expires: 3/30/84

[illegible]
[illegible] of New York
[illegible]
[illegible] County
Commission expires [illegible] 19 84

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AFFIDAVIT OF MICHAEL L. SANDE

Michael L. Sande, being duly sworn, states as follows:

1. I am an Instrumentation and Controls Engineer for the Long Island Lighting Company with the Power Engineering Department. I have been assigned to the Nuclear Operations Support Department for preparation of material for the Shoreham Operating License.

2. The Further Response of Long Island Lighting Company to SC's March 5, 1982 Request for Production of Documents (31) and SC's March 5, 1982 Interrogatories (29 and 35) were prepared under my supervision and direction. To the best of my information, knowledge and belief, the answers contained in those responses are true and correct.

Michael L. Sande
Michael L. Sande

Subscribed and sworn to before me
this 6th day of April, 1982.

Rena Lee Clemens
Notary Public

RENA LEE CLEMENS
Notary Public, State of New York
No. 30-4753163
Qualified in Nassau County
Commission expires Mar. 30, 1984

My Commission Expires: 3/30/84

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FILE NO.

DIRECT DIAL NO. 804 788-

April 9, 1982

Stephen B. Latham, Esq.
Twomey, Latham & Schmitt
P. O. Box 398
Riverhead, New York 11901

Dear Steve:

By this letter, I transmit to you a copy of SNRC-526 (December 31, 1981), which was referenced in "LILCO's Response to SOC's Third Set of Interrogatories and Request for Production of Documents to Long Island Lighting Company," of April 2, 1982. SNRC-248 (and not SNRC-148 as our earlier response indicated) deals with the preservice inspection program. SNRC-248 and subsequent revisions to the plan have been incorporated into a two volume binder set, "Shoreham Nuclear Power Station - Unit 1, Preservice Inspection Program Plan." This set will be made available for SOC's review at a convenient time and location. In addition, in the "Response of Long Island Lighting Company to SOC's March 1, 1982 Interrogatories and Request for Production of Documents," reference was made to two other reports, both dealing with SOC Contention 19(a):

1. "Preservice Inspection of the Shoreham Nuclear Power Station Unit 1 Reactor Pressure Vessel," by Nuclear Energy Services, Inc.

2. "Reactor Pressure Vessel Inspection" by Reinhart & Associates, Inc.

The reports have not been finalized, but the draft versions are enclosed.

Sincerely,

Daniel O Flanagan

Daniel O. Flanagan

271/447
cc: Lawrence Brenner, Esq.
Dr. Peter A. Morris
Dr. James H. Carpenter
Service List

file

LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION
P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

December 31, 1980

SNRC-526

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reactor Building Separation Analysis
Ref. SNRC-471, April 16, 1980 and
SNRC-493, August 14, 1980
Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Dear Mr. Denton:

As discussed in the referenced letters, enclosed herewith are six (6) copies of the Shoreham preliminary REACTOR BUILDING SEPARATION ANALYSIS REPORT dated December 22, 1980. This submittal provides a description of the analysis performed and includes the analysis results for the Reactor Building primary containment drywell area and elevation 8' of the secondary containment. Analyses results covering the remaining levels within the secondary containment are in the final stages of completion and will be submitted during a forthcoming review meeting with your Staff. Your pre-review of this material should provide for a more meaningful discussion at this meeting.

This analysis demonstrates that sufficient separation exists between redundant systems and components within the Reactor Building. Thus the capability to safely shut down the station, in the event of a postulated fire which results in the disability of all cables and raceways in an entire designated area, is maintained.

This analysis will be an ongoing effort which will terminate with the completion of the installation of all Class IE cables and associated equipment. At that time, an engineering and construction "as-built" review will be performed to reaffirm the analysis results.

Very truly yours,

12/31/80 804

J. P. Novarro,
Project Manager
Shoreham Nuclear Power Station

FC 8035
JPM/cc

bcc: Dist. List #14
Eng. File/SR2...A21.010

Enclosures

cc: J. Higgins
R. T. Carlson

(PRELIMINARY) 1.8

REACTOR BUILDING 1.10
SEPARATION ANALYSIS REPORT 1.11

SHOREHAM NUCLEAR POWER STATION - UNIT 1 1.13
LONG ISLAND LIGHTING COMPANY 1.14

Prepared by
STONE & WEBSTER ENGINEERING CORPORATION

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1 PURPOSE 1.13

This analysis is made to demonstrate that sufficient separation exists between redundant systems and components necessary for shutdown such that a postulated event causing the disability of all cables and raceways in an entire designated area will not prevent a plant safe shutdown. 1.14 1.15 1.16 1.17

2 GENERAL METHOD OF ANALYSIS 1.19

The primary and secondary containments are divided into "Affected Areas." All cables and raceways in each "Affected Area" are assumed to be disabled such as to render them unavailable for use in shutdown. A determination is then made whether shutdown can be achieved using the remaining shutdown equipment of other unaffected areas. The areas are chosen conservatively large and the disabling event is fire. Loss of offsite power is assumed concurrent with the postulated event. 1.20 1.22 1.25 1.27 1.28

3 ASSUMPTIONS 1.30

The following are the assumptions and design bases for the separation analysis: 1.31

1. It is assumed that: 1.33

   a. The reactor is operating at 100 percent power when the postulated event occurs. 1.36

   b. Only onsite power is available in achieving safe shutdown. 1.37

   c. The reactor is isolated from the main condenser. 1.38

   d. There is an automatic scram (or manual at the direction of the shift supervisor) to bring the plant to hot shutdown. 1.39 1.40

2. As presented in the NRC review reminder(1), it is assumed that there is a 72 hour period in which to achieve cold shutdown. During this three day period, credit may be taken for manual system operation as well as for reasonable repairs, etc. 1.42 1.44

(1) Nuclear Regulatory Commission. "Review Reminder" from V. Benaroya to Auxilary System Branch Staff Members, August 8, 1978.

4 SPECIFIC METHODS OF ANALYSIS 1.50

4.1 AFFECTED AREAS 1.51

In order to separate the primary and secondary containments into 1.52
conservative affected areas, overlapping segments are defined as 1.54
described below.

4.1.1 Primary Containment 1.56

For the primary containment drywell areas, 60 degree segments are 1.57
chosen. There is no vertical division within the structure. 2.1
Cable and raceways in each segment are disabled and a 2.2
determination made whether shutdown can be accomplished with the
remaining equipment. Upon completion of the analysis of each 2.5
area, the procedure is repeated with new 60 degree segments which
are rotated or indexed 30 degrees from the previously analyzed 2.6
segments. This overlap operation assures that no sensitive 2.7
interface boundaries exist.

Figure 4.1.1-1 illustrates the arrangement of the primary 2.8
containment areas, and Table 4.1.1-1 describes the area 2.10
boundaries.

4.1.2 Secondary Containment 2.12

The method used for the secondary containment is the same as for 2.15
the primary containment except that 45 degree segments are used
and are indexed by 22.5 degree increments. Because there are 2.16
distinct floor levels within the secondary containment, vertical
boundaries are established for the secondary containment areas at 2.17
each floor elevation.

Figure 4.1.2-1 illustrates the arrangement of the secondary 2.18
containment areas, and Table 4.1.2-1 describes the area 2.19
boundaries.

4.2 SHUTDOWN MODEL 2.21

In order to make a determination that shutdown is achievable with 2.22
the cable and raceway in a given area disabled, it is necessary 2.24
to develop a functional model for shutdown. This model is 2.25
illustrated in Figures 4.2-1A, 4.2-1B, and 4.2-1C.

Paths to successful shutdown are shown in this model. All 2.27
systems, safety and nonsafety, which can contribute to plant
shutdown are identified. All auxiliary systems, such as 2.28
ventilation, cooling water, control and instrumentation, as well
as electrical power sources are included. In the analysis, 2.30
however, credit is taken only for safety-related systems and
equipment.

4.3 SHUTDOWN EQUIPMENT

Based on the shutdown model and use of safety-related systems only, the selection of shutdown components is made as follows:

1. System B21 - Nuclear Boiler

The eleven ADS and safety-relief valves are required to operate only manually. Automatic initiation is not necessary and will not normally occur since no LOCA and therefore no high drywell pressure is assumed which is required for automatic initiation. The three head vent valves MOV083, 084, and 085 are required to prevent blowdown of the reactor vessel into the primary containment due to opening of two series valves.

The SRV's may be utilized for a combination hot/cold shutdown operation. With the vessel at high pressure, the valves can provide sufficient pressure relieving capacity to enable the low head systems (LPCI and Core Spray) to provide core inventory. With the vessel at low pressure, the valves can provide extended core and/or suppression pool cooling by holding the valves open, enabling the low head systems to provide a suppression pool/reactor vessel circulation path. Cooling would be provided directly or indirectly via the RHR exchanger. The above modes are designated as the RHR/CS/SRV flow path in the separation analysis.

2. System B31 - Reactor Recirculation System

The two pressure switches, PS023A and B, for automatic RHR system operation are needed.

3. System C41 - Standby Liquid Control

The safety-related portions of this system are required in the event control rod insertion is not completed. It is not desirable to have this system operate unless it is actually required.

4. System C61 - Reactor Plant Remote Shutdown

The eight safety-related indicating transmitter circuits for RHR main flow (FT001), reactor vessel pressure (PT006), service water header pressure (PT011), suppression pool temperature (TT022A and B), and level (LT026), and drywell pressure (PT012) and temperature (TT021) are required.

5. System E11 - Residual Heat Removal 3.17

All safety-related components, except the following ten 3.19
valves, are required: The two flow to suppression pool 3.20
valves MOV042A and B are not required since the 3.22
normally closed upstream valves are protected. The two 3.23
head spray isolation valves MOV053 and 054 are not
required for shutdown since cable failure resulting in 3.24
both valves opening presents no problem since there is
a check valve in series with these MOV's to prevent 3.25
reactor blowdown. The four heat exchanger vent valves 3.26
MOV055A and B and 056A and B are not required for 3.27
shutdown even during the steam condensing mode since
cable failure resulting in opening of these valves will 3.28
drain a one inch line from the heat exchanger opening
to the suppression pool, an acceptable event. The two 3.30
hydrogen recombiner subsystem valves MOV057A and B are
not required for a non-LOCA condition and failure of 3.31
valve cabling will cause valves to open, an event which
will not result in significant degrading of the RHR 3.32
cooling system.

6. System E21 - Core Spray 3.35

All safety-related components are required, except the 3.37
two testable check valve bypass valves MOV081A and B, 3.38
which are not required during shutdown. If these 3.40
valves were to change state, there would be no adverse
effect on system operation. Automatic initiation which 3.41
is based on reactor water level is also required.
Initiation signals based on reactor primary containment 3.42
pressure are not required since there should be no high 3.43
pressure condition without LOCA. Also, failure of the 3.44
high drywell pressure initiation signal will neither
prevent injection nor cause the injection valves to 3.45
open prematurely because a reactor pressure permissive 3.46
in the control circuit of the injection valves will
prevent valve opening on high reactor pressures. This 3.48
permissive is considered a required component.

7. System E41 - High Pressure Coolant Injection 3.51

All safety-related components are required, except the 3.53
five items identified below. One is the loop level 3.54
pump P-050 which if lost will not adversely affect the 3.56
system since the time prior to initiation and between
operating cycles short enough to prevent significant 3.57
draindown of the pump discharge piping. Another item 3.58
is the inboard isolation valve bypass valve MOV047
which is not required for shutdown and will not affect 4.1
system operation in either the open or closed position.
Also, the turbine exhaust vacuum breaker MOV049 is not 4.2
required and is used only after a LOCA. Lastly, the 4.3
condenser exhaust vacuum breaker PCV144 and steamline

trap bypass valve LCV091 are not required for shutdown and will, in fact, fail in the closed position on loss of air due to loss of offsite power. Assuming availability of air, failure of the control circuit resulting in valve opening is not detrimental to system operation. Automatic initiation based on reactor water level is required. Initiation due to high drywell pressure is not required since there should be no such condition without LOCA. Also, failure of drywell pressure initiation signal will not prevent injection, and if premature injection occurs, it will not adversely affect reactor operation. Instrumentation to identify HPCI steamline break which can cause steamline isolation is required. 4.4 4.5 4.6 4.7 4.8 4.9 4.10 4.11 4.12 4.13

8. System E51 - Reactor Core Isolation Cooling 4.16

All safety-related components are required, except those five corresponding to the E41 System (P-051, MOV047, MOV049, PCV144 and LCV091) and for the same reasons. Automatic initiation is also required. 4.18 4.19 4.20

9. System G33 - Reactor Water Cleanup 4.24

The containment isolation valves MOV033 and 034 are required to be closed to isolate the reactor from the remainder of the RWCU System. This isolation is necessary if standby liquid control system initiation is required. 4.26 4.27 4.29

10. System G41 - Fuel Pool Cooling and Cleanup 4.32

The two service water inlet valves, MOV032A and B, used for ultimate cooling water connection and the corresponding valves in the service water system, are required to be closed to prevent pumping service water to the spent fuel storage pool, an event which in time could cause flooding in the reactor building. 4.34 4.35 4.37 4.38

11. System M43 - Fire Protection 4.41

Only the safety-related portion of this system is required to prevent inadvertent shutdown of the ventilation system or nonclosure of CO_2 dampers so that the CO_2 is confined to a fire area. 4.43 4.44 4.46

12. System M50 - RBSVS and Control Room A-C Chilled Water 4.49

All safety-related components are required. 4.51

13. System P41 - Service Water 4.55

All safety-related components are required except the two radiation monitoring system isolation valves MOV102A and B which are not needed during a non-LOCA condition. In addition, a failure causing the valves to open will not result in unacceptable conditions. Automatic initiation is also required. 4.57 4.58 5.2 5.3

14. System P42 - Reactor Building Closed Loop Cooling Water System 5.6

The three P-005A, B, and C RBLCLW circulating pumps and the two heat exchanger inlet isolation valves MOV042A and B are required to supply cooling to RHR pump seals. Valves separating Category I from Category II piping and Division I from Division II piping are not required. Operation of selected components will be manual and no automtic initiation is required. 5.8 5.9 5.11 5.12 5.13 5.14

15. System P50 - Compressed Air 5.17

The MOV's and pressure switches used to supply and/or isolate the air to the SRV accumulators are required. All other components are Category II. 5.19 5.21

16. Systems R22, 23, 24, 35, 42, 43 - Electrical Distribution 5.24

All Class 1E electrical distribution and interconnecting cable is required. 5.26

17. System T46 - Standby Ventilation System 5.30

Only the fourteen unit coolers in the reactor building are required to maintain the ambient temperature around the components needed for shutdown. Manual operation only is required; automatic initiation is not needed. Ventilation equipment required for maintaining negative pressure in the reactor building secondary containment is not needed. The filtering equipment is not required since there is no LOCA/release of radiation. 5.32 5.33 5.35 5.36 5.37 5.38

18. System X41 - Miscellaneous Room HVAC 5.41

All safety-related ventilation components are required in these miscellaneous areas. 5.43

19. System X60 - Diesel/Generator Ventilation 5.47

All safety-related ventilation components in the D/G rooms are required. 5.49

20. System X61 - Control Room A-C 5.53

All safety-related components are required, except the two air-operated valves AOV37A and B which isolate the redundant portions of ducts that will remain intact, assuming no seismic condition. These dampers will fail closed on loss of offsite power. 5.55 5.56 5.58 6.1

4.4 DEVELOPMENT OF SHUTDOWN EQUIPMENT BY AREA 6.4

The development of shutdown equipment by affected area is illustrated in the schematic diagram Figure 4.4-1. 6.5

The first step consists of developing a shutdown equipment list. This is accomplished by using the shutdown model developed, as described in Section 4.2, and identifying all systems with safety-related cable (Table 4.4-1). These are then compared to the model requirements as indicated in Section 4.3 to sort out the safety-related equipment for shutdown. The shutdown equipment list is contained in Table 4.4-2. 6.7 6.8 6.9 6.10 6.13

The second step is to incorporate the elementary diagram (ESK) information on the shutdown equipment list. Since a complete equipment versus ESK list already exists within the computerized Electrical Cable Schedule Information System (ECSIS), the shutdown equipment list is input to the computer, compared against the equipment versus ESK list, and sorted to get the shutdown equipment versus ESK list. 6.14 6.15 6.16 6.18

The third step is to identify the cables associated with each piece of shutdown equipment. This is accomplished by comparing the shutdown equipment versus ESK list generated in the previous step with the cable versus ESK list in the ECSIS. 6.19 6.20 6.21

Having identified, at this point, all shutdown equipment and its associated cable, it remains to identify the cable in each area and compare to the shutdown equipment in order to identify the disabled equipment. 6.22 6.23

The fourth step is to compile lists of cable trays and conduit by area, input to the computer, and compare against the cable versus raceway list in the ECSIS thus creating the cable versus area lists. 6.24 6.25

The fifth step is to compare the shutdown equipment versus cable list from step three against the cable versus area lists from step four to identify the shutdown equipment lost for each area. 6.26 6.27

The final step is to compare the unaffected shutdown equipment versus area lists against the shutdown model to determine the impact on safe shutdown capability. 6.28 6.29 6.31

5 RESULTS AND RECOMMENDATIONS

Appendices A and B present the results of the separation analysis for the primary and secondary containment respectively.

The results are presented for each area investigated in the following format:

1. Systems Impacted (Division I and Division II) - A listing of any system which computer analysis indicated had associated shutdown cable or cables in the area of interest.

2. System Functions Disabled - All safety systems and components previously identified as essential and listed in Tables 4.4-1 and 4.4-2 are evaluated for their importance in achieving a safe shutdown. Those components whose failure would not necessarily cause a system function loss are reviewed and, where no impact upon safe shutdown exists, are so noted under Disabled Function Evaluation below. As an example, in Section 008-07, Paragraphs 1(B) and 1(C) identify unit cooler 1T46*UC002A as a disabled 1T46, Division I, component. However, the loss of that cooler does not affect the remaining Division I, cooler (1T46*UC003A) and Division I 1T46 RBSVS components which have the capability or providing cooling for the Division I equipment utilized for safe shutdown and identified in Paragraph 4, Shutdown Capability.

   Where an event damages extensive equipment in one train (Division I or II), a statement such as "No credit taken for Division I system functions" is made, and the remaining statements generally refer to disabled functions in other Divisions. In such a case, the analysis has determined that no Division I system functions are required to achieve safe shutdown.

3. Disabled Function Evaluation - Identifies, at the system level, the importance to safe shutdown of any function that may be lost as a result of the event.

4. Shutdown Capability - Identifies whether redundant means of providing necessary safe shutdown functions are available (given the Disabled Functions in 3) and generally describes an available procedure for safe shutdown.

5. Further Action Recommended - Provides recommendations for required modifications which will further improve existing plant shutdown capability. These recommendations are not necessarily requisites to achieving shutdown but rather enhancements which would augment existing capabilities.

TABLE 4.1.1-1

PRIMARY CONTAINMENT AREA BOUNDARIES

Primary Segment			Boundary Overlap		
Area	From	To	Area	From	To
N1	0°	60°	01	30°	90°
N2	60°	120°	02	90°	150°
N3	120°	180°	03	150°	210°
N4	180°	240°	04	210°	270°
N5	240°	300°	05	270°	330°
N6	300°	0°	06	330°	30°

TABLE 4.1.2-1 1.8

SECONDARY CONTAINMENT AREA BOUNDARIES 1.10

Primary Segment			Boundary Overlap			1.13
Area	From	To	Area	From	To	1.14
N1	0°	45°	01	22.5°	67.5°	1.16
N2	45°	90°	02	67.5°	112.5°	1.17
N3	90°	135°	03	112.5°	157.5°	1.18
N4	135°	180°	04	157.5°	202.5°	1.19
N5	180°	225°	05	202.5°	247.5°	1.20
N6	225°	270°	06	247.5°	292.5°	1.21
N7	270°	315°	07	292.5°	337.5°	1.22
N8	315°	0°	08	337.5°	22.5°	1.23

Elevation	From	To	1.25
008	008	040	1.27
040	040	063	1.28
063	063	078	1.29
078	078	112	1.30
112	112	150	1.31
150	150	-	1.32

Segments are Numbered Elevation - Area 1.34
Example: 1.35
063-N6; Elevation 063 to 078, Area 225° to 270° 1.36
See Figures 4.1.1-1 and 4.1.1-2 1.37

TABLE 4.4-1

ALL SYSTEMS WITH CLASS IE CABLES
SHOREHAM NUCLEAR POWER STATION
LONG ISLAND LIGHTING COMPANY

System No.	Description
B	
.B21	Nuclear Boiler
.B31	Reactor Recirculation
C	
C11	Control Rod Drive Hydraulic Control
.C41	Standby Liquid Control
C51	Neutron Monitoring
.C61	Reactor Plant Remote Shutdown
C71	Reactor Protection
D	
D11	Process Radiation Monitoring
D21	Area Radiation Monitoring
E	
.E11	Residual Heat Removal
.E21	Core Spray
.E41	High Pressure Coolant Injection
E32	MSIV Leakage Control System
.E51	Reactor Core Isolation Cooling
G	
G11	Radwaste
G33	Reactor Water Cleanup
G41	Fuel Pool Cooling and Cleanup
M	
*M43 (Control Building)	Fire Protection
.M50	RBSVS and Control Room A-C Chilled Water
N	
N11	Main Steam
P	
.P41	Service Water
.P42	Reactor Building Closed Loop Cooling Water
.P50	Compressed Air

TABLE 4.4-1 (Cont)

System No.	Description	
R		2.19
.R22	Metal Clad Switchgear	2.20
.R23	Unit Substations	2.21
.R24	Motor Control Centers	2.22
.R35	AC Control and Instrument Power	2.24
R36	AC Uninterruptible (Vital) Power	2.25
R41	DC Instrument Power (48 V dc)	2.26
.R42	Battery Power (125 V dc)	2.27
.R43	Diesel Emergency Power	2.28
T		2.31
T23 (N_2 to drywell floor seal)	Reactor Containment	2.33 2.34
.T46	Standby Ventilation System	2.35
T48	Primary Containment Atmospheric Control System	2.36 2.37
X		2.41
.X41	Miscellaneous Computer, Screenwell, Relay and Battery Room HVAC	2.42 2.43
.X60	Diesel Generator Ventilation System	2.44 2.45
.X61	Control Room Air-Conditioning System	2.46 2.47
Z		2.51
.Z93	Post-Accident Monitoring	2.52

NOTES: 2.55

. Safe Shutdown Systems. 2.57

* For fire control during shutdown. 3.2

SHOREHAM PLANT SHUTDOWN
SAFE SHUTDOWN COMPONET LIST
(EQUIP VS CKT VS ESK)

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

REVISION 8
12/29/80

IDENTITY	DESCRIPTION	ESK	CKT NO	PWR SC	PWR SC LOC	EQUIP LOC(1) EL-AZ
	AUTOMATIC DEPRESSURIZATION SYSTEM					
1B21*SV092AX/Y	ADS VLV 1B21*RV-92A SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-218
1B21*SV092BX/Y	ADS VLV 1B21*RV-92B SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-234
1B21*SV092CX	ADS VLV 1B21*RV-92C SOVA	1.61-238		1R42*PNLA2	EL 40' RELAY RM	102-234
1B21*SV092DX	ADS VLV 1B21*RV-92D SOVA	1.61-238		1R42*PNLA2	EL 40' RELAY RM	102-244
1B21*SV092EX/Y	ADS VLV 1B21*RV-92E SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-253
1B21*SV092FX	ADS VLV 1B21*RV-92F SOVA	1.61-238		1R42*PNLA2	EL 40' RELAY RM	102-124
1B21*SV092GX	ADS VLV 1B21*RV-92G SOVA	1.61-238		1R42*PNLA2	EL 40' RELAY RM	102-115
1B21*SV092HX/Y	ADS VLV 1B21*RV-92H SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-142
1B21*SV092JX/Y	ADS VLV 1B21*RV-92J SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-126
1B21*SV092KX/Y	ADS VLV 1B21*RV-92K SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-90
1B21*SV092LX/Y	ADS VLV 1B21*RV-92L SOVA/B	1.61-236/7		1R42*PNLA2/B2	EL 40' RELAY RM	102-270
	CORE SPRAY SYSTEM					
	DIVISION 1					
1E21*P013A	CORE SPRAY PUMP	5E21A01	1E21A01	1R22*SHG101	EMER SHGR RM EL 25'	8-103
1E21*P049A	KEEP FILLED PUMP	6E2101	1E21A02	1R24*NCC117	R.B. EL 40'	8-101
1E21*MOV031A	PUMP SUCTION VV	6E2102	1E21A02	1R24*NCC117	R.B. EL 40'	24-148
1E21*MOV033A	DISCHARGE VV	6E2103	1E21A04	1R24*NCC113	R.B. EL 112'	104-115
1E21*MOV035A	RECIRC VV	6E2105	1E21A06	1R24*NCC111	R.B. EL 40'	53-108
1E21*MOV034A	MIN FLOW VV	6E2106	1E21A07	1R24*NCC117	R.B. EL 40'	14-98
1B21*PS023A	PRES INTLK B21-N021A(H21*P004)	1.61-76				78-79
1B21*PS023C	PRES INTLK B21-N021C(H21*P009)	1.61-76				78-102
1E21*PDS033A	CS D/P INTLK (H21*P001)	6E2103	1E21A04	1R24*NCC113	R.B. EL 112"	8-110
1E21*FIS002A	MIN FLOW (H21*P001)					8-110
	DIVISION 2					
1E21*P013B	CORE SPRAY PUMP	5E2102	1E21B01	1R22*SHG-102	EMER SHGR RM EL 25'	8-257
1E21*P049B	KEEP FILLED PUMP	6E2101	1E21B02	1R24*NCC1127	R.B. EL 40'	8-259
1E21*MOV031B	PUMP SUCTION VV	6E2102	1E21B02	1R24*NCC1127	R.B. EL 40'	24-112
1E21*MOV033B	DISCHARGE VV	6E2103A	1E21B04	1R24*NCC1123	R.B. EL 112'	104-245
1E21*MOV035B	RECIRC VV	6E2105	1E21B06	1R24*NCC1121	R.B. EL 40'	53-253
1E21*MOV034B	MIN FLOW VV	6E2106	1E21B07	1R24*NCC1127	R.B. EL 40'	14-262
1B21*PS023B	PRES INTLK B21-N021B(H21*P005)	1.61-77				78-257
1B21*PS023D	PRES INTLK B21-N021D(H21*P010)	1.61-77				78-280
1E21*PDS033B	CS D/P INTLK (H21*P019)	6E2103	1E21A04	1R24*NCC1123	R.B. EL 112	8-248
1E21*FIS002B	MIN FLOW (H21*P019)					8-248
1E41*P074	VACUUM PUMP	11E4101	1E41N01	1R42*NCC0B1	R.B. EL 40'	8-170
1E41*P075	VACUUM TANK COND PUMP	11E4101A	1E41N02	1R42*NCC0B1	R.B. EL 40'	8-166
1E41*P127	AUX LO PUMP	11E4102	1E41N03	1R42*NCC0B1	R.B. EL 40'	8-160
1E41*MOV031	HPCI PUMP SUCT FM CON ST TK VV	11E4109	1E41N09	1R42*NCC0B1	R.B. EL 40'	20-220
1E41*MOV032	HPCI PUMP SUCT FM SUP POOL VV	11E4110	1E41N10	1R42*NCC0B1	R.B. EL 40'	24-210
1E41*MOV034	HPCI STEAN SUP OUTBRD ISO VV	11E4105	1E41B01	1R42*NCC0B2	R.B. EL 112'	64-161
1E41*MOV035	HPCI PUMP DISCHARGE VV	11E4106	1E41N06	1R42*NCC0B2	R.B. EL 112'	64-168
1E41*MOV036	MIN FLOW VV	11E4112	1E41N12	1R42*NCC0B1	R.B. EL 40'	18-197
1E41*MOV037	HPCI TEST BYPASS VV TO CST VV	11E4107	1E41N07	1R42*NCC0B1	R.B. EL 40'	18-195
1E41*MOV038	HPCI TEST BYPASS VV TO CST VV	11E4108	1E41N08	1R42*NCC0B1	R.B. EL 40'	18-205
1E41*MOV039	LUB OIL COOL VV	11E4114	1E41N13	1R42*NCC0B1	R.B. EL 40'	16-190
1E41*MOV041	STEAN SUPPLY INBRD ISOL VV	6E4102	1E41A01	1R42*NCC1118	R.B. EL 112'	66-188
1E41*MOV042	HPCI STEAN OUT BRD ISOL VV	11E4103	1E41B01	1R42*NCC0B2	R.B. EL 112'	66-192

