Washington Public Power Supply System

Box 1223 Elma, Washington 98541-1223 (206)482-4428

Docket No. 50-508
April 27, 1984
G03-84-265

Director of Nuclear Reactor Regulation
ATTN: Mr. G. W. Knighton, Chief
Licensing Branch No. 3
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: NUCLEAR PROJECT 3
RESPONSES TO NRC QUESTIONS

Reference: a) Letter #G03-83-0889, dated November 18, 1983, G. C. Sorensen to G. W. Knighton.

In accordance with the guidance of Generic Letter 82-14, the Supply System hereby submits 40 copies of responses to the NRC's Requests for Additional Information as shown.

This transmittal includes responses for 20 Questions from the NRC's Power Systems Branch pertaining to the WNP-3 Emergency Diesel Generators. The Supply System had not previously scheduled these responses for transmittal for NRC review per reference a).

B001
1/40

NUCLEAR PROJECT 3 RESPONSES TO NRC QUESTIONS

If you require additional information or clarification, the Supply System Point of Contact for this matter is Mr. D. W. Coleman, Licensing Project Manager (206/482-4428 ext. 5436).

Sincerely,

G. C. Sorensen

G. C. Sorensen, Manager
Regulatory Programs

AJM/pm

Attachments:
1) Response to NRC Question 240.04
2) Response to NRC Question 430.11
3) Response to NRC Question 430.26
4) Response to NRC Question 430.27
5) Response to NRC Question 430.28
6) Response to NRC Question 430.29
7) Response to NRC Question 430.30
8) Response to NRC Question 430.31
9) Response to NRC Question 430.33
10) Response to NRC Question 430.38
11) Response to NRC Question 430.39
12) Response to NRC Question 430.42
13) Response to NRC Question 430.43
14) Response to NRC Question 430.44
15) Response to NRC Question 430.45
16) Response to NRC Question 430.46
17) Response to NRC Question 430.47
18) Response to NRC Question 430.48
19) Response to NRC Question 430.50
20) Response to NRC Question 430.59
21) Response to NRC Question 430.84

cc: J. Porrovecchio - Ebasco NYO
N. S. Reynolds - (Bishop, Liberman, Cook, Purcell and Reynolds)
J. A. Adams - NESCO
D. Smithpeter - BPA
V. Nerses - NRC
A. A. Tuzes - CE
WNP-3 Files

Status and Schedule

of Responses to NRC

Safety Review Questions

04/27/84

DIVISION OF LICENSING

Acceptance Review - 08/20/82

100.1	Partial Re-mainder Not Scheduled	
*100.2	Complete	01/17/83
100.3	Complete	10/22/82
100.4	Complete	10/22/82

MECHANICAL ENGINEERING BRANCH

Acceptance Review - 08/20/82

210.1	Complete	10/22/82
210.2	Complete	10/22/82
210.3	Partial Re-mainder Not Scheduled	
210.4	Complete	01/17/83
*210.5	Complete	10/22/82
210.6	Complete	10/22/82
210.7	Complete	10/22/82

Stiff Clamps - 06/25/82

210.1	Complete	07/30/82
*210.2	Complete	07/30/82
*210.3	Complete	07/30/82
210.4	Complete	07/30/82
210.5	Complete	07/30/82
*210.6	Complete	07/30/82
210.7	Complete	07/30/82
210.8	Complete	07/30/82
210.9	Complete	07/30/82
210.10	Complete	07/30/82
*210.11	Complete	07/30/82
210.12	Complete	07/30/82
210.13	Complete	09/14/82

Stiff Clamps - 04/04/83

210.14	Complete	06/15/83
210.15	Complete	06/15/83
210.16	Not Scheduled	
210.17	Complete	06/15/83
210.18	Complete	06/15/83
210.19	Complete	06/15/83
210.20	Complete	06/15/83