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1E41*HOV043	HPCI STEAM TO TUBINE SUPPLY VV	11E4104	1E41N04	1R42*MCC0B1	R.B. EL 40'	17-184
1E41*HOV044	HPCI TURBINE EXHAUST VV	11E4114	1E41N19	1R42*MCC0B1	R.B. EL 40'	20-187
1E41*HOV040	HARMUP ISOL VV	11E4117	1E41N22	1R42*MCC0B2	R.B. EL 112'	64-189
1E41*SOV081	STM LN DRN VV (015-190)	1.61-129				15-190
1E41*SOV082	STM LN DRN VV (015-190)	1.61-129				15-190
1E41*SOV083	COND DISCH VV (009-184)	1.61-129				9-184
1E41*SOV095	COND DISCH VV (009-184)	1.61-129				12-185
1E41*FS003	HPCI PP DISCH (H21*P014)	1.61-125				8-167
1B21*LIS027B	HL TRIP B21-N024B(H21*P004)	1.61-25				78-79
1B21*LIS027D	HL TRIP B21-N024D(H21*P005)	1.61-24				78-297
1E41*PS021L	LO PP SUCT E41-N010(H21*P014)	1.61-24				8-167
1E41*PS026A	HI TURD EX E41-N017A(H21*P014)	1.61-24				8-167
1E41*PS026B	HI TURB EX E41-N017B(H21*P014)	1.61-24				8-167
1E41*PS025B	HI TURD EX E41-N012B(H21*P014)	1.61-24				8-167
1E41*PS025D	HI TURD EX E41-N012D(H21*P014)	1.61-24				8-167
1E41*PS023B	STM PRES L E41-N001B(H21*P036)	1.61-24				8-160
1E41*PS023D	STM PRES L E41-N001D(H21*P036)	1.61-24				8-160
1E41*PDS022B	HI STM D/P E41-N005 (H21*D026)	1.61-25				8-160
1E41*TE054B	HI AREA T E41-N601B(034-185)	1.61-88				34-185
1E41*TE055B	HI AREA T E41-N602B(034-210)	1.61-88				66-210
1E41*TE054A	HI AREA T E41-N601A(034-100_	1.61-88				34-180
1E41*TE055A	HI AREA T E41-N602A(034-200)	1.61-88				34-200
1E41*PDS022A	HI STM D/P E41-N004 (H21*P016)	1.61-25				8-157
1B21B-K32A	B21B-K32A(H11*P614)	1.61-125				CB/63-C12
1B21B-K32B	B21B-K32B(H11*P614)	1.61-125				HG/21-N12
1B31B-K31A	B31B-K31A(B31-PNL53A)	1.61-207				HG/21-P12
1B31B-K31B	B31B-K31B(B31-PNL53B)	1.61-208				8-178
1E41*PS025A	HI TURB EX E41-N012A(H21*P034)	1.61-25				8-178
1E41*PS025C	HI TURB EX E41-N012C(H21*P034)	1.61-25				8-157
1E41*PS023A	STM PRES L E41-N001A(H21*P016)	1.61-25				8-157
1E41*PS023C	STM PRES L E41-N001C(H21*P016)	1.61-25				8-157
1E41*LS092A	SUPR POOL LVL	1.61-125				27-135
1E41*LS092B	SUPR POOL LVL	1.61-125				27-325
1E41*LS093A	COND STRG TK-30 LVL	1.61-125				YARD
1E41*LS093B	COND STRG TK-30 LVL	1.61-125				YARD
1E41*TE56A						66-205
1E41*TE56B						66-210
VV	TURB STOP & LVL SH	1.61-264				
1E41*HOV043-LS6		1.61-264				17-184
1E41*HOV032-LS2		1.61-264				24-210
VV	RV LL (H21-P005)	1.61-264				78-257
VV	RV LL (H21-P005)	1.61-264				78-257
CKT	RV HL & TRIP(H21*P004)	1.61-264				78-79
CKT	MAN ISOL (H11*P601)	1.61-264				CB/63-C12
CKT TRIP SOL		1.61-200				63-208
	REACTOR CORE ISOLATION COOLING SYSTEM-RB					
	DIVISION 1					
1E51*P076	COND VCUUM PUMP	11E5101	1E51N11	1R24*MCC10A2	R.B. EL 112'	8-227
1E51*P077	COND. CONDENSATE PUMP	11E5116	1E51N12	1R24*MCC10A2	R.B. EL 112'	8-230
1E51*HOV031	RC PUMP SUCT FROM CON TK VV	11E5108	1E51N01	1R24*MCC10A2	R.B. EL 112'	11-217
1E51*HOV032	RCIC PUMP SUCT SUP POOL VV	11E5106	1E51N02	1R24*MCC10A2	R.B. EL 112'	24-202
1E51*HOV034	RCIC PUMP DISCHARGE VV	11E5105	1E51N04	1R24*MCC10A1	R.B. EL 40'	16-200
1E51*HOV035	RCIC PUMP DISCHARGE VV	11E5104	1E51N05	1R24*MCC10A2	R.B. EL 112'	78-193
1E51*HOV036	MIN FLOW VV	11E5109	1E51N06	1R24*MCC10A2	R.B. EL 112'	20-234
1E51*HOV037	TEST BYPASS VV	11E5107	1E51N07	1R24*MCC10A1	R.B. EL 40'	20-201
1E51*HOV038	LUBE OIL COLL. VV	11E5110	1E51N08	1R24*MCC10A2	R.B. EL 112'	15-220
1E51*HOV041	RCIC STEAM SUP INBRD ISO VV	6ES102	1E51A01	1R24*MCC112B	R.B. EL 112'	87-180
1E51*HOV042	RCIC STEAM SUP TO TUR OI VV	11E5102	1E51B01	1R24*MCC10A2	R.B. EL 112'	88-180

1E51*MOV043	RCIC STEAM SUP TO TUR SUP VV	11E5103	1E51N09	1R24*MCC10A2	R.B. EL 112'	11-224
1E51*MOV044	RCIC TUR TRIP AND THROTTLE VV	11E5111	1E51N10	1R24*MCC10A2	R.B. EL 112'	11-222
1E51*MOV045	RCIC TUR EXH TO SUP POOL VV	11E5113	1E51N14	1R24*MCC10A1	R.B. EL 40'	31-217
1E51*MOV046	VAC PP DISCHVV	11E5114	1E51N15	1R24*MCC10A1	R.B. EL 40'	29-226
1E51*MOV048	BYPASS VV	11E5112	1E51B02	1R24*MCC10A2	R.B. EL 112'	86-180
1E51*AOV081	DRAIN POT DRAIN	1.61-211				09-245
1E51*AOV083	COND E-36 DRAIN	1.61-211				09-245
1E51*LCV095	COND E-38 DRAIN	1.61-211				09-245
1E51*PS023A	REAC PRS L E51-N019A(H21*P035)	1.61-207				40-100
1E51*PS023B	REAC PRS L E51-N019B(H21*P038)	1.61-208				40-170
1E51*PS023C	REAC PRS L E51-N019C(H21*P035)	1.61-207				40-100
1E51*PS023D	REAC PRS L E51-N019D(H21*P038)	1.61-208				40-170
1E51*PS025A	HI TURB EX E51-N012A(H21*P017)	1.61-207				8-205
1E51*PS025B	HI TURB EX E51-N012B(H21*P037)	1.61-208				8-175
1E51*PS025C	HI TURB EX E51-N012C(H21*P017)	1.61-207				8-205
1E51*PS025D	HI TURB EX E51-N012D(H21*P037)	1.61-208				8-175
1E51*PDS022A	HI STM D/P E51-N017 (H21*P035)	1.61-207				40-100
1E51*PDS022B	HI STM D/P E51-N018 (H21*P038)	1.61-208				40-170
1E51*TE053A	HI AREA T E51-N601A	1.61-89				13-200
1E51*TE053B	HI AREA T E51-N601B	1.61-89				77-180
1E51*TE054A	HI AREA T E51-N602A	1.61-89				87-175
1E51*TE054B	HI AREA T E51-N602B	1.61-89				71-185
1B21*LIS027A	HI HTR LBL B21-N024A(H21*P004)	1.61-207				78-79
1B21*LIS027C	HI HTR LVL B21-N024C(H21*P005)	1.61-208				78-257
1E51*PS021L	LO PP SUCT E51-N006 (H21*P017)	1.61-207				8-205
1E51*PS026A	HI TURB EX E51-N009A(H21*P017)	1.61-207				8-205
1E51*PS026B	HI TURB EX E51-N009B(H21*P017)	1.61-207				8-205
1E51*MOV043	INTLKS	1.61-207				11-224
1E51*FS003	MIN FLOW,1E51*MOV36 (H21*P017)	1.61-208				8-205
1E51*MOV032	INTLKS	1.61-208				24-202
1E51*TE55A	HI AREA TEMP E51-N025A	1.61-240				17-190
1E51*TE55B	HI AREA TEMP E51-N025B	1.61-240				22-200
1E51*TE55C	HI AREA TEMP E51-N025C	1.61-240				31-200
1E51*TE55D	HI AREA TEMP E51-N025D	1.61-240				31-222
1E51*TE56A	HI AREA TEMP E51-N026A	1.61-240				63-180
1E51*TE56B	HI AREA TEMP E51-N026B	1.61-240				63-200
1E51*TE56C	HI AREA TEMP E51-N026C	1.61-240				63-180
1E51*TE56D	HI AREA TEMP E51-N026D	1.61-240				63-200
LS	RCIC TRIP CKT,H1/H2(C61*P-RSP)	1.61-208				63-208
LS4	RCIC TRIP CKT,TURB STP VV(P-RSP)	1.61-208				63-208
1E51*LS001	H1/H2 (C61*P-RSP)	1.61-208				63-208
CKT	RCIC INITIATE (H11*P602)	1.61-207				CB/63-C13
CKT	RCIC TRIP	1.61-207				
CKT	RCIC TRIP	1.61-211				63-208
	RHR SHUTDOWN COOLING SYSTEM					
	DIVISION 1					
1E11*P014A	RHR PUMP	5E1101	1E11A01	1R22*SHG-101	EMER SWGR RM EL 25'	8-95
1E11*P014C	RHR PUMP	5E1103	1E11C01	1R22*SHG-103	EMER SWGR RM EL 25'	8-80
1E11*MOV032A	RHR SHUTDOWN COOL INJECTION VV	6E1103	1E11A04	1R24*MCC1112	R.B. EL 112'	15-083
1E11*MOV032C	RHR SHUTDOWN COOL INJECTION VV	6E1134	1E11C04	1R24*MCC1113	R.B. EL 112'	18-064
1E11*MOV033A	RHR HX SHELL SIDE INLET VV	6E1116	1E11A16	1R24*MCC1119	R.B. EL 40'	25-105
1E11*MOV034A	RHR HX SHELL SIDE BYPASS VV	6E1120	1E11A17	1R24*MCC1112	R.B. EL 112'	28-073
1E11*MOV035A	RHR HX SHELL SIDE OUTLET VV	6E1115	1E11A18	1R24*MCC1117	R.B. EL 40'	31-087
1E11*MOV036A	RHR OUTBOARD VV	6E1126	1E11A19	1R24*MCC111X	R.B. EL 112'	73-092
1E11*MOV037A	RHR INBOARD VV	6E1125	1E11A07	1R24*MCC111X	R.B. EL 112'	73-083
1E11*MOV047	RHR SHUT COOL SUCT INB ISOS VV	6E1105	1E11N02	1R24*MCC1118	R.B. EL 112'	84-016
	DIVISION 2					

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1E11*P014B	RHR PUMP	5E1102	1E11B01	1R22*SHG-102	EMER SHGR RM EL 25'	8-265
1E11*P014D	RHR PUMP	5E1104	1E11D01	1R22*SHG-103	EMER SHGR RM EL 25'	8-280
1E11*MOV032B	RHR SHUTDOWN COOL INJECTION VV	6E1104	1E11B04	1R24*1122	R.B. EL 112'	15-277
1E11*MOV032D	RHR SHUTDOWN COOL INJECTION VV	6E1131	1E11D04	1R24*1122	R.B. EL 112'	18-296
1E11*MOV033B	RHR HX SHELL SIDE INLET VV	6E1138	1E11B16	1R24*1129	R.B. EL 40'	25-255
1E11*MOV034B	RHR HX SHELL SIDE BYPASS VV	6E1141	1E11B17	1R24*1122	R.B. EL 112'	28-288
1E11*MOV035B	RHR HX SHELL SIDE OUTLET VV	6E1135	1E11B18	1R24*1127	R.B. EL 40'	31-278
1E11*MOV036B	RHR OUTBOARD VV	6E1142	1E11B19	1R24*112Y	R.B. EL 112'	73-265
1E11*MOV037B	RHR INBOARD VV	6E1143	1E11B07	1R24*112Y	R.B. EL 112'	73-263
1E11*MOV048	RHR SHUT COOL SUCT OUB ISOS VV	11E1101	1E11N05	1R42*MCC0B2	R.B. EL 112'	73-096
1E11*MOV050	RHR CROSS HDR SHUTOFF VV	6E1124	1E11N01	1R24*1128	R.B. EL 112'	66-281
	REACTOR RECICULATION SYS FOR RHR SHUTDOWN COOLING MODE					
	DIVISION 1					
1B31*MOV031A	RECIRC PUMP SUCT VV	6B3102	1B31A06	1R24*MCC1112	R.B. EL 112'	17-085
1B31*MOV032A	RECIRC PUMP DISCH VV	6B3103	1B31A07	1R24*MCC111X	R.B. EL 112'	14-082
	DIVISION 2					
1B31*MOV031B	RECIRC PUMP SUCT VV	6B3107	1B31B06	1R24*MCC112Z	R.B. EL 112'	24-275
1B31*MOV032B	RECIRC PUMP DISCH VV	6B3103	1B31B07	1R24*MCC112Y	R.B. EL 112'	15-278
	RHR LOW PRESSURE COOLANT INJECTION MODE-RB					
	DIVISION 1					
1E11*P014A	RHR PUMP	5E1101	1E11A01	1R22*SHG-101	EMER SHGR RM EL 25'	8-95
1E11*P014C	RHR PUMP	5E1103	1E11C01	1R22*SHG-103	EMER SHGR RM EL 25'	8-80
1E11*MOV031A	RHR PUMP SUCTION VV	6E1101	1E11A03	1R24*MCC1113	R.B. EL 112'	24-085
1E11*MOV031C	RHR PUMP SUCTION VV	6E1101	1E11C03	1R24*MCC1113	R.B. EL 112'	24-069
1E11*MOV034A	RHR HX SHELL BYPASS VV	6E1120	1E11A17	1R24*MCC1112	R.B. EL 112'	28-073
1E11*MOV036A	RHR OUTBOARD VV	6E1126	1E11A19	1R24*MCC111X	R.B. EL 112'	73-092
1E11*MOV037A	RHR INBOARD VV	6E1125	1E11A07	1R24*MCC111X	R.B. EL 112'	73-083
	DIVISION 2					
1E11*P014B	RHR PUMP	5E1102	1E11B01	1R22*SHG-102	EMER SHGR RM EL 25'	8-265
1E11*P014D	RHR PUMP	5E1104	1E11D01	1R22*SHG-103	EMER SHGR RM EL 25'	8-280
1E11*MOV031B	RHR PUMP SUCTION VV	6E1129	1E11B03	1R24*MCC1122	R.B. EL 112'	24-275
1E11*MOV031D	RHR PUMP SUCTION VV	6E1102	1E11D03	1R24*MCC1122	R.B. EL 112'	24-291
1E11*MOV034B	RHR HX SHELL VV	6E1141	1E11B17	1R24*MCC1122	R.B. EL 112'	28-288
	RHR SHUTDOWN COOLING MODE					
	DIVISION 1					
1E11*P014A	RHR PUMP	5E1101	1E11A01	1R22*SHG-101	EMER SHGR RM EL 25'	8-95
1E11*P014C	RHR PUMP	5E1103	1E11C01	1R22*SHG-103	EMER SHGR RM EL 25'	8-80
1E11*MOV032A	RHR SHUTDOWN COOL INJECTION VV	6E1103	1E11A04	1R24*MCC1112	R.B. EL 112'	15-083
1E11*MOV032C	RHR SHUTDOWN COOL INJECTION VV	6E1134	1E11C04	1R24*MCC1113	R.B. EL 112'	18-064
1E11*MOV033A	RHR HX SHELL SIDE INLET VV	6E1116	1E11A16	1R24*MCC1119	R.B. EL 40'	25-105
1E11*MOV034A	RHR HX SHELL SIDE BYPASS VV	6E1120	1E11A17	1R24*MCC1112	R.B. EL 112'	28-073
1E11*MOV035A	RHR HX SHELL SIDE OUTLET VV	6E1115	1E11A18	1R24*MCC1117	R.B. EL 40'	31-087
1E11*MOV036A	RHR OUTBOARD VV	6E1126	1E11A19	1R24*MCC111X	R.B. EL 112'	73-092
1E11*MOV037A	RHR INBOARD VV	6E1125	1E11A07	1R24*MCC111X	R.B. EL 112'	73-083
1E11*MOV047	RHR SHUT COOL SUCT INB ISOS VV	6E1105	1E11N02	1R24*MCC1118	R.B. EL 112'	84-016
	DIVISION 2					
1E11*P014B	RHR PUMP	5E1102	1E11B01	1R22*SHG-102	EMER SHGR RM EL 25'	8-265
1E11*P014D	RHR PUMP	5E1104	1E11D01	1R22*SHG-103	EMER SHGR RM EL 25'	8-280
1E11*MOV032B	RHR SHUTDOWN COOL INJECTION VV	6E1104	1E11B04	1R24*MCC1122	R.B. EL 112'	15-277
1E11*MOV032D	RHR SHUTDOWN COOL INJECTION VV	6E1131	1E11D04	1R24*MCC1122	R.B. EL 112'	18-296
1E11*MOV033B	RHR HX SHELL SIDE INLET VV	6E1138	1E11B16	1R24*MCC1129	R.B. EL 40'	25-255

1E11*MOV034D	RHR HX SHELL SIDE BYPASS VV	6E1141	1E11B17	1R24*MCC1122	R.B. EL 112'	28-288
1E11*MOV035B	RHR HX SHELL SIDE OUTLET VV	6E1135	1E11B18	1R24*MCC1127	R.B. EL 40'	31-278
1E11*MOV036B	RHR OUTBOARD VV	6E1142	1E11D19	1R24*MCC112Y	R.B. EL 112'	73-265
1E11*MOV037B	RHR INBOARD VV	6E1143	1E11B07	1R24*MCC112Y	R.B. EL 112'	73-263
1E11*MOV048	RHR SHUT COOL SUCT OUB ISOS VV	11E1101	1E11N05	1R42*MCC0B2	R.B. EL 112'	73-096
1E11*MOV050	RHR CROSS HDR SHUTOFF VV	6E1124	1E11N01	1R24*MCC1128	R.B. EL 112'	66-281
	REACTOR RECICULATION SYS FOR RHR SHUTDOWN COOLING MODE					
	DIVISION 1					
1B31*MOV031A	RECIRC PUMP SUCT VV	6B3102	1B31A06	1R24*MCC1112	R.B. EL 112'	17-085
1B31*MOV032A	RECIRC PUMP DISCH VV	6B3103	1B31A07	1R24*MCC111X	R.B. EL 112'	14-082
	DIVISION 2					
1B31*MOV031B	RECIRC PUMP SUCT VV	6B3107	1B31B06	1R24*MCC1122	R.B. EL 112'	24-275
1B31*MOV032B	RECIRC PUMP DISCH VV	6B3103	1B31B07	1R24*MCC112Y	R.B. EL 112'	15-278
	RHR LOW PRESSURE COOLANT INJECTION MODE-RB					
	DIVISION 1					
1E11*P014A	RHR PUMP	5E1101	1E11A01	1R22*SWG-101	EMER SWGR RM EL 25'	8-95
1E11*P014C	RHR PUMP	5E1103	1E11C01	1R22*SWG-103	EMER SWGR RM EL 25'	8-80
1E11*MOV031A	RHR PUMP SUCTION VV	6E1101	1E11A03	1R24*MCC1113	R.B. EL 112'	24-085
1E11*MOV031C	RHR PUMP SUCTION VV	6E1101	1E11C03	1R24*MCC1113	R.B. EL 112'	24-069
1E11*MOV034A	RHR HX SHELL BYPASS VV	6E1120	1E11A17	1R24*MCC1112	R.B. EL 112'	28-073
1E11*MOV036A	RHR OUTBOARD VV	6E1126	1E11A19	1R24*MCC111X	R.B. EL 112'	73-092
1E11*MOV037A	RHR INBOARD VV	6E1125	1E11A07	1R24*MCC111X	R.B. EL 112'	73-083
	DIVISION 2					
1E11*P014B	RHR PUMP	5E1102	1E11B01	1R22*SWG-102	EMER SWGR RM EL 25'	8-265
1E11*P014D	RHR PUMP	5E1104	1E11D01	1R22*SWG-103	EMER SWGR RM EL 25'	8-280
1E11*MOV031B	RHR PUMP SUCTION VV	6E1129	1E11B03	1R24*MCC1122	R.B. EL 112'	24-275
1E11*MOV031D	RHR PUMP SUCTION VV	6E1102	1E11D03	1R24*MCC1122	R.B. EL 112'	24-291
1E11*MOV034B	RHR HX SHELL VV	6E1141	1E11B17	1R24*MCC1122	R.B. EL 112'	28-288
1E11*MOV036B	RHR OUTBOARD VV	6E1142	1E11B19	1R24*MCC112Y	R.B. EL 112'	73-265
1E11*MOV037B	RHR INBOARD VV	6E1143	1E11B07	1R24*MCC112Y	R.B. EL 112'	73-263
1E11*MOV050	RHR CROSS HDR SHUTOFF VV	6E1124	1E11N01	1R24*MCC1128	R.B. EL 112'	66-281
	RHR CONDENSING MODE-RB					
1E41*MOV041	STEAM SUPPLY INBOARD ISOL VV	6E4102	1E41A01	1R24*MCC1118	R.B. EL 112'	66-188
	RHR INTERLOCKS & TRIPS					
	DIVISION 1					
1B31*PS023A	LP INTLK B31-N018A(H21*P006)	1.61-196				40-180
1B21*PS023C	PRES INTLK B21-N021C(H21*P009)	1.61-76				78-102
1B21*PS023A	PRES INTLK B21-N021A(H21*P004)	1.61-76				78-79
1B21*LIS027A	LO HTR LVL B21-N024A(H21*P004)	1.61-27				78-79
1B21*LIS027C	LO HTR LBL B21-N024C(H21*P005)	1.61-27				78-257
1B21*K83	B21-K83 (H11*P622)	1.61-219				CB/44-C12
1B21*K6A	B21-K6A (H11*P609)	1.61-196				CB/63-C13
1B21*K6C	BC1-K6C (H11*P609)	1.61-196				CB/63-C13
1E11*PNS031A	PHP INTLK	1.61-220				24-85
1E11*PNS031C	PHP INTLK	1.61-220				24-69
1E11*PNS032A	PHP INTLK	1.61-220				14-82
1E11*PNS032C	PHP INTLK	1.61-220				18-64
1E11*PDS001A	MINFLOW (H21*P018)	1.61-219				8-75
1B21*LIS029A	LL/HP (H21*P004)	1.61-076				78-79
1E11*PS139A	LL/HP (H21*P004)	1.61-219				78-79

1B21*LIS029C	LL/HP (H21*P004)	1.61-076				78-79
	DIVISION 2					
1B31*PS023B	LP INTLK B31-N018B(H21*P022)	1.61-196				40-353
1B21*PS023D	PRES INTLK B21-N021D(H21*P0010)	1.61-77				78-280
1B21*PS023B	PRES INTLK B21-N021B(H21*P005)	1.61-77				78-257
1B21*LIS027B	LO WTR LVL B21-N024B(H21*P004)	1.61-29				78-79
1B21*LIS027D	LO WTR LVL B21-N024D(H21*P005)	1.61-29				78-257
1B21*K84	B21-K84 (H11*P623)	1.61-196				CB/44-C12
1B21*K6B	B21-K6B (H11*P611)	1.61-193				CB/63-C13
1B21*K6D	B21-K6D (H11*P611)	1.61-193				CB/63-C13
1E11*PNS031B	PMP INTLK	1.61-223				24-275
1E11*PNS031D	PMP INTLK	1.61-223				24-291
1E11*PNS032B	PMP INTLK	1.61-223				15-278
1E11*PNS032D	PMP INTLK	1.61-223				18-296
1E11*PDS001B	MINFLOW (H21*P021)	1.61-219				8-287
CKT	MAN INTIATE	1.61-219				
1E11*PS139B	LL/HP (H21*P005)	1.61-219				78-257
	STANDBY LIQUID CONTROL SYSTEM					
	DIVISION 1					
1C41*P024A	SLC LIQUID CONT PUMP	6C4101	1C41A01	1R24*MCC113	R.B. EL 112'	112-168
	DIVISION 2					
1C41*P024B	SLC LIQUID CONT PUMP	6C4101A	1C41B01	1R24*MCC1123	R.B. EL 112'	112-166
INTER CKT	C02 FIRE PROT CKT,DIESEL RM	11M4304		1R42*PNL-A2, B2 & C1		CONTROL BUILDING EL 63'
INTER CKT	C02 FIRE PROT CKT,BTY RM	11M4303		1R42*PNL-A2, B2 & C1		CONTROL BUILDING EL 63'
INTER CKT	C02 FIRE PROT CKT,EMER SWG RM	11M4305		1R42*PNL-A2, B2 & C1		CONTROL BUILDING EL 63'
INTER CKT	C02 FIRE PROT CKT,RELAY RM	11M4306		1R42*PNL-A1	EMER SWGR RM EL 25'	CONTROL BUILDING EL 25'
	SERVICE WATER SYSTEM-PH/RB					
	DIVISION 1					
1P41*P003A	SERVICE WATER PUMP	5P4101	1P41A01	1R22*SWG101	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*MOV031A	SWP DISCH VV	6P4101	1P41A02	1R24*MCC1110	SCRN EL 20'-6'	SCREENWELL EL 20'
1P41*MOV032A	SW HEADER ISOL VV	6P4103	1P41A05	1R24*MCC1110	SCRN EL 20'-6'	SCREENWELL EL 20'
1P41*MOV033A	SW CROSS TIE VV	6P4108	1P41A03	1R24*MCC1119	R.B. EL 40'	30-30
1P41*MOV033C	SW CROSS TIE VV	6P4109	1P41C03	1R24*MCC1119	R.B. EL 40'	31-40
1P41*MOV034A	RHR HX DISCH VV	6P4110	1P41A08	1R24*MCC1112	R.B. EL 112'	27-91
1P41*MOV035A	TBCLCW ISOL VV	6P4104	1P41A06	1R24*MCC1110	SCRN WL 20'-6'	SCREENWELL EL 20'
1P41*MOV036A	VENT CHILL ISOL VV	6P4105	1P41A07	1R24*MCC1116	DIESEL GEN RM EL 22'	12-46
1P41*MOV037A	RBCLCW HX OUTLET VV	6P4107	1P41A09	1R24*MCC1112	R.B. EL 112'	23-290
1P41*MOV039A	CLT COOLING DRN VV	6P4102	1P41A04	1R24*MCC1119	R.B. EL 40'	34-046
1P41*MOV042A	SW TO FUEL POOL VV	6P4113	1P41A12	1R24*MCC1119	R.B. EL 40'	15-040
1P41*AOV016A	EMER DIESEL HX OUTLET VV	6P4123	1P41A24	1R35*PNLR1	RELAY RM EL 44'	CB/27-L13
	DIVISION 2					
1P41*P003B	SERVICE WATER PUMP	5P4102	1P41B01	1R22*SWG102	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*MOV031B	SWP DISCH VV	6P4119	1P41B02	1R24*MCC1120	SCRN EL 20'-6"	SCREENWELL EL 20'
1P41*MOV032B	SW HEADER ISOL VV	6P4121	1P41B05	1R24*MCC1120	SCRN EL 20'-6"	SCREENWELL EL 20'
1P41*MOV033B	SW CROSS TIE VV	6P4108	1P41B03	1R24*MCC1129	R.B. EL 40'	30-030
1P41*MOV033D	SW CROSS TIE VV	6P4109	1P41C03	1R24*MCC1129	R.B. EL 40'	31-040
1P41*MOV034B	RHR HX DISCH VV	6P4118	1P41B08	1R24*MCC1128	R.B. EL 112'	27-268
1P41*MOV035B	TBCLCW ISOL VV	6P4120	1P41B06	1R24*MCC1120	SCRN EL 20'-6"	SCREENWELL EL 20'
1P41*MOV036B	VENT CHILL ISOL VV	6P4105	1P41B07	1R24*MCC1126	DIESEL GEN RM EL 22'	12-046
1P41*MOV037B	RBCLCW HX OUTLET VV	6P4122	1P41B09	1R24*MCC1128	R.B. EL 112'	23-294