STRUCTURAL ENGINEERING BRANCH

Acceptance Review - 08/20/82

220.1	Complete	10/22/82
220.2	Complete	10/22/82
220.3	Complete	10/22/82
220.4	Complete	10/22/82
220.5	Complete	10/22/82
220.6	Complete	10/22/82
220.7	Complete	10/22/82
220.8	Complete	01/17/83
220.9	Complete	10/22/82

Round One - 05/03/83

220.10	Complete	09/02/83
220.11	Complete	09/02/83
220.12	Complete	09/02/83
220.13	Complete	04/06/84
220.14	Complete	09/02/83
220.15	Complete	04/06/84
220.16	Complete	04/06/84
220.17	Complete	09/02/83
220.18	Complete	01/17/84
220.19	Partial Re-mainder Not Scheduled	
220.20	Complete	09/02/83
220.21	Complete	09/02/83
220.22	Scheduled	05/18/84
220.23	Complete	09/02/83
220.24	Complete	09/02/83
*220.25	Complete	01/17/84
220.26	Complete	01/17/84
220.27	Complete	09/02/83
220.28	Complete	09/02/83
220.29	Complete	09/02/83
220.30	Complete	01/17/84
220.31	Complete	09/02/83
220.32	Complete	09/02/83
220.33	Complete	07/15/83
220.34	Complete	09/02/83
220.35	Complete	09/02/83
220.36	Complete	09/02/83
220.37	Complete	01/17/84
220.38	Complete	09/02/83

STRUCTURAL ENGINEERING BRANCH (Cont'd)

Audit - 11/02/83

Item 1	Scheduled	05/18/84
Item 2	Complete	11/02/83
Item 3	Complete	11/02/83
Item 4	Scheduled	12/31/84
*Item 5	Scheduled	05/18/84
Item 6	Complete	11/02/83
*Item 7	Complete	11/02/83
*Item 8	Complete	11/02/83
Item 9	Complete	11/03/83
Item 10	Complete	11/02/83
*Item 11	Complete	11/02/83
Item 12	Scheduled	05/18/84
Item 13	Complete	11/02/83
Item 14	Scheduled	05/18/84
Item 15	Scheduled	05/18/84
Item 16	Complete	11/02/83
Item 17	Scheduled	05/18/84
Item 18	Scheduled	05/18/84
Item 19	Scheduled	05/18/84
Item 20	Scheduled	05/18/84
Item 21	Scheduled	05/18/84
Item 22	Scheduled	05/18/84
Item 23	Scheduled	05/18/84
Item 24	Scheduled	05/18/84
Item 25	Scheduled	05/18/84

GEOSCIENCES BRANCH-SEISMOLOGY

Round One - 05/03/83

230.1	Not Scheduled
230.2	Not Scheduled
230.3	Not Scheduled
230.4	Not Scheduled
230.5	Not Scheduled
230.6	Not Scheduled

GEOSCIENCES BRANCH-GEOLOGY

Round One - 05/03/83

231.1	Not Scheduled
231.2	Not Scheduled
231.3	Not Scheduled
231.4	Not Scheduled
231.5	Not Scheduled
231.6	Not Scheduled
231.7	Not Scheduled

HYDROLOGIC AND GEOTECHNICAL ENGINEERING BRANCH-HYDROLOGICAL

Acceptance Review - 08/20/82

240.1	Complete	11/30/82

Round One - 07/08/83

240.2	Complete	03/07/84
240.3	Complete	03/07/84
240.4	Complete	04/27/84
240.5	Complete	04/06/84
240.6	Complete	04/06/84
240.7	Complete	04/06/84
240.8	Complete	03/07/84
240.9	Complete	04/06/84
240.10	Complete	04/06/84
240.11	Complete	04/06/84
240.12	Complete	04/06/84
240.13	Complete	03/07/84
240.14	Complete	03/07/84

HYDROLOGIC AND GEOTECHNICAL ENGINEERING BRANCH-GEOTECHNICAL

Acceptance Review - 08/20/82

241.1	Complete	10/22/82
241.2	Complete	10/22/82
241.3	Complete	10/22/82
241.4	Complete	10/22/82
241.5	Complete	10/22/82
241.6	Complete	02/03/83
241.7	Complete	10/22/82
241.8	Complete	10/22/82
241.9	Complete	10/22/82
241.10	Complete	10/22/82
*241.11	Complete	10/22/82

Round One - 04/12/83

241.12	Complete	07/15/83
241.13	Complete	07/15/83
241.14	Complete	07/15/83
241.15	Complete	07/15/83
241.16	Complete	07/15/83
241.17	Complete	07/15/83
241.18	Complete	09/02/83
241.19	Complete	09/02/83
241.20	Complete	01/17/84
241.21	Complete	09/02/83
241.22	Complete	09/02/83
241.23	Complete	11/03/83
241.24	Complete	09/02/83
241.25	Complete	09/02/83

MATERIALS ENGINEERING BRANCH-INSERVICE INSPECTION

Acceptance Review - 08/20/82

250.1	Complete	10/22/82
250.2	[Not Used]	
250.3	Complete	10/22/82

QUALITY ASSURANCE BRANCH

Round One - 05/03/83

260.0	Complete	04/06/84

QUALITY ASSURANCE BRANCH (Cont'd)

Round One - 10/17/83

*260.1	Complete	04/06/84

EQUIPMENT QUALIFICATION BRANCH-ENVIRONMENTAL

Acceptance Review - 08/20/82

270.1	Partial Remainder not Scheduled	
270.2	Complete	02/03/83

EQUIPMENT QUALIFICATION BRANCH-SEISMIC

Acceptance Review - 08/20/82

271.1	Partial Remainder not Scheduled	

CHEMICAL ENGINEERING BRANCH-FIRE PROTECTION

Acceptance Review - 08/20/82

280.1	Complete	10/22/82
280.2	Complete	10/22/82
280.3	Complete	10/22/82
*280.4	Partial Remainder not Scheduled	
*280.5	Complete	10/22/82

CHEMICAL ENGINEERING BRANCH-CHEMICAL

Acceptance Review - 08/20/82

281.1	Complete	03/07/84
281.2	Complete	10/22/82
281.3	Complete	10/22/82
281.4	Not Scheduled	

Round One - 04/12/83

281.5	Complete	07/15/83
*281.6	Complete	01/17/84
281.7	Partial Remainder Not Scheduled	
281.8	Complete	07/15/83
281.9	Complete	07/15/83
281.10	Complete	07/15/83
281.11	Complete	07/15/83
281.12	Complete	07/15/83
281.13	Complete	09/02/83
281.14	Partial Remainder Not Scheduled	
281.15	Complete	07/15/83
281.16	Complete	09/02/83
281.17	Complete	09/02/83

SITING ANALYSIS BRANCH-SITE IMPACT

Acceptance Review - 08/20/82

311.1	Complete	10/22/82
311.2	Complete	10/22/82
311.3	Complete	01/17/84

EFFLUENT TREATMENT SYSTEMS BRANCH

Round One - 04/12/83

321.1	Complete	09/02/83
321.2	Complete	09/02/83
321.3	Complete	04/06/84
321.4	Complete	09/02/83
321.5	Complete	07/15/83
321.6	Complete	09/02/83

AUXILIARY SYSTEMS BRANCH

Acceptance Review - 08/20/82

410.1	Complete	10/22/82
410.2	Complete	02/03/83
410.3	Not Scheduled	
410.4	Not Scheduled	
410.5	Complete	10/22/82
410.6	Complete	10/22/82
410.7	Complete	01/17/83
410.8	Complete	03/24/83
410.9	Complete	10/22/82
410.10	Complete	10/22/82
410.11	Complete	10/22/82
410.12	Complete	02/03/83
410.13	Complete	10/22/82
410.14	Not Scheduled	