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1P41*MOV039B	ULT COOLING DRN VV	6P4102	1P41B04	1R24*MCC1129	R.B. EL 40'	34-046
1P41*MOV042B	SH TO FUEL POOL VV	6P4113	1P41B12	1R24*MCC1129	R.B. EL 40'	15-040
1P41*MOV043	FUEL POOL DRN VV	6P4114	1P41N01	1R24*MCC1127	R.B. EL 40'	12-046
1P41*AOV016B	EMER DIESEL HX OUTLET VV	6P4123	1P41B24	1R35*PNLB1	RELAY RM EL 44'	CB/27-C13
	DIVISION 3					
1P41*P003C	SERVICE WATER PUMP	5P4103	1P41C01	1R22*SWG103	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*P003D	SERVICE WATER PUMP	5P4104	1P41D01	1R22*SWG103	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*MOV031C	SWP DISCH VV	6P4101	1P41C02	1R24*MCC1133	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*MOV031D	SWP DISCH VV	6P4117	1P41D02	1R24*MCC1133	EMER SWGR RM EL 25'	SCREENWELL EL 20'
1P41*MOV036C	VENT CHILL ISOL VV	6P4106	1P41C07	1R24*MCC1134	DIESEL GEN RM EL 22'	12-046
1P41*AOV016C	EMER DIESEL HX OUTLET VV	6P4124	1P41C24	1R35*PNL01	RELAY RM EL 25'	CB/27-C13
	ENERG SW TO FUEL POOL					
	DIVISION 1					
1G33*MOV033	RV DISCH	6G3308	1G33N12	1R24*MCC1113	EMER SWGR RM EL 25'	121-190
	DIVISION 2					
1G33*MOV034	RV DISCH VV	11G3301	1G33N13	1R24*MCC0B2	R.B. EL 112'	121-190
	REACTOR WATER CLEAN-UP SYSTEM					
	DIVISION 1					
1G41*MOV032A	SERVICE WTR INLET VV	6G4103	1G41A04	1R24*MCC1114	EMER SWGR RM EL 25'	162-147
	DIVISION 2					
1G41*MOV032B	SERVICE WTR INLET VV	6G4103	1G41B04	1R24*MCC1124	R.B. EL 150'	162-149
	RBCLCW SYSTEM-RB					
	DIVISION 1					
1P42*P005A	RBCLCW COOLING WATER PUMP	6P4201	1P42A01	1R24*MCC1112	R.B. EL 112'	150-NW
1P42*MOV042A	RBCLCW HX INLET VV	6P4214	1P42A10	1R24*MCC1112	R.B. EL 112'	30-349
	DIVISION 2					
1P42*P005B	RBCLCW COOLING WATER PUMP	6P4202	1P42B01	1R24*MCC1122	R.B. EL 112'	30-352
1P42*MOV042B	RBCLCW HX INLET VV	6P4218	1P42B10	1R24*MCC1128	R.B. EL 112'	150-NW
	DIVISION 3					
1P42*P005C	RBCLCW COOLING WATER PUMP	6P4203	1P42C01	1R24*MCC1131	R.B. EL 63'	150-NE
	EMERGENCY GENERATOR-EGR					
	DIVISION 1					
1R43*G-101	EDG G101 PROT-GEN DIFF CKT	8R4301	1R43A03			DG RM/22-L15
1R43*G-101	VR CT G-101 PROT	8R4301	1R43A24			DG RM/22-L15
1R43*G-101	EMER DG 51/40/32 PROT	8R4301	1R43A05			DG RM/22-L15
1R43*G-101	EMER DG 50N GND PROT	8R4301	1R43A28			DG RM/22-L15
1R43*G-101	CURRENT TEST BCK AND RESIS BOX	8R4301	1R43A27			DG RM/22-L15
1R43*G-101	GOVENOR HYDRAULIC ACTUATOR	11R4302	1R43A23	1R42*PNL-A1	EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-101	EG-A CONT BOX AND NOT OP POT	8R4301	1R43A06		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-101	VR CT G-101 PROT	8R4301	1R43A25		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-101	VOLT REGULATOR	8R4305	1R43A26		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-101	START CIRCUIT	11R4301	1R43A12	1R42*PNL-A1	EMER SWGR RM EL 25'	DG RM/22L-15
1R43*G-101	START CIRCUIT	11R4301	1R43A22	1R42*PNL-A1	EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-101	START CIRCUIT	11R4302	1R43A23	1R42*PNL-A1	EMER SWGR RM EL 25'	DG RM/22-L15
	DIVISION 2					
1R43*G-102	EDG G102 PROT-GEN DIFF CKT	8R4302	1R43B03		EMER SWGR RM EL 25'	DG RM/22-C15

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1R43*G-102	EMER DG 51/40/32 PROT	8R4302	1R43B05		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	EMER DG 50N GND PROT	8R4302	1R43B28		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	CURRENT TEST BCK AND RESIS BOX	8R4302	1R43B27		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	GOVENOR HYDRAULIC ACTUATOR	11R4304	1R43B23	1R42*PNL-B1	EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	EG-A CONT BOX AND MOT OP POT	8R4302	1R43B06		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	VR CT G-102 PROT	8R4302	1R43B25		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	VOLT REGULATOR	8R4306	1R43B26		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	VR CT G-102 PROT	8R4302	1R43B24		EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	START CIRCUIT	11R4303	1R43B12	1R42*PNL-B1	EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	START CIRCUIT	11R4303	1R43B22	1R42*PNL-B1	EMER SWGR RM EL 25'	DG RM/22-C15
1R43*G-102	START CIRCUIT	11R4304	1R43B23	1R42*PNL-B1	EMER SWGR RM EL 25'	DG RM/22-C15
	DIVISION 3					
1R43*G-103	EDG G103 PROT-GEN DIFF CKT	8R4303	1R43C03			DG RM/22-L15
1R43*G-103	EMER DG 51/40/32 PROT	8R4303	1R43C05			DG RM/22-L15
1R43*G-103	EMER DG 50N GND PROT	8R4303	1R43C28			DG RM/22-L15
1R43*G-103	CURRENT TEST BCK AND RESIS BOX	8R4303	1R43C27			DG RM/22-L15
1R43*G-103	GOVENOR HYDRAULIC ACTUATOR	11R4306	1R43C23	1R42*PNL-C1	EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	EG-A CONT BOX AND MOT OP POT	8R4303	1R43C06		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	VR CT G-103 PROT	8R4303	1R43C25		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	VOLT REGULATOR	8R4307	1R43C26		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	VR CT G-103 PROT	8R4303	1R43C24		EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	START CIRCUIT	11R4305	1R43C12	1R42*PNL-C1	EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	START CIRCUIT	11R4305	1R43C22	1R42*PNL-C1	EMER SWGR RM EL 25'	DG RM/22-L15
1R43*G-103	START CIRCUIT	11R4306	1R43C24	1R42*PNL-C1	EMER SWGR RM EL 25'	DG RM/22-L15
	DIESEL FUEL TRANSFER SYS-EGB					
	DIVISION 1					
1R43*P-201A	EG FUEL OIL TRANSFER PUMP	6R4304	1R43A09	1R24*MCC1116	DIESEL GEN RM EL 22'	YARD
1R43*P-202A	EG FUEL OIL TRANSFER PUMP	6R4304	1R43A10	1R24*MCC1116	DIESEL GEN RM EL 22'	YARD
	DIVISION 2					
1R43*P-201B	EG FUEL OIL TRANSFER PUMP	6R4305	1R43B09	1R24*MCC1126	DIESEL GEN RM EL 22'	YARD
1R43*P-202B	EG FUEL OIL TRANSFER PUMP	6R4305	1R43B10	1R24*MCC1126	DIESEL GEN RM EL 22'	YARD
	DIVISION 3					
1R43*P-201C	EG FUEL OIL TRANSFER PUMP	6R4306	1R43C09	1R24*MCC1134	DIESEL GEN RM EL 22'	YARD
1R43*P-202C	EG FUEL OIL TRANSFER PUMP	6R4306	1R43C10	1R24*MCC1134	DIESEL GEN RM EL 22'	YARD
	HVAC SYSTEMS					
	CRAC/RBSVS CHILL WATER SYSTEM-CB					
	DIVISION 1					
1H50*P137A	CHILLED WATER PUMP	6H5001	1H50A08	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/63-L12
1H50*P139A	COND WATER PUMP	6H5003	1H50A10	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/63-L12
1H50*P231A	LUBE OIL PUMP	6H5011	1H50A14	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/63-C16
1H50*WC003A	WATER CHILLER	5H5001	1H50A01	1R22*SWG101	EMER SWGR RM EL 25'	CB/63-L12
1H50*WC003A	CHILLER CONTROLS	5H5001A	1H50A03	1R35*PNL-R1	RELAY RM EL 44'	CB/63-L12
1H50*HOV031A	RETURN VV	6H5005	1H50A04	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/71-L13
1H50*HOV032A	SUPPLY VV	6H5006	1H50A05	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/75-L13
1H50*HOV033A	RET XOVER VV	6H5007	1H50A06	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/75-L13
1H50*HOV034A	SUP X-OVER VV	6H5008	1H50A07	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/75-L13
1H50*AOV068A	ISOL BYPASS VV	6H5009	1H50A12	1R35*PNL-R1	RELAY RM EL 44'	CB/71-L12
1H50*AOV069A	ISOL BYPASS VV	6H5010	1H50A13	1R35*PNL-R1	RELAY RM EL 44'	CB/75-L12
	DIVISION 2					
1H50*P137B	CHILLED WATER PUMP	6H5001	1H50B08	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/63-L13
1H50*P139B	COND WATER PUMP	6H5003	1H50B10	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/63-L13

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1H50*P231B	LUBE OIL PUMP	6H5011	1H50B14	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/63-L13
1H50*HC003B	WATER CHILLER	5H5002	1H50B01	1R22*SWG102	EMER SWGR RM EL 25'	CB/63-L13
1H50*HC003B	CHILLER CONTROLS	5H5002A	1H50B03	1R35*PNL-B1	EMER SWGR RM EL 25'	CB/63-L13
1H50*HOV031B	RETURN VV	6H5005	1H50B04	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/71-L13
1H50*HOV032B	SUPPLY VV	6H5006	1H50B05	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/75-L13
1H50*HOV033B	RET X-OVER VV	6H5007	1H50B06	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/75-L13
1H50*HOV034B	SUP X-OVER VV	6H5008	1H50B07	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/71-L13
1H50*AOV066B	ISOL BYPASS VV	6H5009	1H50B12	1R35*PNL-B1	RELAY RM EL 44'	CB/71-L13
1H50*AOV069B	ISOL BYPASS VV	6H5010	1H50B13	1R35*PNL-B1	RELAY RM EL 44'	CB/75-L13
	DIVISION 3					
1H50*P140A	COND WATER PUMP	6H5004	1H50A11	1R24*MCC1134	DIESEL GEN RM EL 22'	CB/63-L12
1H50*P140B	COND WATER PUMP	6H5012	1H50C14	1R24*MCC1134	DIESEL GEN RM EL 22'	CB/63-L13
1H50*P233A	LUBE OIL PUMP	6H5012	1H50C14	1R24*MCC1134	DIESEL GEN RM EL 22'	CB/63-L15
1H50*P233B	LUBE OIL PUMP	6H5012	1H50D14	1R24*MCC1134	DIESEL GEN RM EL 22'	CB/63-L12
1H50*HC004A	WATER CHILLER	5H5003	1H50C01	1R22*SWG103	EMER SWGR RM EL 25'	CB-63-L12
1H50*HC004B	WATER CHILLER	5H5004	1H50D01	1R22*SWG103	EMER SWGR RM EL 25'	CB/63-L13
1H50*HC004A	CHILLER CONTROLS	5H5003A	1H50C03	1R35*PNL-01	RELAY RM EL 44'	CB/63-L12
1H50*HC004B	CHILLER CONTROLS	5H5004A	1H50D03	1R35*PNL-01	RELAY RM EL 44'	CB/63-L13
	RBSVS SYSTEM-RB					
	DIVISION 1					
1T46*UC002A	UNIT COOLER	6T4619	1T46A13	1R24*MCC1118	R.B. EL 112'	8-332
1T46*UC003A	UNIT COOLER	6T4620	1T46A14	1R24*MCC1118	R.B. EL 112'	8-81
1T46*UC004A	REFUEL LVL UC	6T4621	1T46A15	1R24*MCC1112	R.B. EL 112'	218-60
1T46*UC005A	REFUEL LVL UC	6T4622	1T46A16	1R24*MCC1112	R.B. EL 112'	218-323
1T46*UC020A	RB MCC RM UC	6T4625	1T46A23	1R24*MCC1118	R.B. EL 112'	112-80
1T46*UC021A	MG RM 111 112 UC	6T4626	1T46A33	1R24*MCC1114	R.B. EL 150'	150-22
CKT	RBSVS/CRAC ACC SIGNAL	11T4601	1T46A19			CB/48-C14
CKT	RBSVS INITIAT SIGNAL	11T4602				CB/48-C14
	DIVISION 2					
1T46*UC002B	UNIT COOLER	6T4619	1T46B13	1R24*MCC1128	R.B. EL 112'	40-275
1T46*UC003B	UNIT COOLER	6T4620	1T46B14	1R24*MCC1128	R.B. EL 112'	40-85
1T46*UC004B	REFUEL LVL UC	6T4621	1T46B15	1R24*MCC1122	R.B. EL 112'	218-143
1T46*UC005B	REFUEL LVL UC	6T4622	1T46B16	1R24*MCC1122	R.B. EL 112'	218-240
1T46*UC020B	RM MCC RM UC	6T4625	1T46B23	1R24*MCC1128	R.B. EL 112'	112-227
1T46*UC021B	MG RM 111 112 UC	6T4626	1T46B33	1R24*MCC1127	R.B. EL 40'	150-340
CKT	RBSVS/CRAC ACC SIGNAL	11T4601	1T46B19			CB/48-C14
CKT	RBSVS INITIAT SIGNAL	11T4603				CB/48-C14
	DIVISION 3					
1T46*UC022B	MG RM 113 UC	6T4627	1T46B34	1R24*MCC1131	R.B. EL 63'	161-340
1T46*UC022A	MG RM 113 UC	6T4627	1T46A34	1R24*MCC1131	R.B. EL 63'	161-22
CKT	RBSVS INITIAT SIGNAL	11T4604				ESHG ROOM/25-K13
	RELAY/SHGR ROOM VENT SYSTEM-CB					
	DIVISION 1					
1X41*ACU014A	CHILL WT COOL	6X4125	1X41A01	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/44-C14
1X41*MOD035A	CHILL WT COOL	6X4125	1X41A01	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/53-C12
1X41*FN029A	RELAY RM EXHAUST FAN	6X4121	1X41A02	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/44-C13
	DIVISION 2					
1X41*ACU014B	CHILL WT COOL	6X4125	1X41B01	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/44-C13
1X41*MOD035B	CHILL WT COOL	6X4125	1X41B01	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/55-C12
1X41*FN029B	RELAY RM EXHAUST FAN	6X4121	1X41B02	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/44-C13
	CHILLER EQUIP RM VENT SYSTEM-CB					

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

	DIVISION 1					
1X41*FN039A	RBSV CHILL EQUIP RM FAN	6X4126	1X41A19	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/63-C39
1X41*M0D031A	RBSV INTAKE DAMPER	6X4126	1X41A19	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/63-L16
1X41*M0D032A	RBSV EXHAUST DAMPER	6X4126	1X41A19	1R24*MCC1116	DIESEL GEN RM EL 22'	HVAC/63-L16
	DIVISION 2					
1X41*FN039B	RBSV CHILL EQUIP RM FAN	6X4127	1X41B19	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/63-C15
1X41*M0D031B	RBSV INTAKE DAMPER	6X4127	1X41B19	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/63-L16
1X41*M0D032B	RBSV EXHAUST DAMPER	6X4127	1X41B19	1R24*MCC1126	DIESEL GEN RM EL 22'	HVAC/63-L16
	BATTERY ROOM VENT SYSTEM-CB					
	DIVISION 1					
1X41*FN072A	BTY RM VENT FAN	6X4128	1X41A03	1R24*MCC1115	EMER SWGR RM EL 25'	CB/30-K16
1X41*M0D039A	BTY RM DISCHARGE DAMPER	6X4128	1X41A03	1R24*MCC1115	EMER SWGR RM EL 25'	CB/27-K16
1X41*M0D040A	BTY RM EXHAUST DAMPER	6X4128	1X41A03	1R24*MCC1115	EMER SWGR RM EL 25'	CB/30-K16
1X41*M0D041A	BTY RM EXHAUST DAMPER	6X4128	1X41A03	1R24*MCC1115	EMER SWGR RM EL 25'	CB/26-K16
	DIVISION 2					
1X41*FN072B	BTY RM VENT FAN	6X4129	1X41B03	1R24*MCC1125	EMER SWGR RM EL 25'	CB/30-C16
1X41*M0D039B	BTY RM DISCHARGE DAMPER	6X4129	1X41B03	1R24*MCC1125	EMER SWGR RM EL 25'	CB/29-C16
1X41*M0D040B	BTY RM EXHAUST DAMPER	6X4129	1X41B03	1R24*MCC1125	EMER SWGR RM EL 25'	CB/30-C16
1X41*M0D041B	BTY RM EXHAUST DAMPER	6X4129	1X41B03	1R24*MCC1125	EMER SWGR RM EL 25'	CB/26-C16
	DIVISION 3					
1X41*FN072C	BTY RM VENT FAN	6X4130	1X41C03	1R24*MCC1133	EMER SWGR RM EL 25'	CB/39-K16
1X41*M0D039C	BTY RM DISCHARGE DAMPER	6X4130	1X41C03	1R24*MCC1133	EMER SWGR RM EL 25'	CB/37-K16
1X41*M0D040C	BTY RM EXHAUST DAMPER	6X4130	1X41C03	1R24*MCC1133	EMER SWGR RM EL 25'	CB/41-C16
1X41*M0D041C	BTY RM EXHAUST DAMPER	6X4130	1X41C03	1R24*MCC1133	EMER SWGR RM EL 25'	CB/35-K16
	EMERGENCY GEN ROOM VENT SYSTEM-EGB					
	DIVISION 1					
1X61*FN025A	FILTER BOOST FAN	6X6102	1X61A02	1R24*MCC1116	DIESEL GEN RM EL 22'	EGB/63-C12
1X60*FN028A	EMER VENT FAN	6X6002	1X60A02	1R24*MCC1116	DIESEL GEN RM EL 22'	EGB/22-L15
1X60*M0D31A	DAMPER	6X6002	1X60A02	1R24*MCC1116	DIESEL GEN RM EL 22'	EGB/38-L16
1X60*M0D32A	DAMPER	6X6002	1X60A02	1R24*MCC1116	DIESEL GEN RM EL 22'	EGB/34-L12
	DIVISION 2					
1X61*FN025B	FILTER BOOST FAN	6X6102	1X61B02	1R24*MCC1126	DIESEL GEN RM EL 22'	EGB/63-C12
1X60*FN028B	EMER VENT FAN	6X6003	1X60B02	1R24*MCC1126	DIESEL GEN RM EL 22'	EGB/22-L15
1X60*M0D31B	DAMPER	6X6003	1X60B02	1R24*MCC1126	DIESEL GEN RM EL 22'	EDG/38-L16
1X60*M0D32B	DAMPER	6X6003	1X60B02	1R24*MCC1126	DIESEL GEN RM EL 22'	EDG/CA12
	DIVISION 3					
1X60*FN028C	EMER VENT FAN	6X6004	1X60C02	1R24*MCC1134	DIESEL GEN RM EL 22'	EDG/22-L15
1X60*M0D31C	DAMPER	6X6004	1X60C02	1R24*MCC1134	DIESEL GEN RM EL 22'	EDG/38-CA16
1X60*M0D32C	DAMPER	6X6004	1X60C02	1R24*MCC1134	DIESEL GEN RM EL 22'	EDG/34-CA12
	SCREEN WELL PUMP HOUSE VENT					
	DIVISION 1					
1X41*FN068A	PP HS FAN	6X4118	1X41A15	1R24*MCC1110		SCREENWELL EL 20'
	DIVISION 2					
1X41*FN068B	PP HS FAN	6X4119	1X41B15	1R24*MCC1120		SCREENWELL EL 20'
	CONTROL ROOM AIR CONDITIONING SYSTEM-CB					

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

	DIVISION 1					
1X61*MOV031A	CRAC ISOL VV	6X6104	1X61A05	1R24*MCC1115	EMER SWGR RM EL 25'	CB/78-C12
1X61*MOV32A	CRAC ISOL VV	6X6110	1X61A09	1R24*MCC1115	EMER SWGR RM EL 25'	CB/67-C16
1X61*AOV36A	CRAC NORM AIR INTAKE VV	6X6106	1X61A06	1R35*PNL-R1	RELAY ROOM EL 44'	CB/66-C16
1X61*AOV30A	CRAC ISOS VV	6X6108	1X61A03	1R35*PNL-R1	RELAY ROOM EL 44'	CB/73-C16
1X61*ACU70A	CRAC UNIT	6X6101	1X61A01	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/71-C13
1X61*MOD34A	CRAC UNIT DAMPER	6X6101	1X61A01	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/77-C16
1X61*TCV021A	CRAC-COOLING COIL VV	13X6101	1X61A10			CB/71-C13
CKT	CRAC EMER INIT SIGN (PNL VX1)	11X6101	1X61A07	1R42*PNL-A2		CB/44-C12
1X61*TIC021A	CRAC ACU07A COOLING CONTROL	13X6101	1X61A10			CB/63-K12
1X61*TE021A	CRAC TEMP ELEMENT	13X6101	1X61A10			CB/67-12K
1X61*AOV039A	ISOL DAMPERS	6X6109	1X61A04	1R35*PNL-R1	RELAY RM EL 44'	CB/77-C16
1X61*FN025A	FILTER BOASTER FAN	6X6102	1X61A02	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/63-C12
1X61*MOD033A	FILTER BOASTER FAN DAMPER	6X6102	1X61A02	1R24*MCC1116	DIESEL GEN RM EL 22'	CB/77-C12
	DIVISION 2					
1X61*MOV031B	CRAC ISOL VV	6X6105	1X61B05	1R24*MCC1125	EMER SWGR RM EL 25'	CB/78-C12
1X61*MOC032B	CRAC ISOL VV	6X6111	1X61B09	1R24*MCC1125	EMER SWGR RM EL 25'	CB/70-C16
1X61*AOV36B	CRAC NORM AIR INTAKE VV	6X6106	1X61B06	1R35*PNL-B1	RELAY RM EL 44'	CB/70-C16
1X61*AOV30B	CRAC ISOL VV	6X6108	1X61B03	1R35*PNL-B1	RELAY RM EL 44'	CB/73-C16
1X61*AUC70B	CRAC UNIT	6X6101	1X61B01	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/71-C13
1X61*MOD34B	CRAC UNIT DAMPER	6X6101	1X61B01	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/77-C16
1X61*TCV021B	CRAC-COOLING COIL VV	13X6102	1X61B10			CB/71-C13
CKT	CRAC EMERG INIT SIGN (PNL VX1)	11X6102	1X61B07	1R42*PNL-B2		CB/44-C12
1X61*TIC021B	CRAC ACU70B COOLING CONTROL	13X6102	1X61B10			CB/63-K12
1X61*TE021B	CRAC TEMP ELEMENT	13X6101	1X61B10			CB/67-K12
1X61*APV039B	ISOL DAMPERS	6X6109	1X61B04	1R35*PNL-B1	RELAY RM EL 44'	
1X61*FN025B	FILTER BOASTER FAN	6X6102	1X61B02	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/63-C12
1X61*MOD033B	FILTER BOASTER FAN DAMPER	6X6102	1X61B02	1R24*MCC1126	DIESEL GEN RM EL 22'	CB/74-C12
	COMPRESSED AIR SYSTEM					
	DIVISION 1					
1P50*MOV104	INSIR AIR TO SUPPR CHAMBER VV	6P5012	1P50N05	1R24*MCC1112	R.B. EL 78'	30-250
1P50*MOV103A	COMPRESS AIR SRV OUTBRD ISOL VV	6P5014	1P50A12	1R24*MCC1112	R.B. EL 112'	90-250
1P50*MOV105A	COMPRESS AIR SRV INBRD ISOL VV	6P5016	1P50A13	1R24*MCC1113	R.B. EL 112'	75-220
1P50*MOV113A	COMPRESS AIR SRV NORMAL SUP VV	6P5018	1P50A14	1R24*MCC1112	R.B. EL 112'	90-250
1P50*MOV114A	COMPRESS AIR SRV EMERG SUP VV	6P5020	1P50A15	1R24*MCC1118	R.B. EL 112'	90-250
1P50*PS113A	SERVICE AIR HEADER NORMAL SUP	1.61-273				151-170
1P50*PS105A	SERVICE AIR HEADER PRESSURE	1.61-272				151-155
	DIVISION 2					
1P50*MOV106	INSTR AIR TO SUPPR CHAMBER VV	6P5013	1P50N07	1R24*MCC1129	R.B. EL 40'	30-250
1P50*MOV103B	COMPRESS AIR SRV OUTBRD ISOL VV	6P5015	1P50B12	1R24*MCC1122	R.B. EL 40'	90-070
1P50*MOV105B	COMPRESS AIR SRV INBRD ISOL VV	6P5017	1P50B13	1R24*MCC1122	R.B. EL 112'	89-255
1P50*MOV113B	COMPRESS AIR SRV NORMAL SUP VV	6P5019	1P50B14	1R24*MCC1123	R.B. EL 112'	151-220
1P50*MOV114B	COMPRESS AIR SRV EMERG SUP VV	6P5015	1P50B15	1R24*MCC1123	R.B. EL 112'	89-070
1P50*PS113B	SERVICE AIR HEADER NORMAL SUP	1.61-273				151-220
1P50*PS105B	SERVICE AIR HEADER PRESSURE	1.61-272				151-220
	SWGR MCC PNLS-CR/RB/PH					
	DIVISION 1					
1R22*SWG101	4160V-HVN RHR SW CS SWG111	FE-1B				EL 25'
ACB 101-1	EMERG BUS NORM SUPPLY	5R2209	1R22A01	1R22*SWG101	EMER SWGR RM EL 25'	EL-25'
ACB 101-2	EMER BUS RES SUPPLY	5R2210	1R22A02	1R22*SWG101	EMER SWGR RM EL 25'	EL-25'
BUS 101 SEQ	PROGRAM CKT SW RHR CS HVN	5R2217	1R22A03		EMER SWGR RM EL 25'	EL-25'
BUS	4160 REL & MET CKT	8R1205	1R22A04	1R22*SWG101	EMER SWGR RM EL 25'	EL-25'
	DIVISION 2					

TABLE 4.4-2

SHUTDOWN EQUIPMENT LIST

1R22*SHG102	4160V-HVN RHR SH CS SHG112				EMER SHGR RM EL 25'	EL-25'
ACB 102-1	EMERG BUS NORM SUPPLY	5R2211	1R22B01	1R22*SHG102	EMER SHGR RM EL 25'	EL-25'
ACB 102-2	EMERG BUS RES SUPPLY	5R2212	1R22B02	1R22*SHG102	EMER SHGR RM EL 25'	EL-25'
BUS 102 SEQ	PROGRAM CKT SH RHR CS	5R2218	1R22B03		EMER SHGR RM EL 25'	EL-25'
BUS	4160 REL & MET CKT	8R2206	1R22B04	1R22*SHG102	EMER SHGR RM EL 25'	EL-25'
	DIVISION 3					
1R22*SHG103	4160V-HVN RHR SH SHG113	FE-1AV		1R42*PNL-C1	EMER SHGR RM EL 25'	EL-25'
ACB 103-1	EMERG BUS NORM SUPPLY	5R2213	1R22C01	1R22*SHG103	EMER SHGR RM EL 25'	EL-25'
ACB 103-2	EMERG BUS RES SUPPLY	5R2214	1R22C02	1R22*SHG103	EMER SHGR RM EL 25'	EL-25'
BUS 103 SEQ	PROGRAM CKT SH HVN	5R2219	1R22C03		EMER SHGR RM EL 25'	EL-25'
BUS	4160 REL 7 MET CKT	8R2207	1R22C04	1R22*SHG103	EMER SHGR RM EL 25'	EL-25'
	DIVISION 1					
ACB 101-4	FEEDER TO EMERG BUSS 111	5R2303	1R23A01	1R22*SHG101	EMER SHGR RM EL 25'	EL-25'
1R23*T-101	TRANSFORMER	FE-1B		1R22*SHG101	EMER SHGR RM EL 25'	EL-25'
1R23*SHG111	480V -1R24*MCC1110-9&PNLR1				EMER SHGR RM EL 25'	EL-25'
1JB*701	1R24*MCC1111/9	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1JB*703	1R24*MCC1117/4/Y/Z/A/C	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1JB*300	1JB*701/3	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1JB*702	1R24*MCC1113/8	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
	DIVISION 2					
ACB 102-4	FEEDER TO EMERG BUS 112	5R2304	1R23B01	1R22*SHG102	EMER SHGR RM EL 25'	EL-25'
1R23*T-102	TRANSFORMER	FE-1B		1R22*SHG102	EMER SHGR RM EL 25'	EL-25'
1R23*SHG112	480V -1R24*MCC1120-9&PNLB1				EMER SHGR RM EL 25'	EL-25'
1JB*706	1R24*MCC1127/4/X/A/C	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	EL-25'
1JB*704	1R24*MCC1121/9	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	EL-25'
1JB*301	1JB*704/6	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	EL-25'
1JB*705	1R24*MCC1123/8	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	EL-25'
	DIVISION 3					
ACB 103-5	FEEDER TO EMERG BUS 113	5R2305	1R23C01	1R22*SHG103	EMER SHGR RM EL 25'	EL-25'
1R23*SHG113	480V -1R24*MCC1131-9&PNL01				EMER SHGR RM EL 25'	EL-25'
1R23*T-103	TRANSFORMER	FE-1B		1R22*SHG103	EMER SHGR RM EL 25'	EL-25'
	DIVISION 1					
1R35*PNLR1	120V -HVN SH		1R35A02	1R24*MCC1115	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1110	480V -X41,P41				EMER SHGR RM EL 25'	EL-25'
1R24*MCC1111	480V -E11,E21				EMER SHGR RM EL 25'	EL-25'
1R24*MCC1112	480V -B31,P42,T46,E11	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1113	480V -E21,G33,C41,E11				EMER SHGR RM EL 25'	EL-25'
1R24*MCC1114	480V -G41	FE-1H		1R24*SHG111	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1115	480V -R42,R35,X41,X61,	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1116	480V -M50,P41,R43,X41,X60,X61	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1117	480V -E11,E21				EMER SHGR RM EL 25'	EL-25'
1R24*MCC1118	480V -E41,E11,T46	FE-1K/H		1R23*SHG111	EMER SHGR RM EL 25'	EL-25'
1R24*MCC1119	480V -E11,P41	FE-1K		1R23*SHG111	EMER SHGR RM EL 25'	R.B. EL 40'
1R24*MCC111X	480V -E11,B31	FE-1K		1R24*TRS111X	R.B. EL 112'	R.B. EL 112'-6'
1R24*MCC111Z		FE-1K		1R24*MCC111Y	R.B. EL 78'	R.B. EL 112'-6'
1R24*TRS111Y	TRANSFER SWITCH	FE-1E				R.B. EL 112'-6'
1R24*TRS111X	TRANSFER SWITCH	FE-1E		1R24*MG113A/111		R.B. EL 150'
1R24*MG-111	MOTOR GENERATOR	FE-1E		1R23*SHG-111	EMER SHGR RM EL 25'	R.B. EL 150'
1JB*703	1R24*MCC111Y/7/4/Z	FE-1H		1R24*SHG111	EMER SHGR RM EL 25'	EL 8'
	DIVISION 2					
1R24*MCC1120	480V -P41,X41				EMER SHGR RM EL 25'	SCREENWELL
1R24*MCC1121	480V -E11				EMER SHGR RM EL 25'	R.B. EL 40'
1R24*MCC1122	480V -E11,B31,P42,T46	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	R.B. EL 112'
1R24*MCC1123	480V -E21,C41				EMER SHGR RM EL 25'	R.B. EL 112'

TABLE 4.4-2 SHUTDOWN EQUIPMENT LIST

1R24*MCC1124	480V -G41				EMER SHGR RM EL 25'	R.B. EL 150'
1R24*MCC1125	480V -R42,R35,X41,X61	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	EMER SHGR ROOM
1R24*MCC1126	480V -M50,P41,R43,X41,X60,X61	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	DIESEL GEN ROOM
1R24*MCC1127	480V -E11,E21,P41				EMER SHGR RM EL 25'	R.B. EL 40'
1R24*MCC1128	480V -E11,E51,P41,P42,T46	FE-1J		1R23*SHG112	EMER SHGR RM EL 25'	R.B. EL 112'
1R24*MCC1129	480V -E11,P41	FE-1H		1R23*SHG112	EMER SHGR RM EL 25'	R.B. EL 40'
1R24*TRS112Y	TRANSFER SWITCH	FE-1E		1R24*MG113B/112		R.B. EL 150'
1R24-MCC112A		FE-1J		1R24*MCC112X	R.B. EL 78'	R.B. EL 78
1R24-MCC112C		FE-1H		1R24*MCC112X	R.B. EL 78'	R.B. EL 78
1R24*MCC112X		FE-1H		1R23*SHG112	EMER SHGR RM EL 25'	R.B. EL 78'
1R24*MCC112Y	480V -B31	FE-1H		1R24*TRS112Y	R.B. EL 112'	R.B. EL 112'
1R24*MG112	MOTOR GENERATOR	FE-1E		1R23*SHG-112	EMER SHGR RM EL 25'	R.B. EL 150'
1R24*PNL-01		FE-9NY		1R23*MCC112Y	R.B. EL 112'	R.B. EL 112'
	DIVISION 3					
1R24*MCC1131	480V -P42,T46	FE-1E		1R23*SHG-113	EMER SHGR RM EL 25'	R.B. EL 63'
1R24*MCC1134	480V -M50,P41,R43,X60,	FE-1E		1R23*SHG-113	EMER SHGR RM EL 25'	DIESEL GEN ROOM
1R24*MG113A	MOTOR GENERATOR	FE-1E		1R24*SHG113	EMER SHGR RM EL 25'	R.B. EL 150'
1R24*MG113B	MOTOR GENERAOTR	FE-1E		1R24*SHG113	EMER SHGR RM EL 25'	R.B. EL 150'
	DIVISION 1					
1R35*PNLR1	120V -M50,R43		1R35A02	1R24*MCC1115	EMER SHGR RM EL 25'	EMER SHGR ROOM EL 25
1R35*TR1	480V/120V XFMR PNLR1	FE-1H		1R24*MCC1115	EMER SHGR RM EL 25'	EMER SHGR ROOM EL 25
1R35*T-R2	TRANSFORMER	FE-1H		1R24*MCC1112	R.B. EL 112'	R.B. EL 112
1R35*T-R3	TRANSFORMER	FE-1X		1R24*MCC116	DIESEL GEN RM EL 22'	DIESEL GEN ROOM EL 20
	DIVISION 2					
1R35*PNLB1	120V -M50,R43		1R35B02	1R24*MCC1125	EMER SHGR RM EL 25'	R.B. EL 44'
1R35*TB1	480V/120V XFMR PNLB1			1R24*MCC1125	EMER SHGR RM EL 25'	EMER SHGR ROOM EL 25
1R35*T-B2	TRANSFORMER	FE-1J		1R24*MCC1122	R.B. EL 112'	R.B. EL 112'
1R35*T-B3	TRANSFORMER	FE-1X		1R24*MCC1126	DIESEL GEN RM EL 25'	DIESEL GEN ROOM
	DIVISION 3					
1R35*T01	480V/120V XFMR PNL01	FE-1H		1R24*MCC1133	EMER SHGR RM EL 25'	EMER SHGR ROOM EL 25
1R35*PNL-01		FE-1H		1R35*T-01	EMER SHGR RM EL 25'	R.B. EL 25'
1R35*T-02	TRANSFORMER	FE-1X		1R24*MCC1134	DIESEL GEN RM EL 22'	DIESEL GEN ROOM
	DIVISION 1					
1R42*DCA1	125DC- 1R42*SHGA1 BAT CH	FE-1H		1R24*MCC1115	EMER SHGR RM EL 25'	EMER SHGR ROOM
1R42*PNL-A1	125DC- SHG101&111 DG	FE-1AT		1R42*SHG101	EMER SHGR RM EL 25'	EMER SHGR ROOM
1R42*BAA1	125DC- 1R42*SHGA1 BAT					BATT ROOM
1R42*SHGA1	125DC- PNLA1&A2					EMER SHGR ROOM
1R42*PNLA2	125DC- ADS &GE LOGIC					EMER SHGR ROOM
1H11*PNL-VC1	125 VDC PNL FEED	11R4202		1R42*PNL-A	RELAY RM EL 44'	CONTROL ROOM EL-63
1H11*PNL-VC2	125 VDC PNL FEED	11R4201		1R42*PNL-A2	RELAY RM EL 44'	CONTROL ROOM EL-63

(1) THE EQUIPMENT IN THE REACTOR BUILDING IS LOCATED BY ELEVATION(FT.) AND AZIMUTH(DEGREES): EXAMPLE- 112-230 I.E. REACTOR BUILDING, ELEVATION 112FT.AND 230 DEGREES. THE EQUIPMENT OUTSIDE THE REACTOR BUILDING IS LOCATED BY AREA, ELEVATION, LINE AND COLUMN: EXAMPLE- CB/63-C13 I.E. CONTROL BUILDING, ELEVATION 63FT., LINE C AND COLUMN 13.

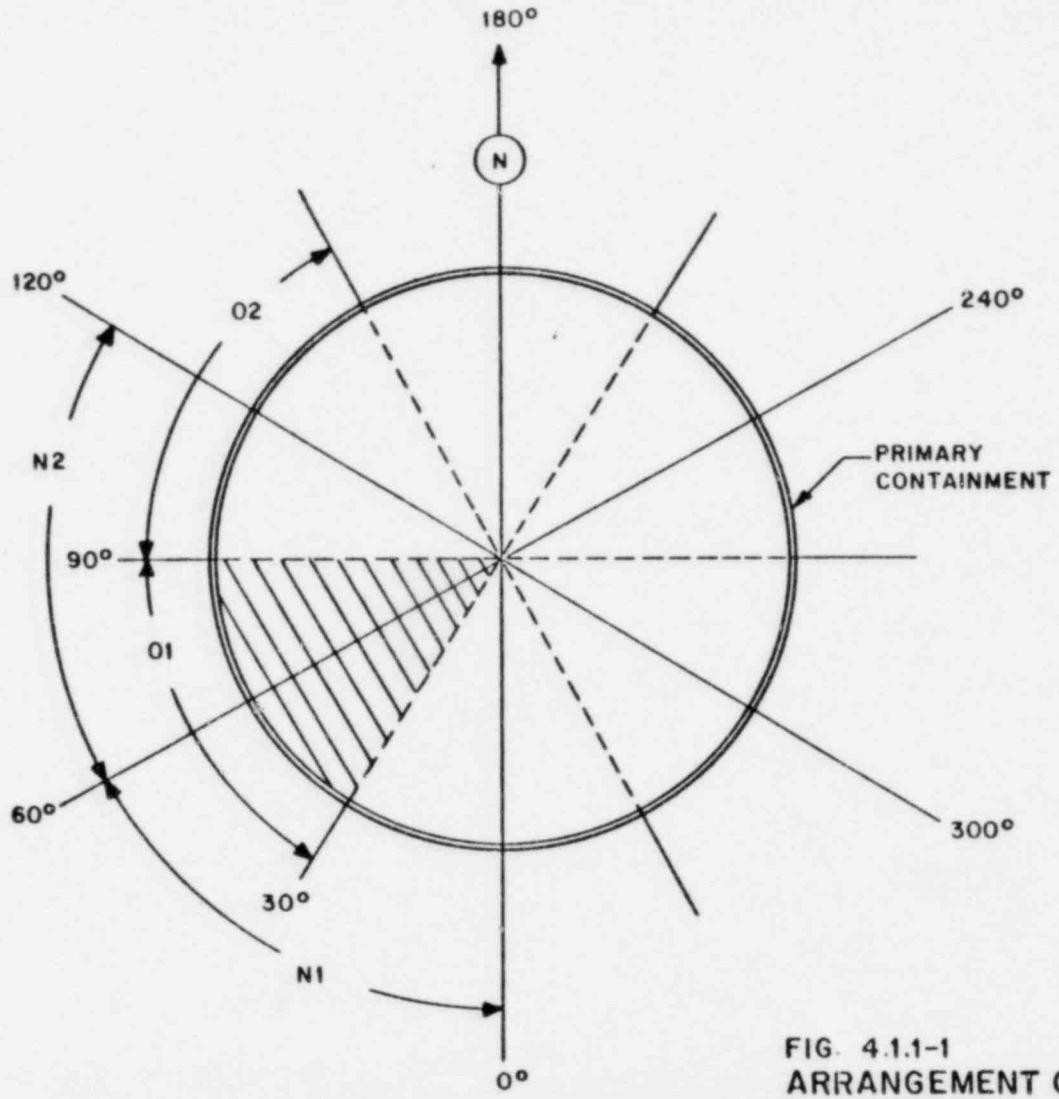

FIG. 4.1.1-1
ARRANGEMENT OF PRIMARY CONTAINMENT AREAS
SHOREHAM NUCLEAR POWER STATION-UNIT 1
SEPARATION ANALYSIS REPORT

OVERLAP SEGMENT

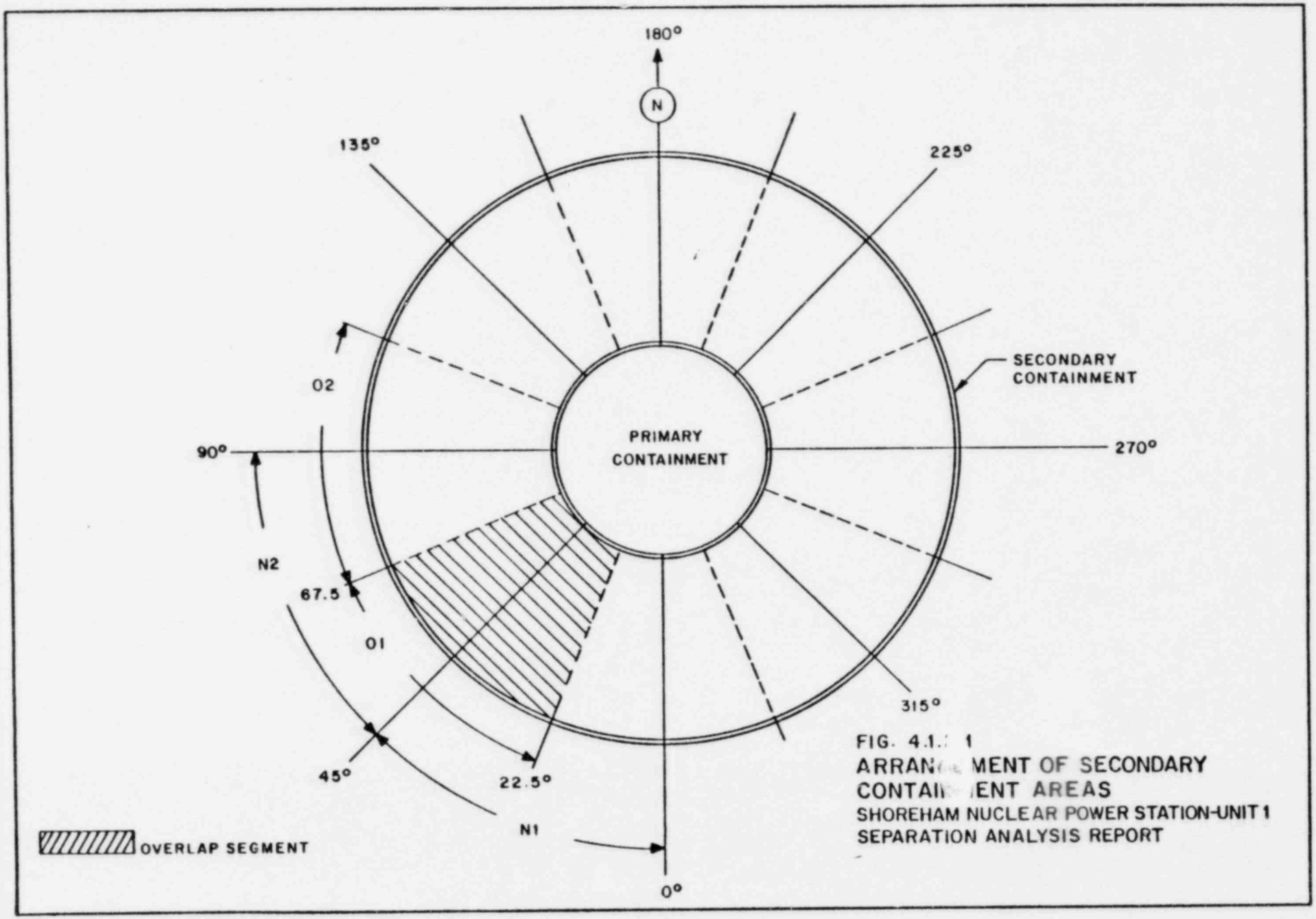

FIG. 4.1.1
ARRANGEMENT OF SECONDARY
CONTAINMENT AREAS
SHOREHAM NUCLEAR POWER STATION-UNIT 1
SEPARATION ANALYSIS REPORT

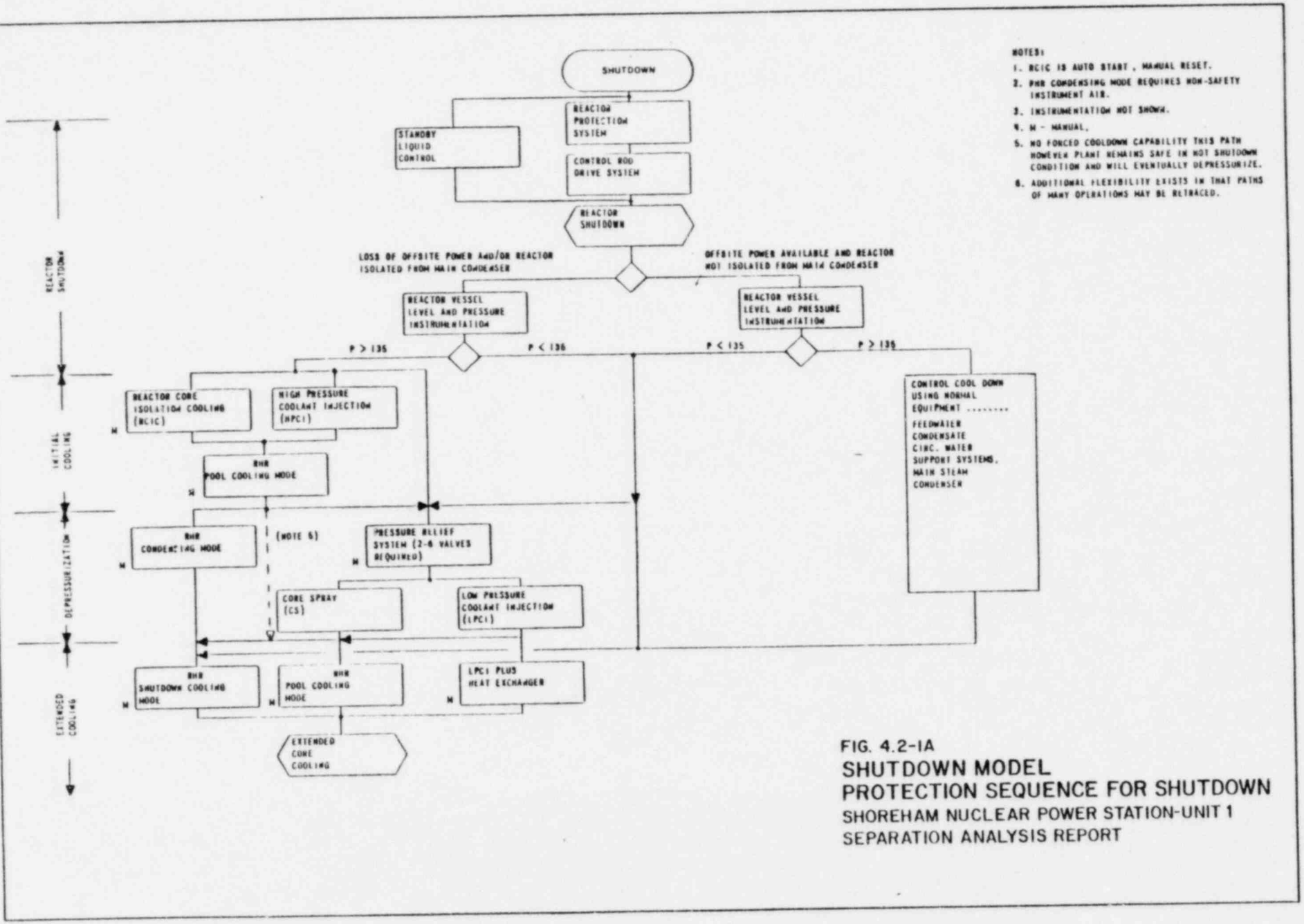

FIG. 4.2-1A

SHUTDOWN MODEL
PROTECTION SEQUENCE FOR SHUTDOWN
SHOREHAM NUCLEAR POWER STATION-UNIT 1
SEPARATION ANALYSIS REPORT

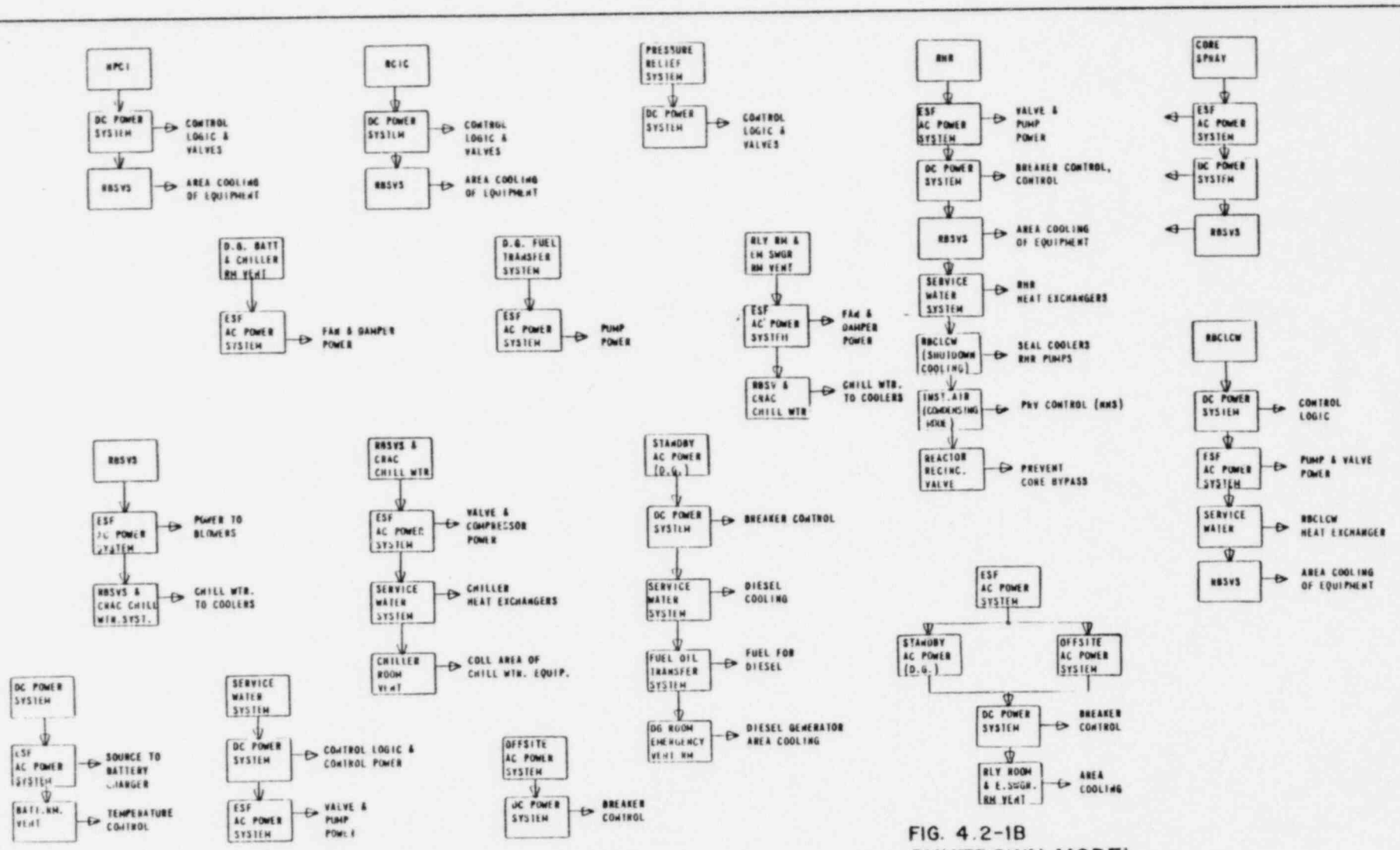

FIG. 4.2-1B

SHUTDOWN MODEL

SHUTDOWN SYSTEMS (IE)

SHOREHAM NUCLEAR POWER STATION-UNIT 1

SEPARATION ANALYSIS REPORT

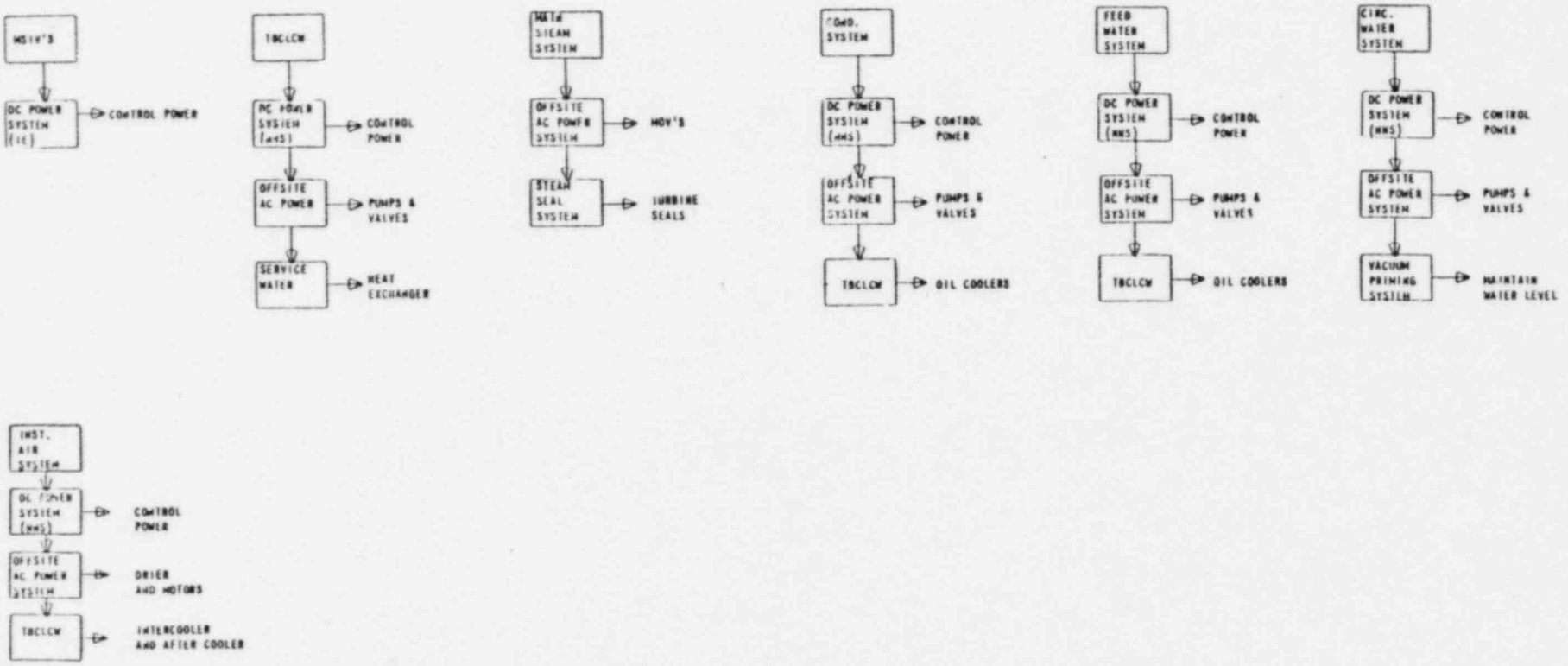

FIG. 4.2-1C
SHUTDOWN MODEL
SHUTDOWN SYSTEMS (NNS)
SHOREHAM NUCLEAR POWER STATION-UNIT 1
SEPARATION ANALYSIS REPORT

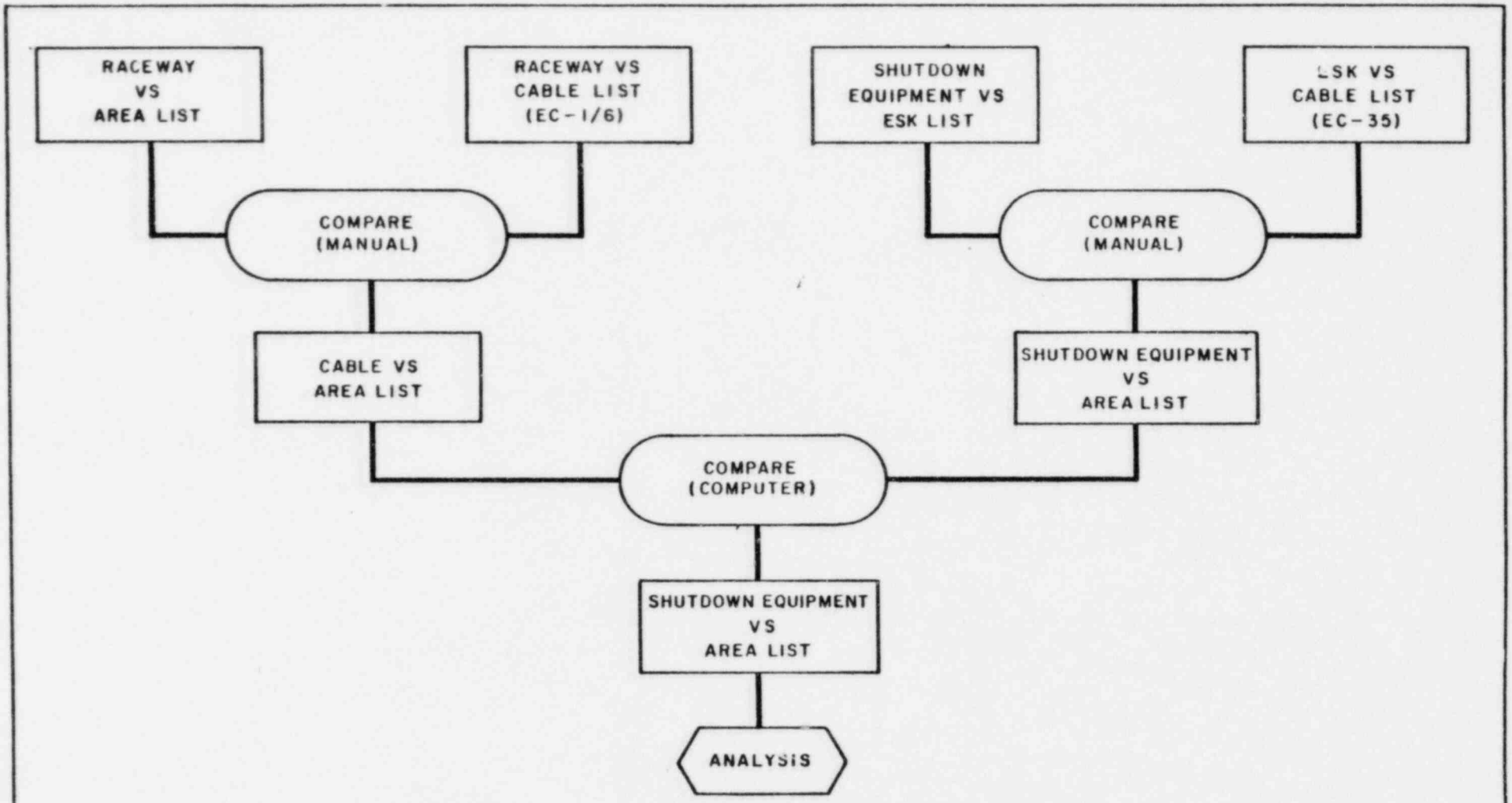

FIGURE 4.4-1
DEVELOPMENT OF SHUTDOWN EQUIPMENT BY AREA
SHOREHAM NUCLEAR POWER STATION-UNIT 1
SEPARATION ANALYSIS REPORT

SEGMENT N1 1.8

CABLE SEPARATION ANALYSIS 1.10
PRIMARY CONTAINMENT 1.11

1. SYSTEMS IMPACTED: 1.14

(A) Division I Systems: B21, B31, C61, E11, G33 1.16

(B) Division II Systems: B21, E41 (Division I) 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, other than the RHR (E11) and RCIC (E51) systems. 1.24

(B) Division I RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047. 1.25 1.26

(C) No credit taken for Division II ADS (B21) system. 1.27

(D) No credit taken for Division II HPCI (E41) system. 1.28

3. DISABLED FUNCTIONS EVALUATION: 1.31

(A) Division II and III systems, and Division I RCIC system are available for shutdown. 1.33

(B) Division I RHR system valve 1E11*MOV047 may be manually operated. 1.35

(C) Division II ADS system is not needed since the Division I RCIC system is available. 1.36

(D) Division II HPCI system is not needed since the Division I RCIC system is available. 1.37

4. SHUTDOWN CAPABILITY: 1.40

Hot and cold shutdown are achievable using Division II and III systems and the Division I RHR system with manual operation of valve 1E11*MOV047 or the Division II RHR/CS/SRV flow path and the RCIC system. 1.42 1.43

5. FURTHER ACTION RECOMMENDED: 1.47

None 1.49

SEGMENT N2 1.6

CABLE SEPARATION ANALYSIS 1.8
PRIMARY CONTAINMENT 1.9

1. SYSTEMS IMPACTED: 1.12

(A) Division I Systems: B21, B31, C61, E11 1.14
(B) Division II Systems: B21, E41 (Div. I) 1.15
(C) Division III Systems: None 1.16

2. SYSTEMS' FUNCTIONS DISABLED: 1.19

(A) No credit taken for Division I systems' functions, other than the RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047 and the RCIC (E51) system. 1.21 1.22 1.23

(B) No credit taken for Division II ADS (B21) system. 1.24

(C) Division II HPCI (E41) system supply inboard isolation valve 1E41*MOV041 (Division I component) 1.25 1.26

3. DISABLED FUNCTION EVALUATION: 1.29

(A) Division II and III systems, Division I RHR system valve 1E11*MOV047 and RCIC systems are available for shutdown. 1.31 1.32

(B) Division II ADS system is not needed since Division I RCIC system is available. 1.34

(C) Division II HPCI system valve 1E41*MOV041 may be manually operated. 1.35

4. SHUTDOWN CAPABILITY: 1.38

Hot and cold shutdown are achievable using Division II and III systems, Division I RHR system valve 1E11*MOV047 and the RCIC system, or Division II HPCI system, if manual operation of valve 1E41*MOV041 is possible. 1.40 1.41 1.42

5. FURTHER ACTION RECOMMENDED: 1.45

None 1.47

SEGMENT N3 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, B31, C61 1.15

(B) Division II Systems: B21, E41 (Div. I) 1.17

(C) Division III Systems: None 1.19

2. SYSTEMS' FUNCTIONS DISABLED: 1.21

(A) No credit taken for Division I systems, other than RHR (E11), RCIC (E51), and remaining ADS (B21) systems. 1.25

(B) Division II ADS (B21) system valves SOV092J and H. 1.28

(C) Division II HPCI (E41) system steam supply inboard isolation valve IE41*MOV041 (Division I component). 1.31 1.32

3. DISABLED FUNCTION EVALUATION: 1.35

(A) Division II and III systems, Division I RHR, RCIC, and remaining ADS systems are available for shutdown. 1.38

(B) Division II remaining ADS system valves are available for shutdown. 1.41 1.42

(C) Division II HPCI system valve IE41*MOV041 may be manually operated. 1.45

4. SHUTDOWN CAPABILITY: 1.47

Hot shutdown is achievable using Division I RCIC System. 1.49
Cold shutdown is possible using the Division I or II RHR 1.50
systems. The Division II HPCI system could also be used for 1.52
hot shutdown, if manual operation of valve IE41*MOV041 is 1.54
possible.