AUXILIARY SYSTEMS BRANCH
(Cont'd)

Round One - 04/12/83

410.15	Complete	07/15/83
410.16	Partial Remainder Not Scheduled	
410.17	Complete	09/02/83
410.18	Complete	09/02/83
410.19	Complete	09/02/83
410.20	Complete	03/07/84
410.21	Partial Remainder Not Scheduled	
410.22	Complete	04/06/84
410.23	Complete	07/15/83
410.24	Complete	09/02/83
410.25	Complete	09/02/83
410.26	Partial Remainder not Scheduled	04/06/84
410.27	Complete	07/15/83
410.28	Complete	07/15/83
410.29	Complete	09/02/83
410.30	Complete	09/02/83
410.31	Complete	11/03/83
410.32	Complete	09/02/83
410.33	Complete	07/15/83
410.34	Not Scheduled	
410.35	Complete	09/02/83
410.36	Complete	09/02/83
410.37	Complete	07/15/83
410.38	Complete	09/02/83
410.39	Complete	03/07/84
410.40	Complete	01/17/84
410.41	Complete	07/15/83
410.42	Complete	03/07/84
*410.43	Complete	07/15/83
410.44	Complete	07/15/83
410.45	Complete	09/02/83
410.46	Complete	07/15/83
410.47	Complete	09/02/83
410.48	Complete	07/15/83
410.49	Complete	07/15/83
410.50	Complete	09/02/83
410.51	Complete	07/15/83
410.52	Complete	09/02/83
*410.53	Complete	04/06/84

INSTRUMENTATION AND CONTROL SYSTEMS BRANCH

Acceptance Review - 08/20/82

421.1	Complete	02/03/83
421.2	Complete	10/22/82

POWER SYSTEMS BRANCH

Acceptance Review - 08/20/82

430.1	Complete	10/22/82
430.2	Complete	10/22/82

Round One - 05/03/83

430.3	Complete	09/02/83
430.4	Complete	09/02/83
430.5	Complete	09/02/83
430.6	Complete	09/02/83
430.7	Complete	09/02/83
430.8	Complete	09/02/83
430.9	Complete	09/02/83
430.10	Complete	09/02/83
430.11	Complete	04/27/84
430.12	Complete	09/02/83
430.13	Complete	09/02/83
*430.14	Complete	03/07/84
430.15	Complete	09/02/83
430.16	Complete	09/02/83
*430.17	Complete	07/15/83
430.18	Complete	09/02/83
430.19	Complete	09/02/83
430.20	Complete	09/02/83
430.21	Complete	11/22/83
430.22	Complete	09/02/83
*430.23	Complete	01/17/84
430.24	Complete	09/02/83
430.25	Complete	09/02/83
*430.26	Complete	04/27/84
430.27	Complete	04/27/84
430.28	Complete	04/27/84
*430.29	Complete	04/27/84
430.30	Complete	04/27/84
430.31	Complete	04/27/84
430.32	Complete	09/02/83
430.33	Complete	04/27/84
430.34	Complete	09/02/83
430.35	Complete	09/02/83
430.36	Complete	11/22/83
430.37	Complete	11/22/83
430.38	Complete	04/27/84
430.39	Complete	04/27/84
430.40	Complete	09/02/83
430.41	Complete	09/02/83
430.42	Complete	04/27/84
430.43	Complete	04/27/84
430.44	Complete	04/27/84
*430.45	Complete	04/27/84

POWER SYSTEMS BRANCH (Cont'd)

Round One - 05/03/83 (Cont'd)