5. FURTHER ACTION RECOMMENDED: 1.56

None 1.58

SEGMENT N4 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, E11, E51 (Div. II) 1.16

(B) Division II Systems: B21, E41 (Division I) 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, other than remaining ADS (B21) system. 1.24 1.26

(B) Division I ADS (B21) system valves 1B21*SOV092AX, BX, CX. 1.27

(C) Division II ADS (B21) system valves 1B21*SOV092AY, BY, EY, LY. 1.29 1.30

(D) Division II HPCI (E41) system steam supply inboard isolation valve 1E41*MOV041. 1.31 1.32

3. DISABLED FUNCTION EVALUATION: 1.34

(A) Remaining Division I and II systems and Division III systems are available for shutdown. 1.36 1.38

(B) Division I ADS valves 1B21*SOV092AX, BX, CX are not needed since the remaining ADS valves are adequate for depressurization. 1.39 1.41

(C) Division II ADS valves 1B21*SOV092AY, BY, EY, LY are not needed since the remaining ADS valves are adequate for depressurization. 1.42 1.44

(D) Division II HPCI system valve 1E41*MOV041 may be inaccessible with relief valve operation. 1.45 1.47

4. SHUTDOWN CAPABILITY: 1.50

Hot shutdown is achievable using the Division II RHR/CS/SRV flow path, or the HPCI system, if manual operation of HPCI steam valve 1E41*MOV041 is possible. Cold shutdown is achievable using remaining Division II and Division III systems. 1.52 1.54 1.55 1.56

5. FURTHER ACTION RECOMMENDED: 2.2

None 2.4

SEGMENT N5 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, G33, E11, E51 (Div. II) 1.15

(B) Division II Systems: B21, C61 1.17

(C) Division III Systems: None 1.19

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A). No credit taken for Division I systems' functions, except for the RHR (E11) shutdown cooling valve 1E11*MOV047. 1.24 1.25

(B) Division I RHR (E11) system bypass valve 1E11*MOV081B. 1.26

(C) No credit taken for Division II ADS (B21) system. 1.27

(D) Division II remote shutdown temperature element 1C61*TE022B. 1.28 1.29

3. DISABLED FUNCTION EVALUATION: 1.31

(A) Division II and III systems are available for shutdown. 1.33

(B) Division I RHR bypass valve 1E11*MOV081B is not required for shutdown. 1.34 1.35

(C) Division II ADS system is not needed since Division II HPCI (E41) system is available. 1.36 1.37

(D) Use of remote shutdown panel is not required for this event. 1.38

4. SHUTDOWN CAPABILITY: 1.41

Hot and cold shutdown are achievable using Division II and III systems, and the Division I RHR system shutdown cooling valve 1E11*MOV047. 1.43 1.45 1.46

5. FURTHER ACTION RECOMMENDED: 1.50

None 1.52

SEGMENT N6 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, G33, E11, E51 (Div. II) 1.16

(B) Division II Systems: B21, B31 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems, except RHR (E11) and Reactor Recirculation (B31) system, and ADS (B21) system valves SOV092H, J, and K. 1.24 1.25 1.26

(B) No credit taken for Division II ADS (B21) system, except valves SOV092C and D. 1.27 1.28

(C) Division II Reactor Recirculation (B31) system valve 1B31*MOV031B. 1.30

(D) Division I RHR (E11) system bypass valve 1E11*MOV081B. 1.31

3. DISABLED FUNCTION EVALUATION: 1.33

(A) Division II and III systems and remaining Division I systems are available for shutdown. 1.35 1.37

(B) Division II ADS system valves SOV092C and D are available. 1.39

(C) Division II Reactor Recirculation system valve 1B31*MOV031B is not required for shutdown. 1.40 1.42

(D) Division I RHR bypass valve 1E11*MOV081B is not required for shutdown. 1.43 1.44

4. SHUTDOWN CAPABILITY: 1.47

Hot shutdown is achievable using Division II HPCI system and cold shutdown is achievable using Division II RHR System. 1.49 1.50

5. FURTHER ACTIONS RECOMMENDED: 1.53

None 1.55

SEGMENT 01 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, B31, E11, C61 1.15

(B) Division II Systems: B21, E41 (Div. I) 1.17

(C) Division III Systems: None 1.19

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, other than the RHR (E11) and the RCIC (E51) systems. 1.25

(B) Division I RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047, and bypass valves 1E11*MOV081A and B. 1.26 1.28

(C) No credit taken for Division II ADS (B21) system. 1.29

(D) Division II HPCI (E41) system steam supply inboard isolation valve 1E41*MOV041 (Division I component). 1.30 1.32

3. DISABLED FUNCTION EVALUATION: 1.34

(A) Remaining Division I and II systems and Division III systems are available for shutdown. 1.36 1.37

(B) Division I RHR system valve 1E11*MOV047 may be manually operated, and valves 1E11*MOV081A and B are not required for shutdown. 1.38 1.39 1.40

(C) Division II ADS system is not needed since Division I RCIC and Division II HPCI systems are available. 1.41 1.43

(D) Division II HPCI system valve 1E41*MOV041 may be manually operated. 1.44 1.45

4. SHUTDOWN CAPABILITY: 1.47

Hot and cold shutdown are achievable using Division II and III systems, Division I RHR with manual operation of valve 1E11*MOV047 and the RCIC system, or Division II HPCI system, if manual operation of valve 1E41*MOV041 is achievable. Cold shutdown is also achievable using the Division II RHR/CS/SRV flow path. 1.49 1.51 1.52 1.54 1.55

5. FURTHER ACTION RECOMMENDED: 1.58

None 2.2

SEGMENT 02 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, B31, C61 1.16

(B) Division II Systems: B21, E41 (Div. I) 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, other than the RHR (E11) and the RCIC (E51) systems. 1.24 1.27

(B) No credit taken for Division II ADS (B21) system. 1.28

(C) Division II HPCI (E41) system steam supply inboard isolation valve 1E41*MOV041 (Division I component). 1.29 1.31

3. DISABLED FUNCTION EVALUATION: 1.34

(A) Remaining Division I and II systems and Division III systems are available for shutdown. 1.36 1.37

(B) Division II ADS system is not required since Division I RCIC and Division II HPCI systems are available. 1.39 1.41

(C) Division II HPCI system valve 1E41*MOV041 may be manually operated. 1.42 1.43

4. SHUTDOWN CAPABILITY: 1.46

Hot and cold shutdown are achievable using Division II and III systems, Division I RHR and RCIC systems, or Division II HPCI system, if manual operation of valve 1E41*MOV041 is possible. 1.48 1.50 1.52

5. FURTHER ACTION RECOMMENDED: 1.55

None 1.57

SEGMENT 03 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B31, C61, E11, E51 (Div. II) 1.16

(B) Division II Systems: E41 (Div. I) 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, other than the ADS (B21) system. 1.24 1.25

(B) Division II HPCI (E41) system steam supply inboard isolation valve 1E41*MOV041. 1.26 1.27

3. DISABLED FUNCTION EVALUATION: 1.29

(A) Division II and III systems and Division I ADS system are available for shutdown. 1.31 1.32

(B) Division II HPCI valve 1E41*MOV041 may be manually operated, but, it may be inaccessible with HPCI steam valve operation. However, Division II RHR/CS/SRV flow path is available. 1.33 1.34 1.35

4. SHUTDOWN CAPABILITY: 1.38

Hot shutdown is achievable using the Division II RHR/CS/SRV flow path, cold shutdown is achievable using remaining Division II and Division III systems. 1.40 1.41

5. FURTHER ACTION RECOMMENDED: 1.44

None 1.46

SEGMENT 04 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, G33, E11, 1.15
(Division II) E51 1.16

(B) Division II Systems: B21, C61 1.18

(C) Division III Systems: None 1.20

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions, except for the RHR (E11) shutdown cooling valve 1E11*MOV047. 1.25 1.26

(B) Division I RHR (E11) system bypass valve 1E11*MOV081B. 1.29

(C) No credit taken for Division II ADS (B21) system. 1.31

(D) Division II remote shutdown temperature element 1C61*TE022B. 1.33 1.34

3. DISABLED FUNCTIONS EVALUATION: 1.37

(A) Remaining Division II and III systems are available for shutdown. 1.39 1.40

(B) Division I RHR bypass valve 1E11*MOV081B is not required for shutdown. 1.44

(C) Division II ADS system is not required since the Division II HPCI system is available. 1.46 1.47

(C) Use of remote shutdown panel is not required for this event. 1.49 1.50

4. SHUTDOWN CAPABILITY: 1.52

Hot shutdown is achievable using Division II HPCI system. 1.55
Cold shutdown is achievable using remaining Division II and 1.56
Division III systems, and the Division I RHR system shutdown 1.57
cooling valve 1E11*MOV047.

5. FURTHER ACTION RECOMMENDED: 2.2

None 2.4

SEGMENT 05 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, E11, G33, E51 (Div. II) 1.15

(B) Division II Systems: B21, B31, C61 1.17

(C) Division III Systems: None 1.19

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems other than Reactor Recirculation (B31) and RHR (E11) systems, and ADS (B21) system valves SOV092C and D. 1.24 1.25

(B) No credit taken for Division II ADS (B21) system other than valves SOV092H, J, and K. 1.26

(C) Division II Reactor Recirculation (B31) system valve 1B31*MOV031B. 1.27

(D) Division II Remote Shutdown (C61) system temperature element 1C61*TE022B. 1.28

(E) Division I RHR (E11) system bypass valve 1E11*MOV081B. 1.29

3. DISABLED FUNCTIONS EVALUATION: 1.32

(A) Division II and III systems and remaining Division I systems are available for shutdown. 1.34

(B) Division II ADS system valves SOV092H, J, and K are available. 1.35

(C) Division II Reactor Recirculation system valve 1B31*MOV031B is not required for shutdown. 1.37

(D) Use of remote shutdown panel is not required for this event. 1.38

(E) Division I RHR bypass valve 1E11*MOV081B is not needed. 1.39

4. SHUTDOWN CAPABILITY: 1.42

Hot shutdown is achievable using Division II HPCI system, and cold shutdown is achievable using Division I and Division II RHR/CS/SRV flow paths. 1.44 1.45

5. FURTHER ACTION RECOMMENDED: 1.48

None 1.50

SEGMENT 06 1.7

CABLE SEPARATION ANALYSIS 1.9
PRIMARY CONTAINMENT 1.10

1. SYSTEMS IMPACTED: 1.13

(A) Division I Systems: B21, C61, E11, G33 1.15

(B) Division II Systems: B21, B31 1.17

(C) Division III Systems: None 1.19

2. SYSTEMS' FUNCTIONS DISABLED: 1.22

(A) No credit taken for Division I systems' functions except Reactor Recirculation (B31), RHR (E11) and RCIC (E51) systems. 1.24 1.25

(B) No credit taken for Division II ADS (B21) system. 1.26

(C) Division II Reactor Recirculation (B31) system valve 1B31*MOV031B. 1.27

(D) Division I RHR (E11) system valves 1E11*MOV047 and 1E11*MOV081B. 1.28

3. DISABLED FUNCTION EVALUATION: 1.30

(A) Remaining Division I and II systems and Division III systems are available for shutdown. 1.32 1.33

(B) Division II ADS system is not required since Division II HPCI and Division I RCIC systems are available for hot shutdown, and Division I ADS is available for the Division II RHR/CS/SRV flow path. 1.34 1.35

(C) Division II Reactor Recirculation system valve is not required. 1.36

(D) Division I RHR shutdown cooling valve 1E11*MOV047 may be manually operated, and bypass valve 1E11*MOV081B is not required for shutdown. 1.37 1.38

4. SHUTDOWN CAPABILITY: 1.41

Hot shutdown is achievable using Division I RCIC or Division II HPCI system. Cold shutdown is achievable using Division I ADS valves and Division II RHR/CS/SRV flow path. 1.43 1.44 1.45

5. FURTHER ACTION RECOMMENDED: 1.48

None 1.50

SEGMENT 008-N1
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division 1 System: E11, P41, P42, T46

(B) Division II Systems: P41

(C) Division III Systems: None

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division I systems' functions, other than the RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047.

(B) Division II SW (P41) system fuel pool drain valve 1P41*MOV043.

(C) Division I and II SW (P41) system drain valves 1P41*MOV039A,B.

(D) Division I and II SW (P41) systems ultimate cooling valves 1P41*MOV033A,B, C, D.

3. DISABLED FUNCTION EVALUATIONS:

(A) Division II and III systems are available.

(B) Fuel pool cooling can be effected by intermittent use of Division II RHR system.

(C) Division I and II SW systems drain valves are not required since Division II RHR system is available.

(D) Division I and II SW system ultimate cooling valves are not necessary since Division II RHR system is available.

4. SHUTDOWN CAPABILITY:

Hot and cold shutdown are achievable using Division II and III systems.

5. FURTHER ACTION RECOMMENDED:

None

SEGMENT 008-N2
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems : E11, E21, P41, P42, T46

(B) Division II Systems : None

(C) Division III Systems: E11(C)

2. SYSTEMS' FUNCTIONS DISABLED:

No credit taken for Division I and III(C) systems' functions, other than the RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047.

3. DISABLED FUNCTION EVALUATION:

Division II and III (D) systems are available.

4. SHUTDOWN CAPABILITY:

Hot and cold shutdown are achievable using Division II and III (D) systems.

5. FURTHER ACTION RECOMMENDED:

None

SEGMENT 008-N3
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: B21, B31, C41, E11, E21, E51, G33, G41, P41, P42, T46, Z93

(B) Division II Systems: E41 (Div. I components only)

(C) Division III Systems: None

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division I systems' functions.

(B) Division II HPCI (E41) system will not tolerate spurious action of its Division I components. These include pressure switches which are connected locally either in parallel or in series and run back to the H11-P617 panel as a single wire pair (1E41*PS025A&C, 1E41*PS023A&C, and 1E41*PDS022A).

(C) RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047

3. DISABLED FUNCTION EVALUATION:

(A) Division II and III systems are available.

(B) Division II RHR/CS/SRV flow path is available.

(C) RHR system valve 1E11*MOV047 can be manually operated.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using Division II RHR/CS/SRV flow path.

Cold shutdown is achievable using Division II RHR with manual operation of valve 1E11*MOV047, or Division II RHR/CS/SRV circulation/suppression pool cooling mode.

In some instances the HPCI System could be used for hot shutdown if the following cables are protected:

1E41ARC404
1E41ARC405
1E41ARC408

5. FURTHER ACTION RECOMMENDED: 3.32

Separate the "red" cables associated with the HPCI pressure switches 1E41*PS022A&C, 1E41*P5023A and 1E41*PDS025A&C, from the RCIC "red" cables so that HPCI may be available for hot shutdown. 3.34 3.35 3.36

Alternatively, protect the affected raceways using thermal barriers such as Kaowool blankets. 3.40

6. ACTION TO BE TAKEN 3.42

Affected conduits will be protected by thermal barriers (Kaowool blankets). 3.44 3.45

SEGMENT 008-N4 3.48
SEPARATION ANALYSIS 3.49
SECONDARY CONTAINMENT 3.50

1. SYSTEMS IMPACTED: 3.53

(A) Division I Systems: B21, C61, E11, E21, E51, Z93 3.55

(B) Division II Systems: E41 (including Div. I components) 3.57 3.58

(C) Division III Systems: E11(C), P42(C), T46 4.2

2. SYSTEMS' FUNCTIONS DISABLED: 4.4

(A) No credit taken for Division I or III systems' functions, other than the RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047. 4.7 4.9 4.10

(B) No credit taken for Division II HPCI (E41) systems' functions. 4.12 4.13

3. DISABLED FUNCTION EVALUATION: 4.15

Division II RHR/CS/PRV flow path is available. 4.17

4. SHUTDOWN CAPABILITY: 4.20

Hot shutdown is achievable using Division I and II RHR/CS/SRV flow path. 4.23 4.24

In some instances the HPCI system could be used for hot shutdown if the following cables are protected. 4.27 4.28

1E41ARX449 4.31
1E41ARX450 4.32
1E41ARX451 4.33
1E41ARX452 4.34

Cold shutdown is achievable using Division II normal RHR. 4.36

5. FURTHER ACTION RECOMMENDED: 4.39

Separate the "red" cables associated with the HPCI temperature elements 1E41*TE054 and 1E41*TE055 from the RCIC "red" cables so that HPCI may be available for hot shutdown. 4.41 4.42 4.43

Alternatively, protect the affected raceways using thermal barriers such as Kaowool blankets. 4.45 4.46

Also the reduction of fire hazard in the vicinity of the HPCI and RCIC pumps and surrounding raceways may make available the RCIC or HPCI systems as alternative to using the RHR/CS/SRV flow path. 4.48 4.49 4.50

6. ACTION TO BE TAKEN 4.52

Affected conduits will be protected by thermal barriers (Kaowool blankets). 4.54 4.55

To reduce the fire hazard in the HPCI/RCIC area, the following will be provided: 4.57 4.58

(A) Additional water spray, cable tray bottoms on selected horizontal "Red" trays, and thermal barrier (Kaowool blankets) on selected "Red" conduits. 5.2 5.3

(B) Curbs around the HPCI and RCIC turbines. 5.5

(C) Additional local smoke detection. 5.7

(D) A partial fire barrier between vertical cable trays and the adjacent RCIC turbine. 5.9 5.10

SEGMENT 008-N5
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: B21, E51 (including Div. II components)

(B) Division II Systems: B21, B31, C41, C61, E11, E21, E41 (including Division I components), G33, G41, P41, P42, T46, Z93

(C) Division III Systems: C61, P41, P42, T46

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division II and III systems' functions, other than the RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048.

(B) Reactor low water level switch 1B21*L1SO27C only impacts Division I RCIC (E51) and RHR (E11) systems.

(C) No credit taken for Division I RCIC (E51) system.

3. DISABLED FUNCTION EVALUATION:

(A) Division I RHR/CS/SRV flow path is available.

(B) Reactor low water level switch 1B21*L1SO27C is one out of two Division I sensors, and the redundant unit 1B21*L1SO27A remains functional.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using Division I RHR/CS/SRV flow path with a manual pressure reduction and Division I CS system (E21) providing makeup.

In some instances the HPCI or RCIC systems could be used for hot shutdown if the following cables are protected:

(a)		(b)	
	1E41ARC405		1E51BBC310
	1E41ARX449		1E51BBX431
	1E41ARX450		1E51BBX432
	1E41ARX451		1E51BBX433
	1E41ARX452		1E51BBX434

Cold shutdown is achievable using Division I RHR system.

5. FURTHER ACTION RECOMMENDED: 6.10

Separate the "red" cables under 4 (a) above associated with 6.12
the HPCI pressure switches 1E41*PS025A and C and temperature 6.13
elements 1E41*TE054A and 1E41*TE055A from the RCIC "red" 6.14
cables so that HPCI may be available for hot shutdown.

Also, separate the "blue" cables under item 4 (b) above 6.18
associated with the RCIC pressure switches 1E51*PS025B and D
and temperature elements 1E51*TE053B and 1E51*TE054B from 6.19
the HPIC "blue" cables so that RCIC may be available for hot
shutdown.

In addition the reduction of fire hazard in the vicinity of 6.21
the HPCI and RCIC pumps and surrounding raceways may make 6.22
available the RCIC or HPCI systems as alternative to using
the RHR/CS/SRV flow path. 6.23

Alternatively, protect the effected raceways using thermal 6.26
barriers such as Kaowool blankets.

6. ACTION TO BE TAKEN 6.28

Affected conduits will be protected by thermal barriers 6.30
(Kaowool blankets). 6.31

To reduce the fire hazard in the HPCI/RCIC area, the 6.33
following will be provided: 6.34

(A) Additional water spray, cable tray bottoms on selected 6.36
horizontal "Red" trays, and thermal barrier (Kaowool 6.37
blankets) on selected "Red" conduits.

(B) Curbs around the HPCI and RCIC turbines. 6.39

(C) Additional local smoke detection. 6.41

(D) A partial fire barrier between vertical cable trays 6.43
and the adjacent RCIC turbine. 6.44

SEGMENT 008-N6
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: E51 (including Div. II components)

(B) Division II Systems: B21, B31, C41, C61, E11, E21, E41, G33, G41, P41, P42, T46, Z93

(C) Division III Systems: E11(D)

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division I RCIC (E51) systems' functions.

(B) No credit taken for Division II systems' functions.

(C) No credit taken for Division III RHR (E11) (D) system functions.

(D) RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048.

3. DISABLED FUNCTION EVALUATION:

(A) RHR system valve 1E11*MOV047 can by manually operated.

(B) Division I RHR/CS/SRV flow path is available.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using Division I RHR/CS/SRV flow path with a manual pressure reduction and Division I CS system (E21) providing makeup.

In some instances the RCIC system could be used for hot shutdown if the following cables are protected:

1E51BBC310
1E51BBC320
1E51BBC322

Cold shutdown is achievable using Division I RHR system 1 with manual operation of valve 1E11*MOV048, or Division I RHR/CS/SRV circulatory/suppression pool cooling modes.

5. FURTHER ACTION RECOMMENDED: 7.45

Separate the "blue" cables associated with the RCIC pressure switches 1E51*PS022B, 1E51*PS023B and D, and 1E51*P5025B and D from the "blue" HPCI cables, so that RCIC may be available for hot shutdown. 7.48 7.49

Alternatively, protect the affected raceways using thermal barriers such as Kaowool blankets. 7.53

6. ACTION TO BE TAKEN 7.55

Affected conduits will be protected by thermal barriers (Kaowool blankets). 7.57 7.58

SEGMENT 008-N7 8.3
SEPARATION ANALYSIS 8.4
SECONDARY CONTAINMENT 8.5

1. SYSTEMS IMPACTED: 8.8

(A) Division I Systems: None 8.10

(B) Division II Systems: B21, C61, E11, E21, P41, P42, Z93 8.12 8.13

(C) Division III Systems: E11(D) 8.15

2. SYSTEMS' FUNCTIONS DISABLED: 8.17

(A) No credit taken for Division II systems' functions, other than the RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048. 8.20 8.21

(B) No credit taken for Division III(D) systems' functions. 8.23 8.24

3. DISABLED FUNCTION EVALUATION: 8.26

Division I and III(C) systems are available. 8.28

4. SHUTDOWN CAPABILITY: 8.31

Hot and cold shutdown are achievable using Division I and III(C) systems. 8.33 8.34

5. FURTHER ACTION RECOMMENDED: 8.37

None 8.39

SEGMENT 008-N8 8.42
SEPARATION ANALYSIS 8.43
SECONDARY CONTAINMENT 8.44

1. SYSTEMS IMPACTED: 8.47

(A) Division I Systems: P41, P42, T46 8.49

(B) Division II Systems: B21, C61, E11, E41, P41, P42, Z93 8.51 8.52

(C) Division III Systems: None 8.54

2. SYSTEMS' FUNCTIONS DISABLED: 8.56

(A) No credit taken for Division II systems' functions, other than RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048. 9.1 9.2

(B) Division I SW (P41) and RBCLCW (P42) system affected components result in the loss of Division I RBCLCW system. 9.4 9.5

(C) Division I RBSVS (T46) system unit cooler 1T46*UC002A. 9.8

3. DISABLED FUNCTION EVALUATION: 9.11

(A) Division I and III systems are available. 9.13

(B) Division I RHR system shutdown cooling mode using the Division II RBCLCW system is unavailable; however, the Division I RHR/CS/SRV flow path is available. 9.16 9.17

(C) Division I RBSVS unit cooler 1T46*UC002A impacts Division II equipment. 9.19 9.20

4. SHUTDOWN CAPABILITY: 9.22

Hot shutdown is achievable using Division I RCIC system. 9.24

Cold shutdown is achievable using Division I RHR/CS/SRV flow path. 9.26 9.27

5. FURTHER ACTION RECOMMENDED: 9.29

None 9.31

SEGMENT 008-01 1.5
SEPARATION ANALYSIS 1.6
SECONDARY CONTAINMENT 1.7

1. SYSTEMS IMPACTED: 1.10

(A) Division I Systems: E11, P41, P42, T46 1.12

(B) Division II System: P41 1.14

(C) Division III Systems: None 1.16

2. SYSTEMS' FUNCTIONS DISABLED: 1.19

(A) No credit taken for Division I system functions, other than the RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047. 1.22

(B) Division II SW (P41) system fuel pool drain valve 1P41*MOV043. 1.25

(C) Divisions I and II SW (P41) system drain valves 1P41*MOV03A and B. 1.28

(D) Divisions I and II SW (P41) systems ultimate cooling valves 1P41*MOV033A, B, C, and D. 1.30 1.31

3. DISABLED FUNCTION EVALUATION: 1.34

(A) Division II and III systems are available. 1.36

(B) Fuel pool cooling can be effected by intermittent use of Division II RHR (E11) system, instead of the SW system. 1.39 1.40

(C) Divisions I and II SW system drain valves not necessary since Division II RHR system is available. 1.43 1.44

(D) Divisions I and II SW system supply valves are not necessary since Division II RHR system is available. 1.46 1.48

4. SHUTDOWN CAPABILITY: 1.50

Hot and cold shutdown are achievable using Division II and III systems. 1.52 1.53

5. FURTHER ACTION RECOMMENDED: 1.55

None 1.57

SEGMENT 008-02
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: E11, E21, P41, P42, T46

(B) Division II Systems: None

(C) Division III System: E11(C)

2. SYSTEMS' FUNCTIONS DISABLED:

No credit taken for Division I and III(C) systems functions, other than RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047.

3. DISABLED FUNCTION EVALUATION:

Division II and III (D) systems are available.

4. SHUTDOWN CAPABILITY:

Hot and cold shutdown are achievable using Division II and III(D) systems.

5. FURTHER ACTION RECOMMENDED:

None

SEGMENT 008-03
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: B21, B31, C41, E11, E21, E51, G33, G41, P41, P42, T46, Z93

(B) Division II Systems: E41 (Div. I components only)

(C) Division III System: E11(C)

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division I and III (C) systems' functions.

(B) Division II HPCI (E41) system will not tolerate spurious actions of its Division I components. These include valve 1E41*MOV041 and pressure and level switches. These switches are either in parallel or series connected locally and run back to the H11-P617 panel as a single wire pair.

(C) RHR (E11) system shutdown cooling inboard isolation valve 1E11*MOV047.

3. DISABLED FUNCTION EVALUATION:

(A) Division II systems are available.

(B) HPCI system valve 1E41*MOV041 will have to be manually operated. Field inspection indicated that it is not possible to relocate the valve cable 1E41NRC146 away from this segment so as to maintain remote valve operation. Division II is available.

(C) RHR system valve 1E11*MOV047 can be manually operated.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using Division II and III (D) RHR/CS/SRV flow path.

In some instances the HPCI system could be used for hot shutdown, if the following cables are protected: 3.26

1E41ARC404 3.29
1E41ARC405 3.30
1E41ARC408 3.31

Cold shutdown is achievable using Division II RHR with manual operation of valve 1E11*MOV048, or Division II and III (D) RHR/CS/SRV circulator/suppression pool cooling flow path. 3.34 3.35 3.37

5. FURTHER ACTION RECOMMENDED: 3.39

Separate the "red" cables associated with the HPCI pressure switches 1E41*PS023A and C, 1E41*PS025A and C, and 1E41*PDS022A from the "red" RCIC cables, so that HPCI may be available for hot shutdown. Alternatively, protect the affected raceways using thermal barriers such as Kaowool blankets. 3.41 3.43 3.44 3.45

6. ACTION TO BE TAKEN 3.47

Affected conduits will be protected by thermal barriers (Kaowool Blankets). 3.49 3.50

SEGMENT 008-04 3.53
SEPARATION ANALYSIS 3.54
SECONDARY CONTAINMENT 3.55

1. SYSTEMS IMPACTED: 3.58

(A) Division I System: E51 4.2

(B) Division II System: E41 (including Div. I components) 4.4 4.5

(C) Division III Systems: None 4.7

2. SYSTEMS' FUNCTIONS DISABLED: 4.10

(A) No credit taken for Division I RCIC (E51) system functions. 4.12 4.13

(B) No credit taken for Division II HPCI (E41) system functions. 4.15 4.16

3. DISABLED FUNCTION EVALUATION: 4.18

Divisions I and II RHR/CS/SRV flow paths are available. 4.21

4. SHUTDOWN CAPABILITY: 4.24

Hot shutdown is achievable using the Divisions I and II RHR/CS/SRV flow path with a manual pressure reduction and Division I or II CS systems (E21) providing makeup. 4.26 4.28

In some instances the HPCI system could be used for hot shutdown if the following cables are protected: 4.32

1E41ARC405 4.35
1E41ARX450 4.36
1R41ARX451 4.37
1E41ARX452 4.38

Cold shutdown is achievable using Division I or II RHR system. 4.42

5. FURTHER ACTION RECOMMENDED: 4.44

Separate the "red" cables associated with the HPCI pressure switches 1E41*PS025A and C and temperature elements 1E41-TE054A and 1E41-TE055A from the "red" RCIC cables, so that HPCI may be available for hot shutdown. 4.47 4.48

Alternatively, protect the affected raceways using thermal bariers such as Kaowool blankets. 4.51

In addition, the reduction of fire hazard in the vicinity of the HPCI and RCIC pumps and surrounding raceways may make 4.53 4.55

available the RCIC or HPCI system as alternative to using the RHR/CS/SRV flow path. 4.57

6. ACTION TO BE TAKEN 5.2

Affected conduits will be protected by thermal barriers (Kaowool Blankets). 5.4 5.5

To reduce the fire hazard in the HPCI/RCIC area, the following will be provided: 5.8 5.9

(A) Additional water spray, cable tray bottoms on selected horizontal "Red" trays, and thermal barrier (Kaowool Blankets) on selected "Red" conduits. 5.11 5.12 5.13

(B) Curbs around the HPCI and RCIC turbines. 5.15

(C) Additional local smoke detection 5.18

(D) A partial fire barrier between vertical cable trays and the adjacent RCIC turbine. 5.20 5.22

SEGMENT 008-05
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I System: E51 (including Div. II components)

(B) Division II Systems: B21, B31, C41, C61, E11, E21, E41 (including Division I components), G33, G41, P41, P42, T46, Z93

(C) Division III Systems: E11(D), C61(D), P41(D), P42(C), T46

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division I RCIC (E51) system functions.

(B) No credit taken for Division II system functions.

(C) No credit taken for Division III system functions.

(D) RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048.

3. DISABLED FUNCTION EVALUATION:

(A) RHR system valve 1E11*MOV047 can be manually operated.

(B) Division I RHR/CS/SRV flow path is available.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using the Division I RHR/CS/SRV flow path with a manual pressure reduction and Division I CS system (E21) providing makeup.

In some instances the HPCI or RCIC systems could be used for hot shutdown if the following cables are protected:

(a)
1E41ARX449
1E41ARX450
1E41ARX451
1E41ARX452

(b)
1E51BBC310
1E51BBC320
1E51BBC422
1E51BBX431
1E51BBX432
1E51BBX433
1E51BBX434

Cold shutdown is achievable using the normal RHR system with manual operation of valve 1E11*MOV048, or Division I RHR/CS/SRV circulation/suppression pool cooling flow path. 6.24 6.25 6.26

5. FURTHER ACTION RECOMMENDED: 6.28

Separate the "red" HPCI cables under Item 4 (a) above associated with temperature elements 1E41*TE054A and 1E41*TE055A from the RCIC "red" cables so that HPCI may be available for hot shutdown. 6.30 6.31 6.32

Also, separate the "blue" RCIC cables under Item 4 (b) above associated with pressure switches 1E51*PS022B, 1E41*PS023B and D and 1E51*PS025B and D, and temperature elements 1E51*TE053B and 1E51*TE054B from the HPCI "blue" cables so that RCIC may be available for hot shutdown. 6.35 6.36 6.37

Alternatively, protect the affected raceways using thermal barriers such as Kaowool blankets. 6.40

6. ACTION TO BE TAKEN 6.43

Affected conduits will be protected by thermal barriers (Kaowool Blankets). 6.45 6.46

SEGMENT 008-06 6.51
SEPARATION ANALYSIS 6.52
SECONDARY CONTAINMENT 6.53

1. SYSTEMS IMPACTED: 6.56

(A) Division I System: None 6.58

(B) Division II Systems: B21, C41, C61, E11, E21, E41, G41, P41, P42, T46, Z93 7.2 7.3

(C) Division III System: E11(D) 7.5

2. SYSTEMS' FUNCTIONS DISABLED: 7.8

(A) No credit taken for Division II system functions, other than RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048. 7.10 7.11

(B) No credit taken for Division III(D) system functions. 7.14

3. DISABLED FUNCTION EVALUATION: 7.16

Divisions I and III(C) systems are available. 7.18

4. SHUTDOWN CAPABILITY: 7.21

Hot and cold shutdown are achievable using Divisions I and III (C) systems. 7.23 7.25

5. FURTHER ACTION RECOMMENDED: 7.28

None 7.30

SEGMENT 008-07
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: P41, T46

(B) Division II Systems: E11, E41, P41, P42, T46, Z93

(C) Division III Systems: None

2. SYSTEMS' FUNCTIONS DISABLED:

(A) No credit taken for Division II system functions, other than RHR (E11) system shutdown cooling outboard isolation valve 1E11*MOV048.

(B) Division I SW(P41) system affected components result in the loss of Division I RBCLCW (P42) system.

(C) Division I RBSVS (T46) system unit cooler 1T46*UC002A.

3. DISABLED FUNCTION EVALUATION:

(A) Division I and III systems are available.

(B) Division I RHR (E11) system shutdown cooling mode using the Division II RBCLCW system is unavailable; however, the RHR/CS/SRV flow path is available.

(C) Division I RBSVS system unit cooler 1T46*UC002A impacts Division II equipment.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using Division I RCIC system.

Cold shutdown is achievable using Division I RHR/CS/SRV flow path.

5. FURTHER ACTION RECOMMENDED:

None

SEGMENT 008-08
SEPARATION ANALYSIS
SECONDARY CONTAINMENT

1. SYSTEMS IMPACTED:

(A) Division I Systems: E11, P41, P42, T46

(B) Division II Systems: E11, P41, P42

(C) Division III Systems: None

2. SYSTEMS' FUNCTIONS DISABLED:

(A) Divisions I and II RHR (E11) system heat exchanger inlet valves 1E11*MOV033A and B.

(B) Direct cooling of fuel pool by both Division I and II of SW (P41) systems.

(C) RHR (E11) system emergency cooling backup from SW (P41) system for both Divisions I and II.

(D) Ultimate cooling supply valves 1P41*MOV033A,B,C, and D) of Divisions I and II SW (P41) systems.

(E) SW (P41) and RBCLCW (P42) systems' sides of the RBCLCW system heat exchangers for both Divisions I and II.

(F) Division I RBSVS (T46) system unit cooler 1T46*UC002A.

3. DISABLED FUNCTION EVALUATION:

(A) Divisions I and II RHR system heat exchanger inlet valves 1E11*MOV033A and B are physically located outside this segment and could be manually operated in order to use the RHR system heat exchangers.

(B) Fuel pool cooling can be effected by intermittent use of Division I RHR system.

(C) SW ultimate cooling not required for shutdown

(D) Cross-connection of Divisions I and II of SW systems is not necessary since both the SW divisions are separately available.

(E) Division I RHR shutdown cooling modes are unavailable; however, Division I and II RHR/CS/SRV flow paths are available.

(F) Division I RBSVS system unit cooler 1T46*VC002A impacts Division II equipment.

4. SHUTDOWN CAPABILITY:

Hot shutdown is achievable using the Division I HPCI or Division II RCIC system.

Cold shutdown is achievable using Divisions I and II RHR/CS/SRV flow paths with the RHR system used in suppression pool cooling, and manual operation of valves 1E11*MOV33A and B.

5. FURTHER ACTION RECOMMENDED:

None

FINAL REPORT

INDEPENDENT REVIEW OF THE INSPECTION OF SHOREHAM NUCLEAR POWER STATION UNIT I REACTOR PRESSURE VESSEL

Prepared For

LONG ISLAND LIGHTING COMPANY
Shoreham Nuclear Power Station
Wading River, New York

January 23, 1982

By

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Prepared By: _____
Eugene R. Reinhart
President

Date: March 8, 1982

SUMMARY

During the time period from December, 1981 through February, 1982, REINHART & ASSOCIATES, INC., performed an independent review of the inspection history of the Shoreham Nuclear Power Station Unit I Reactor Pressure Vessel (RPV), and also observed portions of the pre-service inspection of the same RPV at the powerplant site. This effort was performed at the request of the Long Island Lighting Company (LILCO), in accordance with LILCO Purchase Order No. 363108-1. The purpose of this inspection and review was to determine the adequacy of past and present inspection efforts in complying with requirements of the American Society of Mechanical Engineers (ASME) Codes and the Nuclear Regulatory Commission. Due to the compressed time schedule, this effort was conducted to verify the adequacy of key points in the inspection process only and not to review and/or witness every detail of the present inspection process, nor every past inspection record. When questions were raised from this cursory review, then the specific item in question was pursued in detail to a successful conclusion.

The results of the review indicated that the Shoreham reactor pressure vessel was inspected in accordance with the applicable ASME fabrication codes. The ASME Pre-Service Inspection also appeared to satisfy the requirements of applicable codes.

The quality assurance programs of LILCO, Combustion Engineering (the RPV fabricator) and Nuclear Energy Services (pre-service inspection contractor) were reviewed and found to comply with the intent of applicable NRC requirements.

LIST OF FIGURES

14 - View of both RPV Calibration Blocks used for Calibration of Ultrasonic Inspection Instruments, Manual and Automated Examinations (R&A Photograph on 12/03/81)

15 - NES Data Acquisition System as Witnessed by E. Reinhart on 12/03/81

16 - Closed-Circuit Video Screen Presentation of UT Data and Position of Search Units on RPV (Digital Numbers) 12/03/81

17 - Identification Card used for Closed Circuit TV Data Recorder

18 - View of Data Display and Acquisition System (12/03/81)

19 - View of System used to operate the Remote-Controlled Inspection System

20 - Inspection System ("sled") removed from Track prior to Scan at Weld I-308J, Witnessed by E. Reinhart on 12/09/81

21 - RPV Nozzel N5B at ∿ 415", near Witness Area 2

22 - View down from Witness Area 2 upon Sled during Remote Examination of Weld I-308J, 12/09/81

DRAFT
FOR REVIEW

Gene Reinhart
3/10/82

FINAL REPORT

INDEPENDENT REVIEW OF THE INSPECTION OF SHOREHAM NUCLEAR POWER STATION UNIT I REACTOR PRESSURE VESSEL

PROJECT LIL-1181 JANUARY 23, 1982
P.O. 861793

Prepared For

LONG ISLAND LIGHTING COMPANY

Wading River, New York

By

REINHART & ASSOCIATES, INC.
Austin, Texas

INTRODUCTION

During the time period from December, 1981 through January, 1982, REINHART & ASSOCIATES, INC. (R&A) performed an independent review of the inspection history of the Shoreham Nuclear Powerplant Reactor Pressure Vessel (RPV), and also observed portions of the on-site pre-service inspection of the same RPV. This effort was performed at the request of the Long Island Lighting Company (LILCO), in accordance with LILCO Purchase Order No. 363108, Rev. 0, dated 11/30/81 and Rev. 1, dated 12/28/81 (listed as References 1 and 2, and contained in Appendix A).

The purpose of this inspection and review was to determine the adequacy of the past and present inspection effort in compliance with the fabrication and pre-service inspection requirements of the American Society of Mechanical Engineers (ASME) Codes. Applicable ASME Codes are:

1. Construction:

   a. ASME Section III, 1971 Edition, Summer, 1972. Addenda - Rules for Construction of Nuclear Power Plant Components (Reference 3).

   b. ASME Section V, 1971 Edition, Summer, 1972. Addenda - Nondestructive Examination (Reference 4).

2. Pre-Service Inspection:

   a. ASME Section XI, 1971 Edition, Summer, 1972. Addenda - Rules for In-Service Inspection of Nuclear Reactor Coolant Systems (Reference 5).

The Nuclear Regulatory Commission (NRC) Document 10CFR50, Appendix B - Quality Assurance Criteria for Nuclear Power Plants (Reference 6) also applies to the quality-control of this RPV inspection.

Initially, the effort outlined by LILCO was to include a day-to-day witness of the pre-service inspection by alternating members of an R&A inspection team for the duration of the inspection. Extensive document review was also requested. The team was comprised of two R&A Staff Members and one R&A Subcontractor.

Each member of the team complied with the training, experience and educational requirements of the American Society of Nondestructive Testing (ASNT) Document SNT-TC-1A, 1975, for Level III Inspectors in the Nondestructive Examination (NDE) Method of Ultrasonic Testing (Reference 7). The team members selected by LILCO were: John P. Porter and E. R. Reinhart of REINHART & ASSOCIATES, INC. and Richard I. Seals, a consultant to R&A.

After conducting a two-week site review, LILCO changed the scope of work to eliminate the remaining site review and directed R&A to complete the effort of document and record review by mid-January, 1982. This effort was expanded slightly by the addition of a review of radiographic inspection records to the scope of work. This review was conducted at the facilities of Combustion Engineering (CE) in Chattanooga, Tennessee. The final effort, therefore, conducted by R&A covered in this report, included the following:

1. Review of inspection plans, quality-assurance documents and inspection data (conducted at Shoreham Plant site and at the offices of R&A, Austin, Texas).

2. Witness of pre-service inspection conducted at Shoreham Plant site.

3. Meetings conducted to discuss and resolve questions.

4. Review of radiographic film records of the inspection of the Shoreham RPV (conducted at the offices of Combustion Engineering, Chattanooga, Tennessee).

The above effort was conducted in sufficient detail to verify the adequacy of selected key points in the inspection process, but did not review and/or witness every step or detail of the present inspection process, nor every past inspection record. When questions were raised within a specific area, this area was pursued in detail until the questions were resolved. The specific areas selected for review were independently determined by R&A. The results of this effort are presented in the following sections:

DOCUMENTATION REVIEW

The documentation review was conducted to verify the adequacy and authenticity of the inspection records and also to determine that the inspection process had been controlled in such a manner that would produce a credible inspection at the required inspection sensitivity. There are two basic documents that are used to control the inspection of nuclear components:

1. Inspection Procedure - the inspection procedure is developed from the requirements of the applicable code and defines the

necessary steps that must be followed in order to perform an inspection. The procedure also details the training and qualification requirements for inspectors, and performance requirements for the inspection equipment that must be used. The procedure also details the acceptance and rejection criteria that will be used to evaluate any material discontinuities found during the inspection.

2. Quality Assurance Plan - in order to insure the credibility of an inspection, the NRC requires that fabricators, inspectors and operator-owners of nuclear powerplants follow a written plan, by which the inspection process is an independent function that reports directly to high levels of responsible management, and is also a process that can be audited. These written plans are referred to as Quality Assurance (QA) Documents, Plans and/or Procedures.

Since both of the above documents control the performance and credibility of an inspection, R&A first reviewed the inspection procedure for technical compliance with code requirements, then reviewed the applicable QA document for NRC compliance. The areas covered in reviewing the inspection documentation of the Shoreham RPV covered the following sequence:

1. Vessel Fabrication:

   a. Inspection Procedures
   b. QA Plan
   c. Inspection Records

2. Pre-Service Inspection:

   a. Inspection Procedures
   b. QA Plan

Documentation review in each of the above areas is covered in the following sections:

FABRICATION

From the review of the information in References 8 through 25, the following sequence of inspections were followed during fabrication of the RPV:

1. Shop RT - a shop radiographic inspection was performed in accordance with ASME Section III (Reference 3) at the facilities of Combustion Engineering (CE) in Chattanooga, Tennessee. The applicable QA documents associated with the fabrication and inspection are References 13 through 19. The procedure used for

this inspection is listed as References 8 through 19. The radiographic inspection records are kept at the offices of CE and a portion of these records were reviewed by R&A staff members, E. R. Reinhart and C. C. Allen (see resumés, Appendix B), during the time period of January 5-6, 1982. The details of this review are covered in Appendix C.

All the inspection records, procedures and QA documents appeared to comply with the applicable code and regulatory requirements for fabrication of an RPV of this vintage.

2. Shop UT - after fabrication of the RPV, an Ultrasonic Examination of the RPV welds was performed for the purpose of obtaining additional inspection information. This was not a code requirement at that time (See figures 1 and 2)

   The results of this inspection disclosed reportable ultrasonic indications in two of the nozzle-to-vessel welds that led to a decision to repair these nozzles. The nozzles were repaired and re-inspected with RT and UT (Reference 16).

   From the results of this examination, one of the nozzles was accepted. The other nozzle-to-shell weld was still found to contain reportable indications and was ~~again~~ repaired for the second time. The nozzle-to-shell weld was then re-inspected and found to be acceptable. The reports, procedures and data covering the inspection and repair of these nozzles are listed as References 16 through 21 (See figure 3).

From a cursory review of the material in References 20 and 21, and a site examination of the radiographic examination records at Combustion Engineering (Appendix C), the inspection records for these two nozzle-to-shell repair welds appear to be in order and follow the applicable code requirements.

PRE-SERVICE INSPECTION

The Pre-Service Inspection (PSI) of the Shoreham vessel must satisfy the requirements of the applicable ASME Code (Section XI, Reference (4)) and NRC documents (10CFR50, Reference 6). The Pre-Service Inspection was conducted in two steps: 1) manual examination outside containment, and 2) manual and automated examination inside containment. The details of these inspections are covered in the following sections:

1. Manual PSI Baseline Outside Containment - the initial PSI of the Shoreham RPV was conducted after shipment of the RPV to the Shoreham site, but before the vessel was placed into containment.

that

This inspection consisted of a manual Ultrasonic Examination of the RPV welds. ~~The examination was conducted in order to obtain ultrasonic baseline records of all the welds, since some of the welds~~ would be inaccessable once the vessel was placed into containment. The procedures and records covering this examination are listed in References 23, 24 and 25.

of this examination,

From a brief review of these records, it appears that the inspection was conducted in accordance with the applicable codes and regulatory requirements.

2. Manual PSI Baseline Inside Containment - this inspection was essentially a repeat of the inspection conducted outside containment on those vessel welds that may not be accessable to remote Ultrasonic Examination, once the vessel becomes operational. The documents that apply to the PSI, including records of the calibration standard reviewed by R&A, are listed as References 26 through 28. In addition to RPV welds, an ultrasonic baseline of the RPV nozzle inner radius was also conducted. This technique uses an ultrasonic search unit, placed on the outside surface of the vessel wall, to scan the nozzle inner radius for service-caused cracks. This was not a specific code requirement, but may be useful for future in-service examinations.

for examination of the inner radius

This procedure was not reviewed, since this examination was beyond the scope of this effort. All of the documents reviewed appeared to comply with the applicable code and regulatory requirements. Site witness of manual Ultrasonic Examinations is covered in a later section of this report.

~~AUTOMATED PSI BASELINE~~

- this inspection

~~The~~ Automated PSI Baseline Inspection was conducted using a remote-controlled ultrasonic scanning system that inspected the RPV welds from the outside surface. The documents listed as References 29 through 33 apply to this inspection and were briefly reviewed by R&A. These documents indicated that the critical steps, needed to qualify the function of the automated inspection equipment prior to its use on the pressure vessel, were anticipated. These documents were extensive and appeared to cover every major mechanical function of the automated device. In addition to these basic documents, R&A requested that LILCO supply test results verifying that the performance checks called out in the NES procedures were, in fact, performed. These test reports were supplied by NES to LILCO and were reviewed by R&A. The test reports are listed as References 34, 35 and 36, respectively. These reports verified that the inspection system had performed the required scanning function under simulated inspection conditions.

SITE WITNESS

The second major phase of this project was the witnessing of pre-service inspection activities at the Shoreham Powerplant. This effort was conducted in order to insure that the various steps detailed in the inspection procedures were, in fact, being followed, and included review of inspector certification documents, instrument calibration checks and other site-related documents. This effort was conducted during the time period from December 1 through December 12, 1981. The results were reported to the LILCO site representative, Mr. Eugene Nicholas, on both a daily and weekly basis (References 37 through 39). Manual and automated inspections were randomly selected and witnessed. The results are discussed in the following sections:

Manual Ultrasonic Inspection - The witness effort in this area included a check of the ultrasonic instrument calibration activity to verify that it was being performed in accordance with the NES procedure. One particular weld examination was followed from calibration to hands-on examination, to recalibration. This examination was the longitudinal (0°) wave ultrasonic examination of weld 1-308C, and surrounding base material. The weld, and the point at which the inspection process was monitored, is shown in Figure 4 as Witness Area 1. This weld was selected since the initial shop examination disclosed acceptable indications in this weld (Reference 14, Paragraph 3). Figures 5 through 10 depict various stages of the actual inspection. These photographs were taken by R&A Staff Member E. Reinhart, after approval by LILCO.

The NES inspectors appeared competent and were very willing to discuss the details and results of their inspection. This was only one check out of the many inspections being conducted; however, this team did appear to be following the NES procedure exactly. It is interesting to note that reportable, but acceptable, indications were again found in this area of the RPV, indicating ~~some degree of~~ correlation between the pre-service field examination and the original shop inspection.

Automated Ultrasonic Inspection - The witness activity in this area included:

1. Examination of pole tracks mounted near RPV wall (Figures 11 and 12).
2. Discussion of system operation with NES inspectors.
3. Witness of calibration of remote inspection system (Figures 13 and 14).
4. Witness of NES data display and acquisition system, and witness of control system during automated inspection scan (Figures 15 through 19).
5. Witness of remote inspection from Witness Area 2 during actual scan of weld (Figures 20, 21 and 22).

From the witness activity and meetings at the site, the following comments are made regarding the automated system:

1. The automated system used in this examination uses tracks mounted on poles ("pole-tracks"), with the poles secured to the inside of the round shield wall, in close proximity to, but not touching, the wall of the RPV. The "pole-tracks" provide a guide track for an inspection device (sled) to move up and down the length of the RPV. A rotating arm on the sled allows scans to be performed at right-angles to the direction of the vertical "pole-tracks". Thus, scans can be accomplished in both the horizontal and vertical directions. With this capability, since the poles are positioned at several areas around the RPV, a considerable volume of the RPV can be reached for inspection.

2. The inspection arm contains a module with three ultrasonic search units; two shear-wave (both 45°) and one longitudinal wave. These techniques are called for in the Code.

3. The control system has a means to monitor the spatial position of the inspection device on the RPV wall, controls the scan speed and extends and/or rotates the various components to accomplish either horizontal or vertical scans of the RPV welds and adjacent base material.

4. The data display and acquisition system uses three standard ultrasonic instruments. Permanent recording of information is accomplished using a strip-chart recorder and closed-circuit television system.

5. This type of system has been extensively used world-wide over the past eight years by at least two in-service inspection contractors, and does not represent new or untried technology (Reference 40).

6. The overall automated system appears to satisfy the code and regulatory requirements that are relevant to this RPV.

CONCLUSIONS

From the information reviewed in this effort, the shop and pre-service inspections of the RPV appear to conform to the applicable ASME Code and NRC requirements for the Shoreham No. 1 reactor pressure vessel.

REFERENCES

1. LILCO Purchase Order No. 363108 and Scope of Work No. Q101, Rev. 0, dtd 11/30/81 (in Appendix A).

2. LILCO Purchase Order No. 363108-1 and Scope of Work No. Q101, Rev. 1, dtd 12/28/81 (in Appendix A).

3. ASME Section III, 1971 Edition, Summer 1972 Addenda - Rules for Construction of Nuclear Power Plant Components.

4. ASME Section V, 1971 Edition, Summer, 1972 Addenda - Nondestructive Examination.

5. ASME Section XI, 1971 Edition, Summer, 1972 Addenda - Rules for In-Service Inspection of Nuclear Reactor Coolant Systems.

6. Nuclear Regulatory Commission (NRC) Document 10CFR50, Appendix B - Quality Assurance Criteria for Nuclear Power Plants.

7. ASNT, Recommended Practice, No. SNT-TC-1A (1975 Edition).

8. Combustion Engineering, Inc., M&P Spec. No.: 2.4.1.3(c), Process Specification for Radiographic Examination of Commercial Nuclear Components, August 22, 1969.

9. Above, with Addendum 1(a), October 30, 1970.

10. Above, with Addendum 2(a), January 6, 1971.

11. Above with Addendum 3(a), October 20, 1971.

12. Above with Addendum 4(a), December 5, 1972.

13. Stone & Webster (S&W) Engineering Corporation, Inspection Report, Shop Quality Control, Trip Report No. 1, J.O. No. 11600.50, 10/7-9/69.

14. Report No. 7, 2/2-4/72.

15. Report No. 8, 8/16-17/73.

16. Report No. 13, 10/21-23/73.

17. Report No. 14, 11/4-9/73.

18. Report No. 15, 11/13-15/73.

19. Report No. 19, 2/22-27/79.

20. Joint Report to LILCO by the Shoreham Unit #1 Evaluation Team; General Electric, Combustion Engineering, Southwest Research Institute, Stone Webster, "Report of the Shop Ultrasonic Examination of the Shoreham Nuclear Power Station Unit I Reactor Pressure Vessel Welds", April 27, 1973.

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22. NES Report No. 81A0447, "Manual Ultrasonic Examination of the Shoreham Nuclear Power Station One Reactor Pressure Vessel", Rev. 1, April 18, 1977.

23. Wlock, Eugene C., LILCO letter to Mr. J. Kohlmeyer, CE, "Reactor Pressure Vessel Weld Identification, Shoreham Nuclear Power Station - Unit 1, TM-4-551, October 4, 1974.

24. US NRC Office of Inspection and Enforcement, Inspection Report No. 50-322/75-08, 7/9/75.

25. Schoner, F.X. memorandum to Gerecke, T.F., "Manual Ultrasonic Examination of the Shoreham Reactor Pressure Vessel by Nuclear Services, Inc., Shoreham Nuclear Power Station, W.O. 4430, May 24, 1976.

26. NES Document 80A0482, "Shoreham Nuclear Power Station Unit I, Pre-Service Inspection Program Plan", Prepared for LILCO by NES, Rev. G, 2/16/81.

27. NES Document 80A0462, "Manual Ultrasonic Examination Procedures for Reactor Pressure Vessel, Circumferential and Longitudinal Welds, Long Island Lighting Company, Shoreham No. 1", June 10, 1975.

28. General Electric Letter to LILCO, Shoreham Nuclear Power Station Unit #1, UT Calibration Standards.

29. NES Document 80A0470, "Automated Ultrasonic Examination Procedures for Reactor Vessel Nozzle Welds", Rev. No. 1, 11/3/78.

30. NES Document 80A0480, "Automated Ultrasonic Examination Procedures for Reactor Vessel Welds", Rev. No. 2, 10/12/81.

31. Shoreham Nuclear Power System - 1 Final Safety Analysis Report, pp. 121-26 through 121-26c, Revision 19, September, 1980, and Exhibits 121 26-1 (describes the scanner).

32. NES Document No. 80A4340, Functional Test Procedure, BWR Vessel Scanner (80D063), Rev. 0, 3/23/81.

33. NES Document No. 85A149, Procedure for the Certification of Surface-Oriented Ultrasonic Examination Heads, Rev. 0, 9/9/81.