430.46	Complete	04/27/84
430.47	Complete	04/27/84
430.48	Complete	04/27/84
430.49	Complete	09/02/83
430.50	Complete	04/27/84
430.51	Complete	09/02/83
430.52	Not Scheduled	
430.53	Not Scheduled	
430.54	Complete	09/02/83
430.55	Complete	09/02/83
430.56	Complete	09/02/83
430.57	Complete	09/02/83
430.58	Not Scheduled	
430.59	Complete	04/27/84
430.60	Complete	09/02/83
430.61	Complete	11/22/83
430.62	Complete	09/02/83
430.63	Complete	09/02/83
430.64	Complete	11/22/83
430.65	Complete	09/02/83
430.66	Complete	09/02/83
430.67	Complete	09/02/83
430.68	Complete	09/02/83

POWER SYSTEMS BRANCH
(Cont'd)

Round One - 05/11/83

430.69	Complete	04/06/84
430.70	Complete	04/06/84
430.71	Not Scheduled	
430.72	Not Scheduled	
430.73	Complete	04/06/84
430.74	Not Scheduled	
430.75	Not Scheduled	
430.76	Complete	03/07/84
430.77	Not Scheduled	
430.78	Not Scheduled	
430.79	Not Scheduled	
430.80	Not Scheduled	
430.81	Not Scheduled	
430.82	Partial Remainder not Scheduled	
430.83	Not Scheduled	
430.84	Complete	04/27/84
430.85	Not Scheduled	
430.86	Complete	04/06/84
430.87	Complete	04/06/84
430.88	Complete	04/06/84
430.89	Not Scheduled	
430.90	Not Scheduled	
430.91	Not Scheduled	
430.92	Not Scheduled	
430.93	Not Scheduled	
430.94	Complete	04/06/84
430.95	Complete	04/06/84
430.96	Not Scheduled	
*430.97	Complete	04/06/84
430.98	Not Scheduled	

REACTOR SYSTEMS BRANCH

Acceptance Review - 08/20/82

440.1	Complete	01/17/83

REACTOR SYSTEMS BRANCH
(Cont'd)

Round One - 05/11/83

440.2	Not Scheduled	
440.3	Not Scheduled	
440.4	Not Scheduled	
440.5	Complete	03/07/84
440.6	Not Scheduled	
440.7	Not Scheduled	
440.8	Not Scheduled	
440.9	Not Scheduled	
440.10	Not Scheduled	
440.11	Not Scheduled	
440.12	Not Scheduled	
440.13	Not Scheduled	
440.14	Not Scheduled	
440.15	Not Scheduled	
440.16	Not Scheduled	
440.17	Not Scheduled	
440.18	Not Scheduled	
440.19	Not Scheduled	
440.20	Not Scheduled	
440.21	Not Scheduled	
440.22	Not Scheduled	
440.23	Not Scheduled	
440.24	Not Scheduled	
440.25	Not Scheduled	
440.26	Not Scheduled	
440.[illegible]	Not Scheduled	
440.28	Not Scheduled	
440.29	Not Scheduled	
440.30	Not Scheduled	
440.31	Not Scheduled	
440.32	Not Scheduled	
440.33	Not Scheduled	
440.34	Not Scheduled	

ACCIDENT EVALUATION BRANCH-SYS. AND RAD. ANALYSIS

Round One - 04/12/83

450.1	Complete	03/07/84
450.2	Complete	07/15/83
450.3	Complete	07/15/83
450.4	Complete	09/02/83
450.5	Complete	11/03/83
450.6	Complete	11/22/83
450.7	Complete	09/02/83
450.8	Complete	04/06/84
450.9	Complete	09/02/83
450.10	Complete	11/03/83
450.11	Complete	09/02/83
450.12	Complete	11/22/83

ACCIDENT EVALUATION BRANCH-METEOROLOGY

Acceptance Review - 08/20/82

451.1	Complete	10/22/82
451.2	Complete	10/22/82

Round One - 04/12/83

*451.3	Complete	07/15/83
451.4	Complete	09/02/83
451.5	Complete	07/15/83
*451.6	Complete	04/06/84
451.7	Complete	07/15/83

EFFLUENT TREATMENT SYSTEMS BRANCH

Acceptance Review - 08/20/82

460.1	Complete	11/22/83

RADIOLOGICAL ASSESSMENT BRANCH-RADIATION PROTECTION

Acceptance Review - 08/20/82

471.1	Complete	01/17/84
471.2	Complete	10/22/82
471.3	Complete	10/22/82
471.4	Complete	10/22/82
471.5	Complete	10/22/82
471.6	Complete	11/22/83
471.7	Complete	10/22/82
471.8	Complete	10/22/82
471.9	[Not Used]	

Round One - 04/12/83

471.10	Complete	07/15/83
471.11	Complete	09/02/83
*471.12	Complete	01/17/84
471.13	Complete	09/02/83
471.14	Not Scheduled	
471.15	Complete	09/02/83
471.16	Complete	09/02/83
471.17	Complete	07/15/83
*471.18	Complete	07/15/83
471.19	Complete	09/02/83
471.20	Complete	11/03/83
471.21	Complete	03/07/84
471.22	Complete	09/02/83
471.23	Complete	01/17/84
471.24	Complete	07/15/83
471.25	Complete	01/17/84

CONTAINMENT SYSTEMS BRANCH

Acceptance Review - 08/20/82

480.1	Complete	10/22/82
480.2	Complete	01/17/83
480.3	Not Scheduled	
480.4	Complete	10/22/82
480.5	Partial Remainder Not Scheduled	
480.6	Partial Remainder Not Scheduled	

CONTAINMENT SYSTEMS BRANCH (Cont'd)

Round One - 05/03/83

480.7	Complete	09/02/83
480.8	Complete	09/02/83
480.9	Complete	04/06/84
480.10	Complete	09/02/83
480.11	Complete	09/02/83
480.12	Complete	01/17/84
480.13	Complete	11/22/83
480.14	Complete	09/02/83
480.15	Complete	09/02/83
480.16	Not Scheduled	
480.17	Complete	11/22/83
480.18	Complete	11/22/83
*480.19	Complete	03/07/84
480.20	Complete	04/06/84
480.21	Complete	11/22/83
480.22	Complete	11/03/83
480.23	Complete	09/02/83
480.24	Complete	01/17/84
480.25	Complete	09/02/83
480.26	Complete	01/17/84

CORE PERFORMANCE BRANCH-FUELS

Acceptance Review - 08/20/82

490.1	Not Scheduled	

Round One - 05/03/83

490.2	Not Scheduled	

CORE PERFORMANCE BRANCH-THERMAL HYDRAULICS

Round One - 05/03/83

492.1	Complete	09/02/83
492.2	Partial Remainder not Scheduled	
*492.3	Complete	04/06/84

HUMAN FACTORS ENGINEERING BRANCH

Acceptance Review - 08/20/82

620.1	Complete	10/22/82

LICENSEE QUALIFICATIONS BRANCH

Acceptance Review - 08/20/82

630.1	Complete	10/22/82
630.2	Complete	10/22/82

Round One - 04/12/83

630.3	Complete	07/15/83
630.4	Partial Remainder Not Scheduled	
630.5	Complete	09/02/83
630.6	Complete	09/02/83
630.7	Complete	07/15/83
630.8	Complete	07/15/83
630.9	Complete	09/02/83
*630.10	Complete	09/02/83
630.11	Complete	09/02/83
630.12	Complete	07/15/83

PROCEDURES AND TEST REVIEW BRANCH

Acceptance Review - 08/20/82

*640.1	Complete	10/22/82
*640.2	Complete	10/22/82
*640.3	Complete	10/22/82

PROCEDURES AND TEST REVIEW BRANCH (Cont'd)