34. NES Document 80A4340, Results of Tests 1 through 10, 3/27/81.

35. NES Document 80A3720, Shoreham Vessel Scanner, On-Site Fit-Up Procedure, Rev. 0, 3/11/81.

36. NES Document No. 80A4438, Report on Shoreham Vessel Scanner On-Site Fit-Up Procedure, Rev. 0, 4/30/81.

37. Reinhart, E. R., Daily Activity Reports to E. Nicholas, LILCO, as follows:

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    b. 12/02/81
    c. 12/03/81
    d. 12/04/81
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    a. 12/07/81
    b. 12/08/81
    c. 12/09/81
    d. 12/11/81

40. Southwest Research Institute Brochure, "Mechanized Inservice Examination Equipment", 1974, pp. 6 and 7.

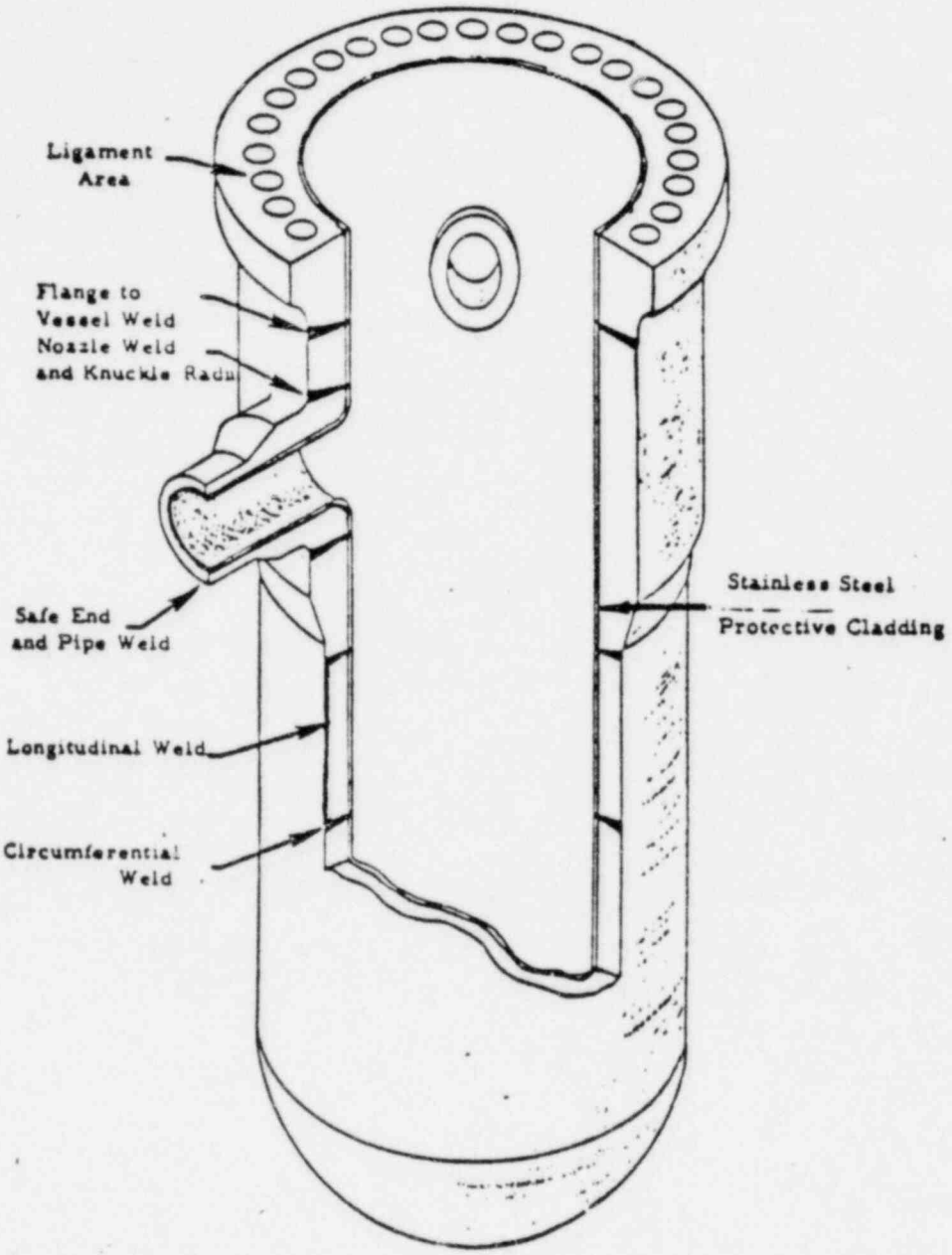

FIGURE 1 - Schematic of Typical Reactor Pressure Vessel.

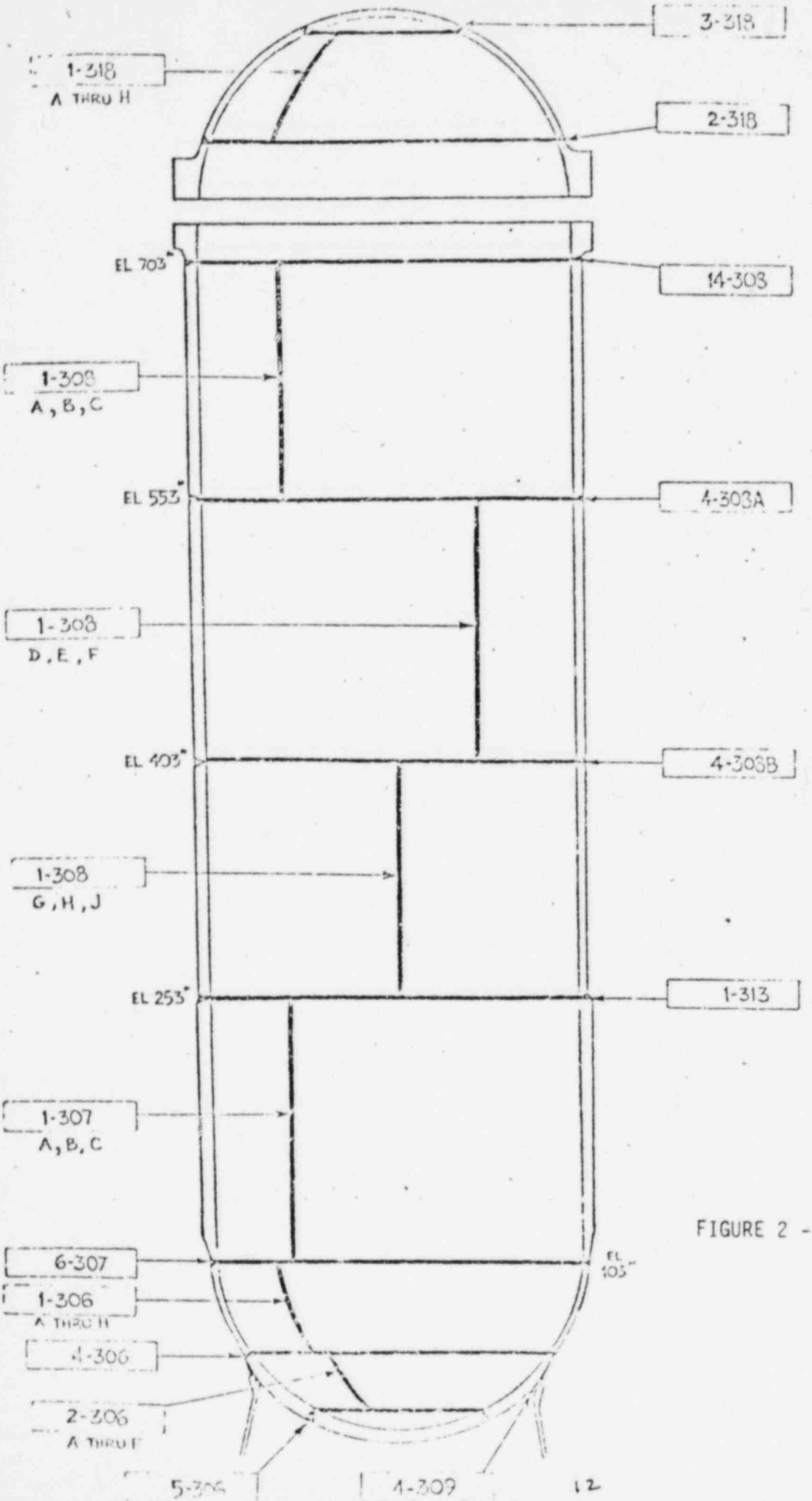

FIGURE 2 - Shoreham Unit 1 RPV Weld Layout.

~~add~~ also identify welds
1-308 A, B & C
and 1-313.

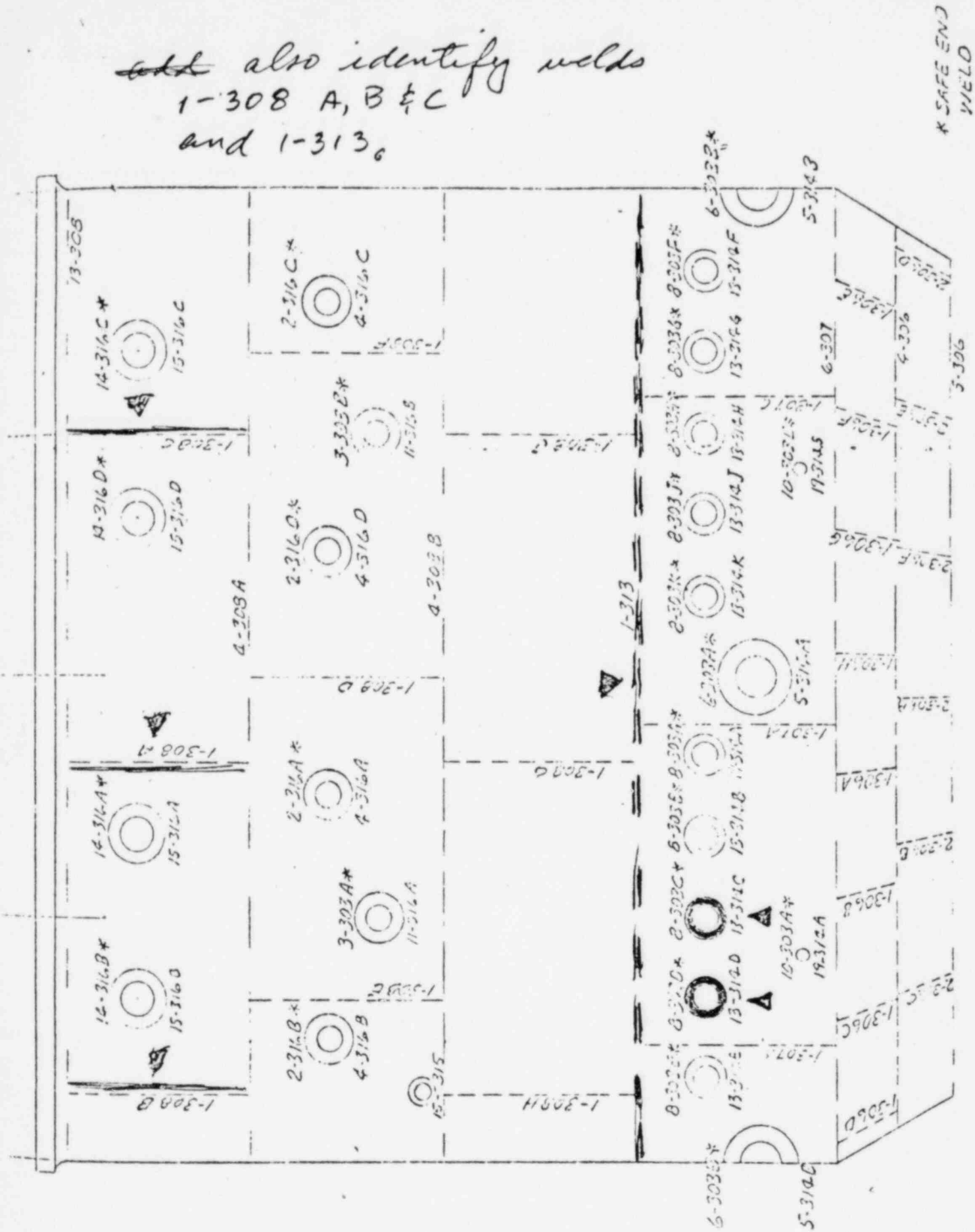

FIGURE 3 - Shoreham RPV Weld Identification showing Welds selected for RT Data Review.

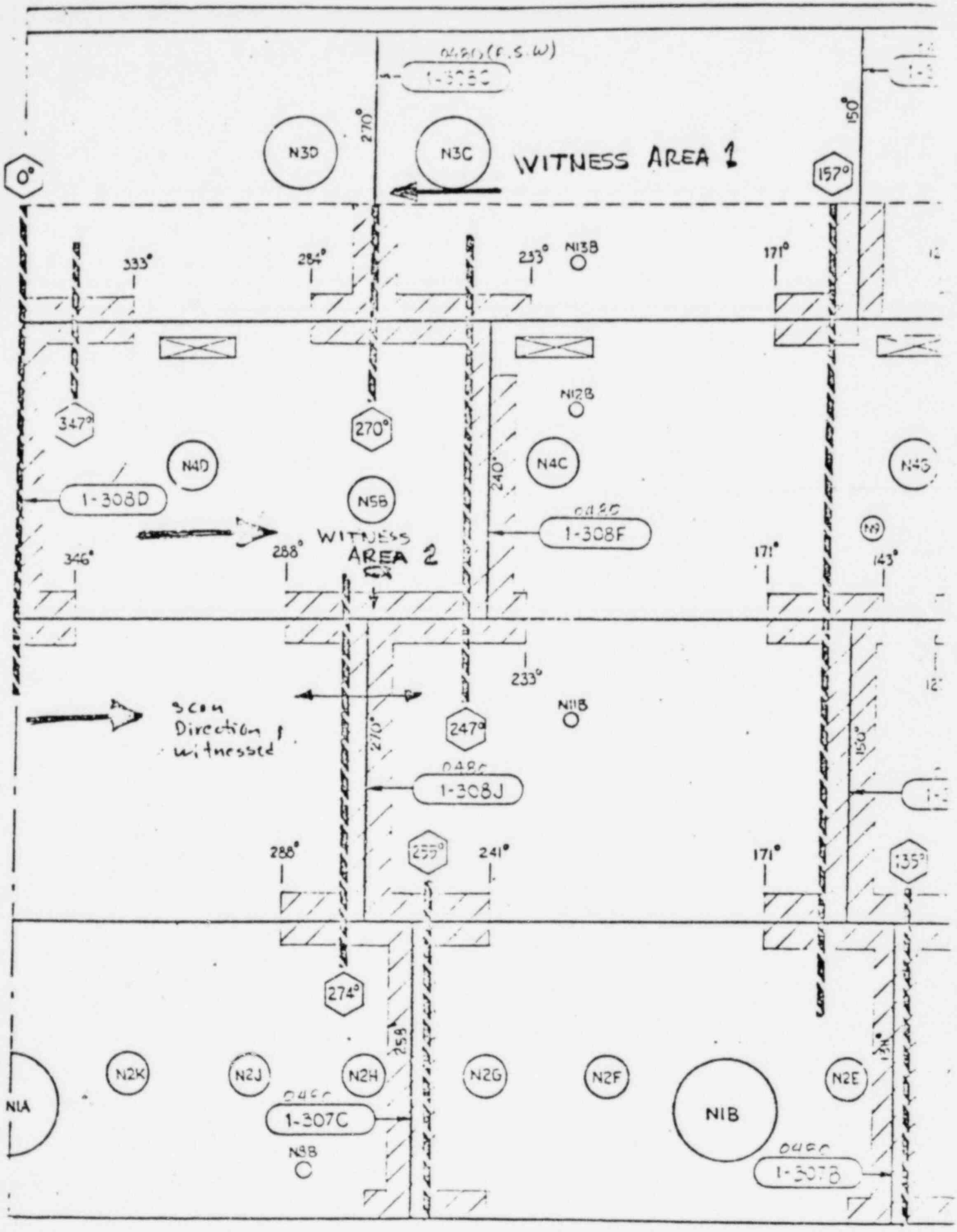

FIGURE 4 - NES Drawing of Vessel Weld Layout and Track Locations showing Witness Areas 1 and 2.

FIGURE 5 - Photograph of the Inspection of Weld 1-308C at Elevation 618 in., by NES Inspectors, using the Longitudinal Wave Ultrasonic Examination Technique, as witnessed by E. Reinhart on 12/10/82 (R&A Photograph). Smooth Paint-Free Metal Surface is shown in the Examination Area at Bottom Left of Photograph.

FIGURE 6 - Ultrasonic Longitudinal Wave Examination of Base Metal Next to N3D (right side) Nozzle-to-Shell Weld at 2:54 P.M. on 12/10/81 (R&A Photograph).

FIGURE 7 - L-wave Examination of Base Metal on Left Side of Nozzle N3D at 3:30 P.M. on 12/10/81 (R&A Photograph).

FIGURE 8 - View of Nozzle N3D near RPV to Nozzle Weld, showing Smooth, Paint-Free Surfacea Condition prepared for UT Examination (Area above N3D Identification Number shown on Nozzle).

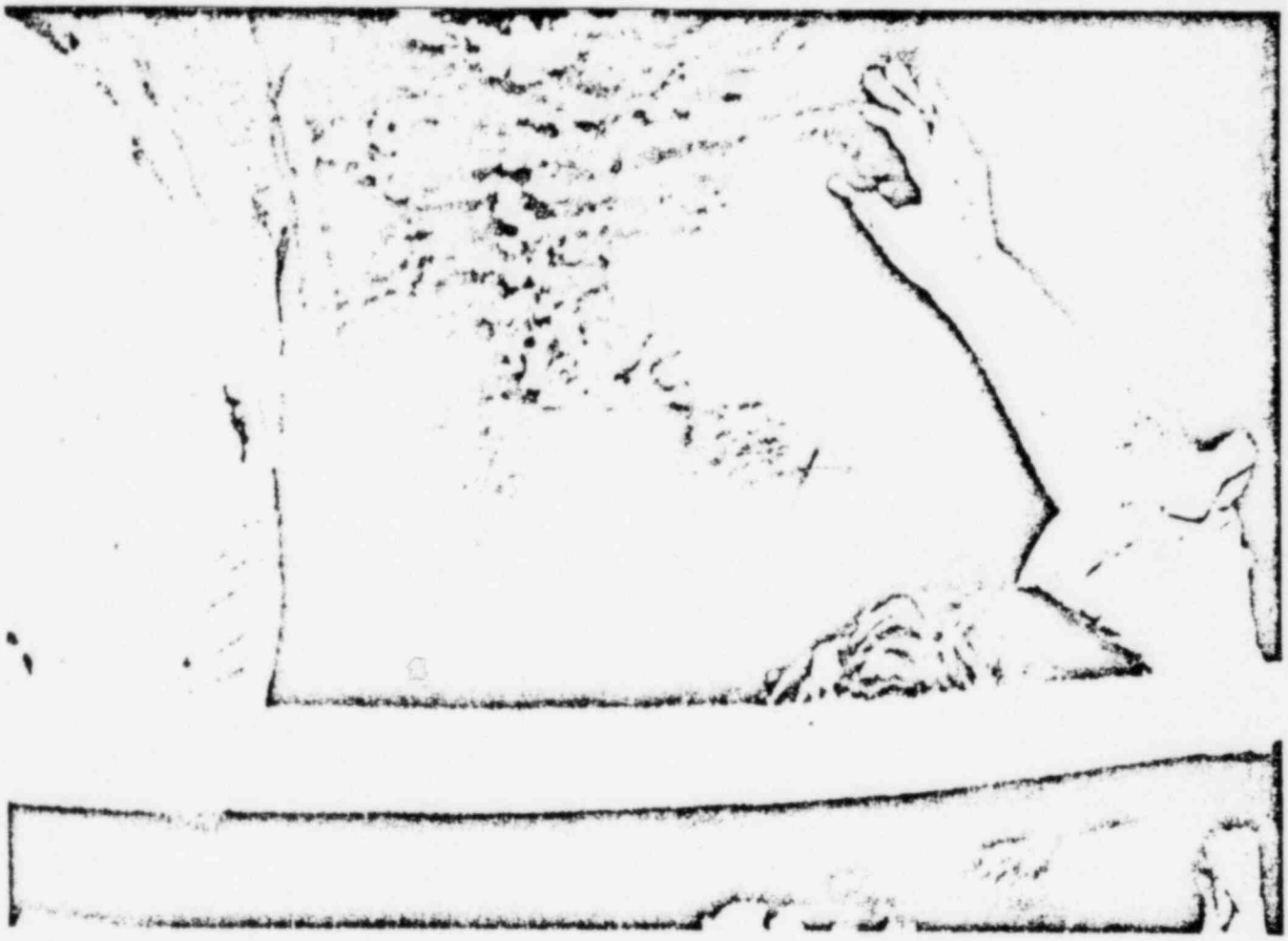

FIGURE 9 - View of Manual Longitudinal Ultrasonic Examination of RPV Weld and Base Metal at ∿ 618" Elevation as witnessed by E. Reinhart on 12/10/81. The Shiny, Paint-Free Surface of the Area Undergoing Examination is shown at and to the Left of the Search Unit.

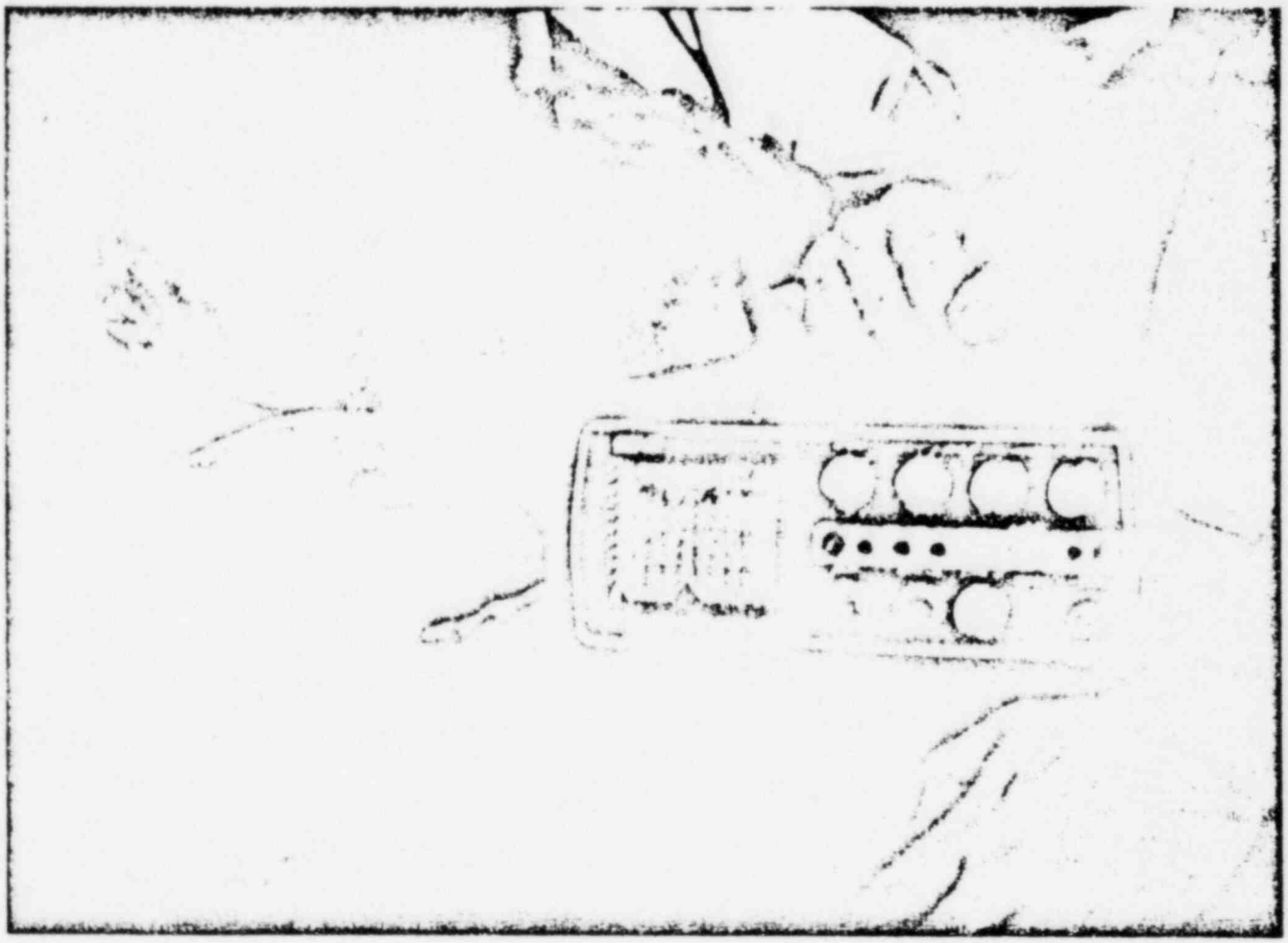

FIGURE 10 - View of Ultrasonic Instrument Screen showing Peaked Signal from Reflector in RPV (mid-screen). This Indication was acceptable due to Low Amplitude and lack of Length, however, Indication did Correlate with Results Reported by Shop Inspection, indicating Valid Correlation between Inspections.

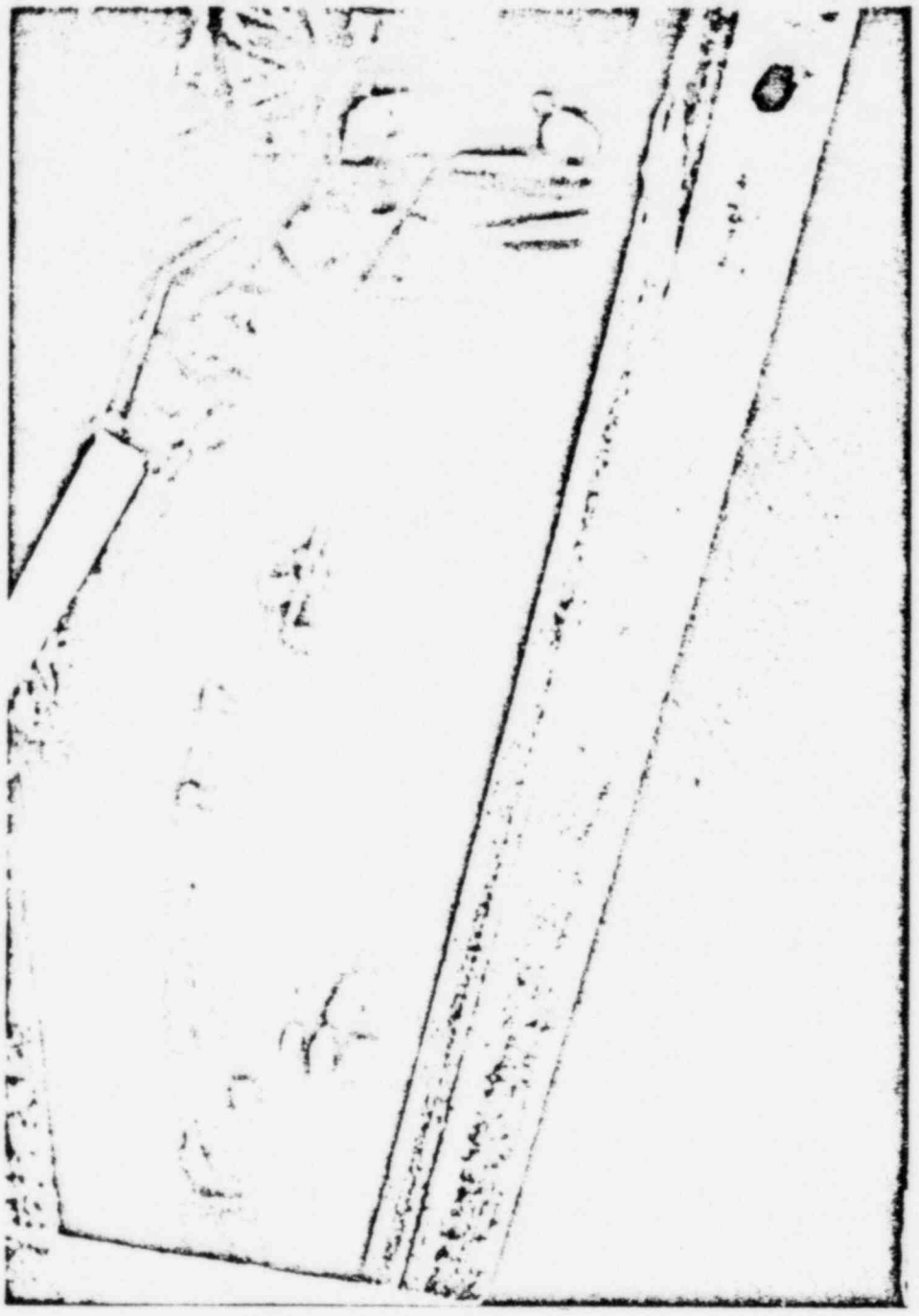

FIGURE 11 - View from Top of Shield Wall (Elevation ~ 618") of Pole Tracks used to Guide Automated Remote-Controlled Inspection System (R&A Photograph, 12/10/81).

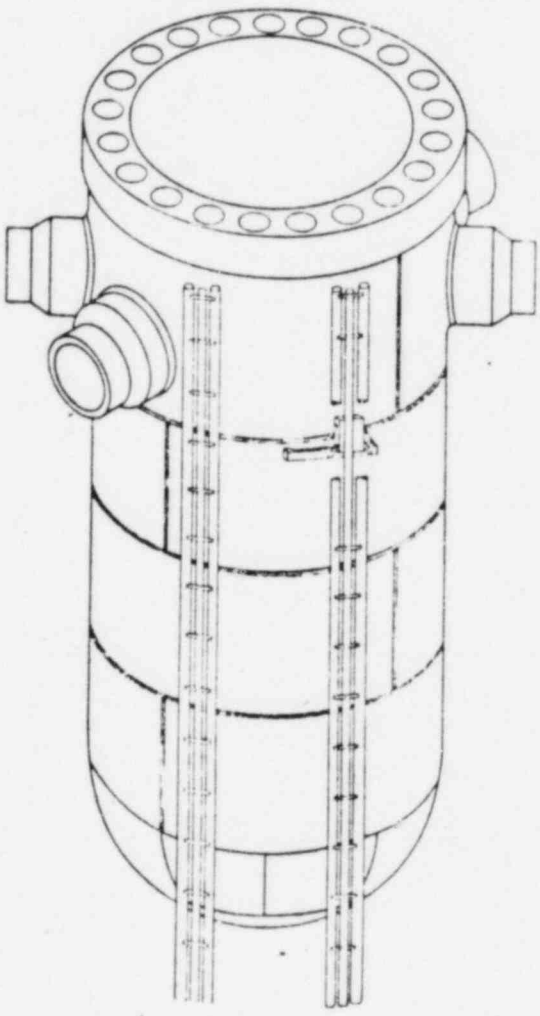

FIGURE 12 - Schematic Drawing of Location of Tracks on RPV and Operation of the Remote-Controlled Inspection System.

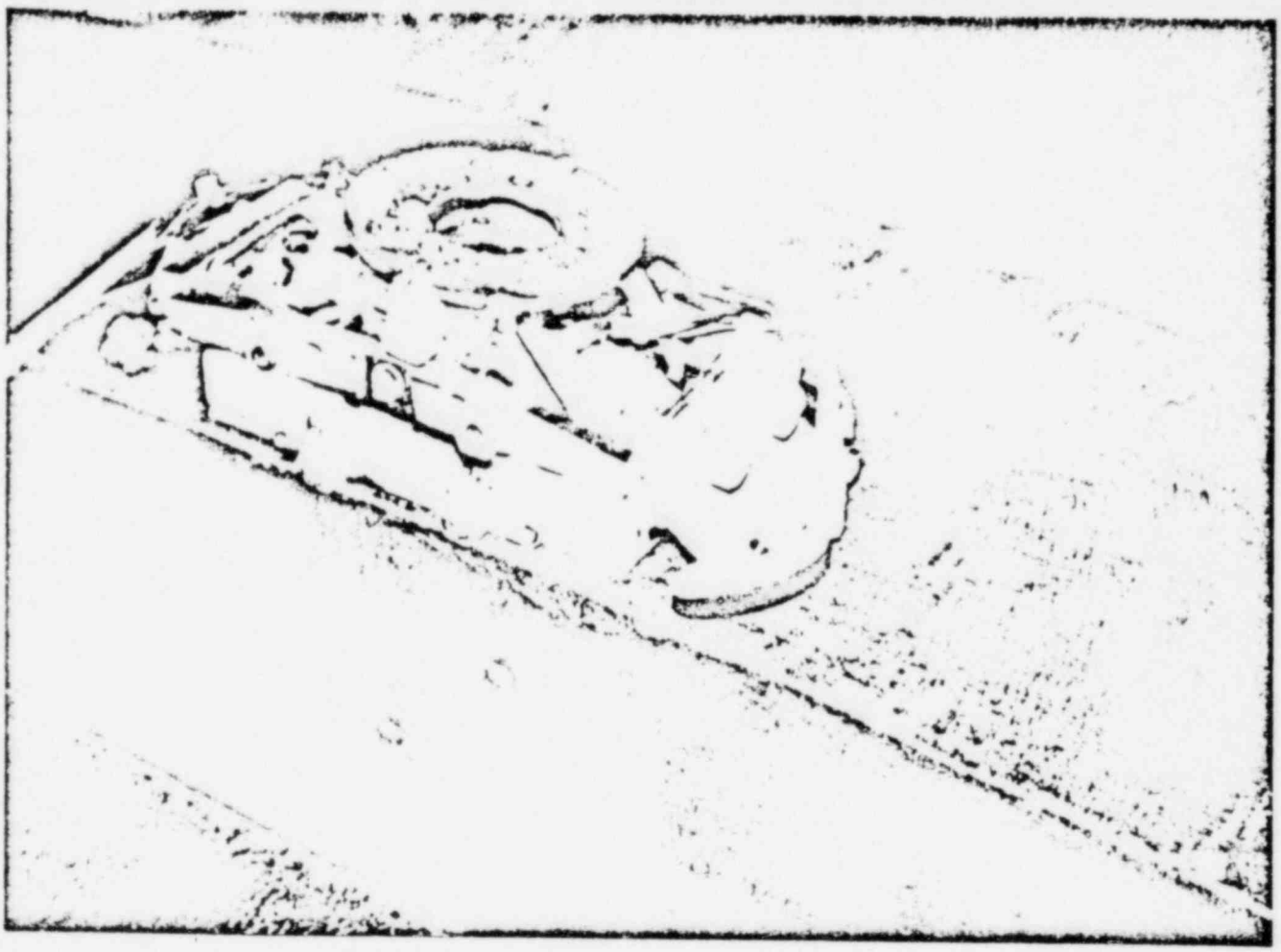

FIGURE 13 - View of RPV Calibration Block and Module containing Ultrasonic Search Units, used with the Automated Inspection System.

FIGURE 14 - View of Both RPV Calibration Blocks used for Calibration of Ultrasonic Inspection Instruments, Manual and Automated Examinations (R&A Photograph 12/03/81).

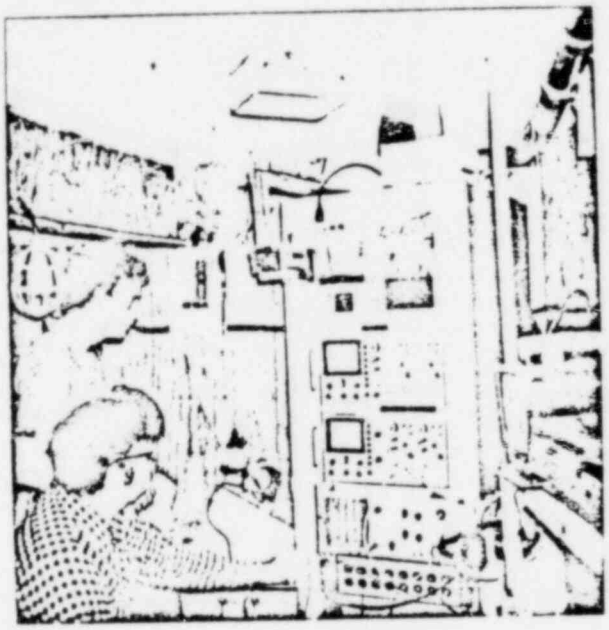

FIGURE 15 - NES Data Acquisition System, as Witnessed by E. Reinhart, 12/03/81.

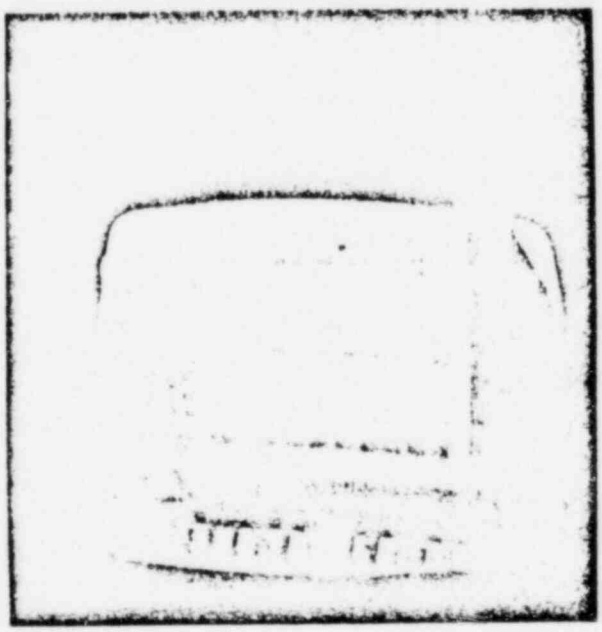

FIGURE 16 - Closed Circuit Video Screen Presentation of UT Data and Position of Search Units on RPV (Digital Numbers).

Plant/Unit _____ Date _____

Tape# _____ Time _____

Weld# _____

Scan# _____

CalDataPkg# _____

Sled# _____

	CH1	CH2	CH3
Sound Beam Angles			
Sled Orientation			

Examiner LII _____

Operator _____

FIGURE 17 - Identification Card used for Closed Circuit TV Data Recorder.

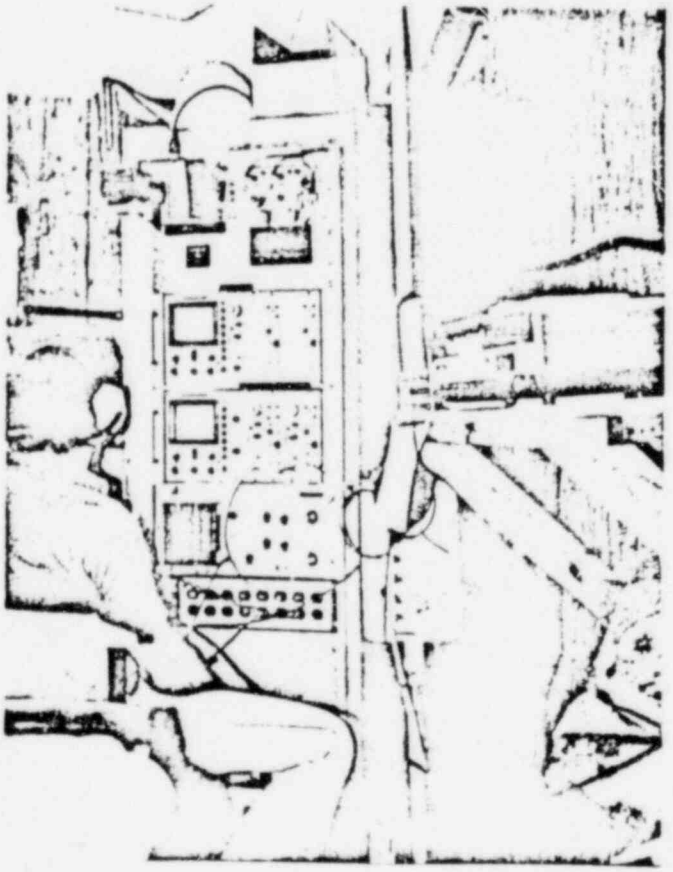

FIGURE 18 - View of Data Display and Acquisition System (12/03/81).

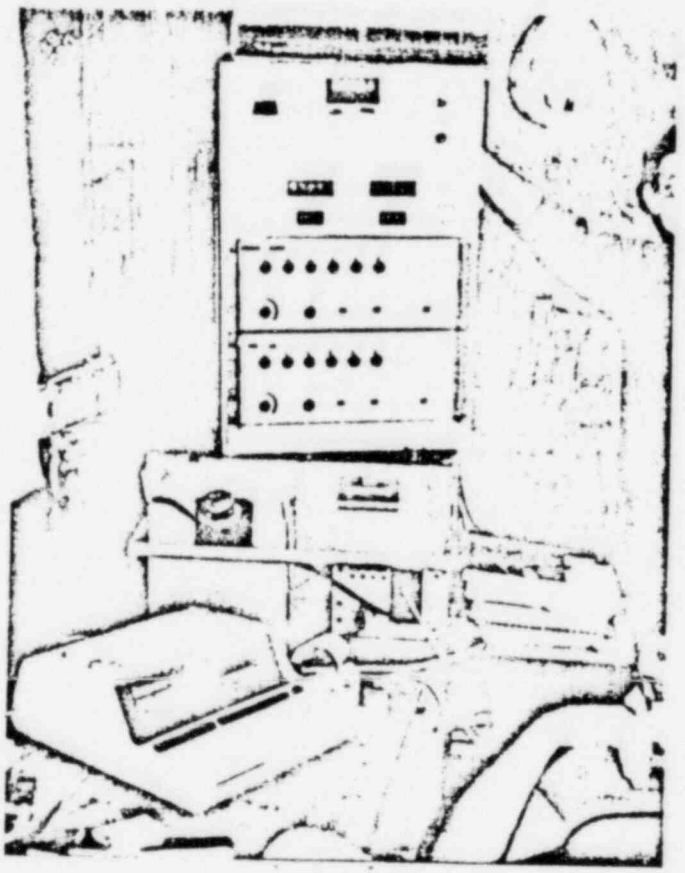

FIGURE 19 - View of System used to Operate the Remote-Controlled Inspection System.

FIGURE 20 - Inspection System ("Sled") Removed from Truck prior to Scan of Weld 1 - 308J, Witnessed by E. Reinhart on 12/09/81.

FIGURE 21 - RPV Nozzle N5B at ∿ 270° and Elevation of ∿ 415", near Witness Area 2.

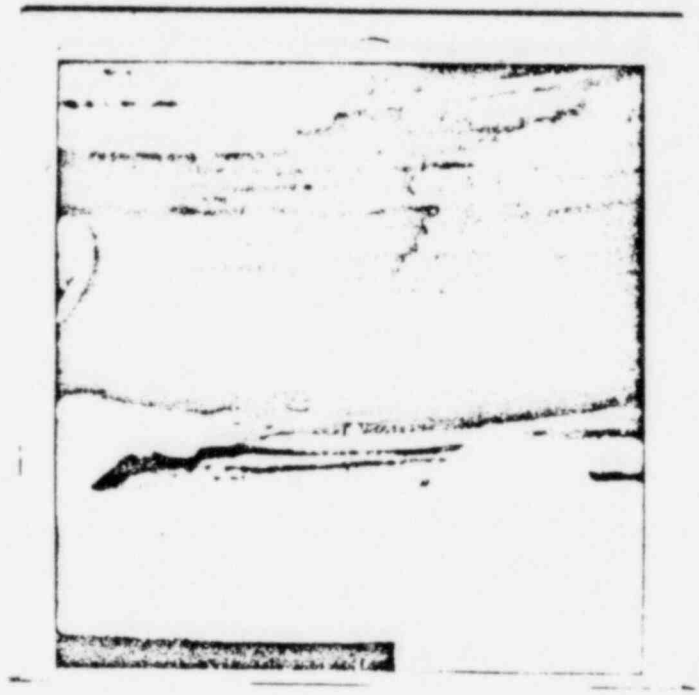

FIGURE 22 - View Down from Witness Area 2, during Remote Examination of Weld 1-308J on 12/09/81.

APPENDIX A

LONG ISLAND LIGHTING SCOPE OF WORK - Purchase Order No. 363108-1, Rev. 0, 11/30/81 and Rev. 1, 12/28/81.

APPENDIX B

Resumés

Calvin C. Allen, R&A

John P. Porter, R&A

Eugene R. Reinhart, R&A

Richard I. Seals, Consultant to R&A

APPENDIX C

REVIEW OF RADIOGRAPHIC INSPECTION RECORDS

AT

COMBUSTION ENGINEERING
CHATTANOOGA, TN.

PRESERVICE INSPECTION

OF THE

SHOREHAM NUCLEAR POWER STATION-UNIT ONE

REACTOR PRESSURE VESSEL

Prepared Under Project 5536 for the

Long Island Lighting Company

By

Nuclear Energy Services, Inc.
Danbury, Connecticut 06810

Project Application	Prepared By	Date
APPROVALS		
TITLE/DEPT.	SIGNATURE	DATE

NES

REVISION LOG

NUCLEAR ENERGY SERVICES, INC.

DOCUMENT NO. ____________

PAGE ________ OF ________

REV. NO.	DATE	PAGE NO.	DESCRIPTION	APPROVAL

TABLE OF CONTENTS

1. SUMMARY

The following report covers preservice examinations of the SNPS-1 Reactor pressure vessel performed in December 1981. This information supplements NES Report No. 81A0447 which covers reactor pressure vessel examinations performed prior to this period. The specific examinations performed are listed in Table 1 (Ultrasonic) and Table 2 (Visual) of this report.

2. DISCUSSION

2.1 GENERAL

The ultrasonic and visual examinations were performed in accordance with Nuclear Energy Services, Inc. (NES) procedures that were designed to meet the intent of the 1971 ASME boiler and Pressure Vessel Code, Section XI 1971 Edition through the Summer of 1972 Addenda and NES specification 80A0448, "Quality Assurance Program Plan - Inservice Inspection, Shoreham". Copies of the examination procedures are included as Appendix A. The test data, including calibration sheets and examination results, is included in Appendix F.

Examination personnel performing the 1981 baseline examinations were certified in accordance with established NES procedures and with SNT-TC-1A, the American Society for Non-Destructive Testing document which deals with personnel certification. Copies of the personnel certifications of each individual performing the examinations are included as Appendix B.

2.2 EQUIPMENT

Sonic Mark I and Krautkramer USL 32 UT instruments were used in the manual examinations. A three channel ultrasonic system employing Automation Industries S80 UT Instruments was used for automated examinations. The search units (transducers and wedges, where used) were of varying types manufactured by AI, KB Aerotech, and NES. The details of the ultrasonic instrument - search unit combination can be found on the calibration data sheets in Appendix F. Equipment certifications can be found in Appendix C. The couplant used in the manual exams was Ultagel II manufactured by Echo Labs; the automated exams required demineralized water supplied by LILCO, eythlene glycol manufactured by Dow chemical and Phot Flo manufactured by Kodak. The couplant certifications are included in Appendix D.

Calibration blocks used to perform the examinations were supplied by GE and NES. Certifications for the NES supplied blocks are in Appendix E.

2.3 TECHNIQUES

2.3.1 Ultrasonics

All ultrasonic examinations of the vessel shell welds (longitudinal, circumferential, dome, meridional and nozzle to shell), were examined with 0° straight beam and 45° angle beam techniques; Inner Radius exams were examined with 45° and 70° techniques. The vessel flange weld was examined with 0°, 5°, 10.5° and 45° techniques.

The weld examinations covered the weld, heat affected zone and base metal as defined in the examination procedures.

The ultrasonic instrument - search unit combinations were calibrated before each examination on the appropriate calibration block. Periodic calibration checks were performed at the completion of each four hour period of examination and/or at the change of examination personnel, equipment etc., and at the completion of the examination of each similar series of welds as defined in the examination procedures.

2.3.2 Visual

Visual examinations were performed as required on the RPV Close Head Nuts, Studs, Washers, Spare Bushings, Clad Patches, Dryer Hold Down Brackets, Guide Rod Brackets, Steam Dryer Support Lugs, Feedwater Sparger Brackets, Upper Surveillance Specimen Baskets, Core Spray Lines, Feedwater Spargers, Shroud, Shroud Support Plate, Steam Seperator and Dryer, Vessel Cladding, CRD Housing to Vessel Welds, Core ΔP and Liquid Poison Piping, Welds on Shroud Support Assembly, and the In-Core Flux Monitor Housing to Vessel Weld.

3. EXAMINATION RESULTS

Required examination of all areas and items were completely performed except as noted in this Section. No reportable indications were detected during performance of this examination workscope. Areas which did not receive full examination coverage are listed in Paragraphs 3.1 and 3.2.

3.1 ULTRASONIC EXAMINATIONS

Limitations to required coverages areas note below.

3.1.1 Automated Examination

1. Circumferential Weld No. 4-308A.

   Vessel stabilizings at azimuth 45°, 135°, 225° and 315° and elevation 544.0" limited the coverage areas.

2. Circumferential Weld No. 4-308B

   A tapered condition due to plate mismatch precluded examination of two small patches of weld.

3. Circumferential Weld No. 1-313

   This weld joins plates of differing thickness with a machined taper of the thicker plate. Coverage of approximately 1" above the weld and 2" below the weld was limited due to the tapered intersection.

4. Longitudinal Weld No. T-308A

   Coverage was reduced by approximately 4" in the area of nozzle N13A.

5. Longitudinal Weld Nos. 1-308E and I308F

   Coverage of the uppermost portions of these welds was limited due to interference with vessel stabilizer lugs.

6. Longitudinal Weld Nos. 1-308G, 1-308H and 1-308J

   The lower portions of these welds were not covered due to interference from the tapered area (see Item 3 above).

7. Longitudinal Weld Nos. 1-307A, 1-307B and 1-307C

   The upper portion of those welds were not covered due to interference from the tapered area. (See Item 3 above).

3.1.2 Manaual Examinations

1. Longitudinal Weld No. 1-308C

   A small scan area at the 696" elevation was obstructed by a thermocouple.

2. Circumferential Weld No. 3-318 (closure head)

   Nozzle locations reduced coverage at 0° and 180° azimuths.

3. Meridonal Weld Nos. 1-318B, 1-318D, 1-318F and 1-318H (closure head)

   Closure head lifting lugs obstructing portions of scan areas

4. Meridional Weld No. 1-306D (bottom head)

   Nozzle placement interfered with scan area.

5. Feedwater nozzles N4A and N4C

   Nozzles are obstructed by N12A and N12B respectively.

3.2 VISUAL EXAMINATIONS

Limitation to required coverage areas are note below:

1. Closure Head Studs

   Studs 1,26, 27,39,40 and 52 were completely inspected. The remaining studs were installed and inspected from the flange up to 41 3/4". An ASME Section III exam was performed by Reactor Controls, Inc. on uninspected areas in lieu of an NES visual exam.

2. CLosure Head Busings 325-05-01 through 52

   An ASME Section III exam was performed by Reactor Controls, Inc. on the 52 installed bushings in lieu of an NES visual exam.

RPV Interior

Visual exams were performed on 100% of the accessible components required to be examined under category B-N-1 and B-N-2.

TABLE 1A
AREA OF EXAMINATION - VERTICAL WELDS
(AUTOMATED EXAMINATIONS)

5-7/8" SHELL COURSE

Weld No.	℄	Exam Coverage (inches) From	To
1-308A	30°	553	618
1-308B	150°	553	618
1-308C	270°	553	618
1-308D	0°	104	703
1-308E	120°	403	553
1-308F	240°	403	553
1-308G	30°	253	403
1-308H	150°	253	403
1-308J	270°	253	403

6-7/8" SHELL COURSE

Weld No.	℄	Exam Coverage (inches) From	To
1-307A	18°	104	140
		227	253
1-307B	138°	104	253
1-307C	258°	104	253

TABLE 1A
AREA :OF EXAMINATION - CIRCUMFERENTIAL WELDS
(AUTOMATED EXAMINATIONS)

5-7/8" SHELL COURSE

Weld No.	℄	Exam Coverage DEG From	To
4-308A	553"	340.03°	26.65°
4-308A	553"	106.41°	115.37°
4-308A	553"	245.40°	278.02°
4-308B	403"	359.95°	355.53°
4-308B	403"	106.41°	124.24°
4-308B	403"	147.81°	165.64°
4-308B	403"	236.53°	254.36°
4-308B	403"	266.10°	283.93°

5-7/8" - 6-7/8" SHELL COURSE

Weld No.	℄	Exam Coverage DEG From	To
1-313	253"	17.70°	35.52°
1-313	253"	27.11°	165.64°
1-313	253	245.40°	283.93°

TABLE 1B

RPV SHELL/CLOSURE HEAD/FLANGE LIGAMENTS WELDS

(Manual Exams)

Weld No.	Description
6-307	Shell Weld @ 104" elevation
4-306	Bottom Head Weld
5-306	Bottom Head Weld
2-318	Closure Head Flange Weld
3-318	Closure Head Weld
1-308A (el 618" - 703")	Shell Weld @ 30° Azimuth
1-308B (el 618" - 703")	Shell Weld @ 150° Azimuth
1-308C (el 618" - 703")	Shell Weld @ 270° Aximuth
1-318A-H	Closure Head Meridional Welds
1-306A-H	Bottom Head Meridional Welds
2-306A-F	Bottom Head Meridional Welds
325-01-01 through 52	Closure Head Studs
325-02--1 through 52	Closure Head Nuts
325-01-01-L through 52-1	Closure Head Nuts
325-01-01-L through 52-L	RPV Flange Ligaments
4-324A through D	Stabilizer Brackets

TABLE 1B

RPV NOZZLE WELDS

(Manual Exams)

Weld No.	Description
4-317	Head to Vent Nozzle (N7) Weld
4-317-r	Vent Nozzle (N7) Inner Radius
2-317A	Heas to Instrument Nozzle (N6A) Weld at 0° Azimuth
2-317A-r	Head to Instrument Nozzle (N6A) Inner Radius
2-317B	Head to Instrument Nozzle (N6B) Weld at 180° Azimuth
2-317B-r	Instrument Nozzle (N6B) Inner Radius
15-316A	RPV to MS Nozzle (N3A) Weld at 72° Azimuth
15-316A-r	MS Nozzle (N3A) Inner Radius
15-316B	RPV to MS Nozzle (N3B) Weld at 108° Azimuth
15-316B-r	MS Nozzle (N3B) Inner Radius
15-316C	RPV to MS Nozzle (N3C) Weld at 252° Azimuth
15-316C-r	MS Nozzle (N3C) Inner Radius
15-316D	RPV to MS Nozzle (N3D) Weld at 288° Azimuth
15-316D-r	MS Nozzle (N3D) Inner Radius
4-316A	RPV to FW Nozzle (N4A) Weld at 45° Azimuth
4-316A-r	FW Nozzle (N4A) Inner Radius
4-316B	RPV to FW Nozzle (N4B) Weld at 135° Azimuth
4-316B-r	FW Nozzle (N4B) Inner Radius
4-316C	RPV to FW Nozzle (N4C) Weld at 225° Azimuth
4-316C-r	FW Nozzle (N4C) Inner Radius
4-316D	RPV to FW Nozzle (N4D) Weld at 315° Azimuth
4-316D-r	FW Nozzle N4D Inner Radius
19-314A	RPV to JP1 Nozzle (N8A) Weld at 105° Azimuth
19-314A-r	JP1 Nozzle (N8A) Inner Radius
19-314B	RPV to JP1 Nozzle (N8B) at 250° Azimuth
19-314B-r	JP1 Nozzle (N8B) Inner Radius
11-316A	RPV CS Nozzle Weld at 90° Azimuth
11-316A-r	CS Nozzle (N5A) Inner Radius
11-316B	RPV to CS Nozzle (N5B) Weld at 270° Azimuth
11-316B-r	CS NOzzle (N5B) Inner Radius
15-315	RPV to CRD Return Nozzle (N9) Weld at 146° Azimuth
15-315-r	CRD Return Nozzle (N9) Inner Radius
13-314A	RPV to Inlet Nozzle (N2A) Weld at 30° Azimuth
13-314A-r	Inlet Nozzle (N2A) Inner Radius
13-314B	RPV to Inlet Nozzle (N2B) Weld at 60 ° Azimuth
13-314B-r	Inlet Nozzle (N2B) Inner Radius
13-314C	RPV to Inlet Nozzle (N2C) Weld a 90° Azimuth
13-314C-r	Inlet Nozzle (N2C) Inner Radius

TABLE 1B (Continued)

RPV NOZZLE WELDS

(Manual Exams)

Weld No.	Description
13-314D	RPV to Inlet Nozzle (N2D) Weld at 120° Azimuth
13-314D-r	Inlet Nozzle (N2D) Inner Radius
13-314E	RPV to Inlet Nozzle (N2E) Weld at 150° Azimuth
13-314E-r	RPV Inlet Nozzle (N2E) Inner Radius
13-314F	RPV to Inlet Nozzle (N2F) Weld at 210° Azimuth
13-314F-r	Inlet Nozzle (N2F) Inner Radius
13-314G	RPV to Inlet Nozzle (N2G Weld at 240° Azimuth
13-314G-r	Inlet Nozzle (N2G) Inner Radius
13-314H	RPV to Inlet Nozzle (N2H) Weld at 270° Azimuth
13-314H-r	Inlet Nozzle (N2H) Inner Radius
13-314J	RPV to Inlet Nozzle (N2J) Weld at 300° Azimuth
13-314J-r	Inlet Nozzle (N2J) Inner Radius
13-314K	RPV to Inlet (N2K) Weld at 330° Aximuth
13-314K-r	Inlet Nozzle (N2K) Inner Radius
5-314A	RPV to Outlet Nozzle (N1A) Weld at 0° Azimuth
5-314A-r	Outlet Nozzle (N1A) Inner Radius
5-314B	RPV to Outlet Nozzle (N1B) Weld at 180° Azimuth
5-314B-r	Outlet Nozzle (N1B) Inner Radius

TABLE 2

VISUAL EXAMS

Weld No.	Description
325-01-01 through 52	Closure Head Studs
325-02-01 through 52	Closure Head Nuts
325-03-01 through 52	Closure Head Washers
325-05-S1 through S6	Closure Head Buslings
RPV-01-P	Vessel Clad Patch at 90° Aximuth
RPV-02-P	Vessel Clad Patch at 270° Azimuth
RPV-03-P	Vessel Clad Patch at 45° Aximuth
RPV-04-P	Vessel Clad Patch at 135° Aximuth
RPV-05-P	Vessel Clad Patch at 225° Aximuth
RPV-06-P	Vessel Clad Patch at 315° Aximuth
RPV-01-i A-D	Dryer Hold Down Brackets
RPV-02-i A & B	Guide Rod Brackets
RPV-03-i A-D	Steam Dryer Support Lugs
RPV-04-i A-H	Feedwater Sparger Brackets
RPV-05-i A-H	Core Spray Brackets
RPV-06-i A-H	Upper Surveillance Specimen Brackets
RPV-07-i	Lower Surveillance Specimen Brackets
RPV-08-i	Core Spray Lines
RPV-09-i	Feedwater Spargers
RPV-10-i	Jet Pumps
RPV-11-i	Shroud
RPV-12-i	Shroud Support Plate
RPV-13-i	Core Plate Hold Down Bolts
RPV-14-i	Steam Separator and Dryer
RPV-14-i	Vessel Cladding (Representative)
RPV-16-i	CRD Housing to Vessel Welds
RPV-17-i	Shroud Support Lugs
RPV-18-i	Core Δ P and Liquid Poison Piping
RPV-19-i	Welds on Shroud Support Assembly
RPV-20-i	Underside of Core Plate
RPV-21-i	In-Core Flux Monitor Housihng to Vessel Weld

In the Matter of
LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station, Unit 1)
Docket No. 50-322 (OL)

CERTIFICATE OF SERVICE

I hereby certify that copies of LILCO'S AMENDED RESPONSE TO SUFFOLK COUNTY'S REQUEST FOR PRODUCTION OF DOCUMENTS and LILCO'S FURTHER RESPONSE TO SUFFOLK COUNTY INTERROGATORIES were served upon the following people by first-class mail, postage prepaid, on April 9, 1982, except for those with an asterisk who were served by Federal Express or by hand on April 9, 1982.

Lawrence Brenner, Esq.*
Administrative Judge
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555

Dr. Peter A. Morris*
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Secretary of the Commission
U.S. Nuclear Regulatory
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