Round One - 06/01/83

640.1	Complete	09/02/83
640.2	Complete	09/02/83
640.3	Complete	09/02/83
640.4	Complete	09/02/83
640.5	Complete	09/02/83
640.6	Complete	09/02/83
640.7	Complete	09/02/83
640.8	Complete	09/02/83
640.9	Complete	09/02/83
640.10	Complete	09/02/83
640.11	Complete	09/02/83
640.12	Complete	09/02/83
640.13	Complete	09/02/83
640.14	Complete	11/03/83
640.15	Complete	11/03/83

Round One - 10/14/83

640.16 Not Scheduled

GENERIC ISSUES BRANCH

Round One - 06/01/83

730.0 Not Scheduled

EMERGENCY PREPAREDNESS LICENSING BRANCH

Acceptance Review - 08/20/82

810.1 Not Scheduled

ACCEPTANCE REVIEW LETTER ENCLOSURE 4

Acceptance Review - 08/20/82

1	Complete	02/03/83
2	Not Scheduled	
3	Complete	04/06/84
4	Complete	10/22/82
*5	Complete	04/06/84
*6	Complete	01/17/83
7	Complete	10/22/82
8	Not Scheduled	
9	Not Scheduled	
*10	Partial Remainder Not Scheduled	
11	Complete	04/06/84
12	Complete	10/22/82
13	Complete	10/22/82
*14	Complete	10/22/82

*Response to question resulted in further commitment.

Question No.

240.04 FSAR 2.4.2.3 SRP 2.4.2

You state that roofs of safety-related structures generally have parapets 12 inches above the roof high points and 18 inches above the low points. You then state that one roof section located adjacent to the Steam Tunnel at elevation 417.5 ft MSL is surrounded by walls to elevation 443.5 ft MSL. Is this the only roof that does not have parapet walls 12 to 18 inches above the roof? If not, identify all other structures that do not meet this design criterion and describe how roofs were designed to withstand to local PMP.

Response

The roofs of all safety related structures have parapets 12 inches above the roof high point, and a maximum of 18 inches above the roof low points.

The only exception is the two roof sections adjacent to the Steam Tunnels at elevation 417.5 ft MSL, as outlined in the FSAR Subsection 2.4.2.3, Page 2.4-21.

Question No.

430.11 (SRP 9.5.4) The FSAR does not adequately address piping classification in the fuel oil storage and transfer system. Revise the FSAR (Section 9.5.4.2.4) to state what piping conforms to ASME Section III, and what piping conforms to ANSI B31.1. Indicate piping classifications on Fig. 9.5.4-1, and identify all interfaces where there is a change of classification.

Response

Section 9.5.4.2.4 and Figure 9.5.4-1 will be revised as shown to more clearly indicate the piping design classifications.

9.5.4.2.4 Piping and Tanks

Piping lines conform to pressure and temperature requirements outlined in American National Standards Institute (ANSI) B31.1 or American Society of Mechanical Engineers (ASME) Section III, Class 3. Insert A

Process lines less than 2-1/2 inches in diameter are schedule 80 pipe, while lines 2-1/2 inches and larger are schedule 40.

All valves are carbon steel. Valves less than 2-1/2 inches in diameter have 600 lbs ANSI rating, valves 2-1/2 inches in diameter and larger have 150 lbs. ANSI rating.

9.5.4.3 Safety Evaluation

The diesel generator fuel oil storage and transfer system safety evaluation is as follows:

The diesel generator fuel oil storage and transfer system provides two independent sources of diesel fuel oil supply having a low heating value (LHV) of approximately 19,000 Btu/lb.

The capacity of each of the DGFOSTS storage tank is sufficient for seven day operation plus a seven percent margin of each of the diesel generators, at the highest actual operating load. Thus, a 14-day total plus a seven percent margin diesel fuel oil inventory is available for operation of one diesel generator during a complete loss of offsite electrical power. Within this period, offsite power is expected to be restored and additional fuel can be delivered to the plant site.

The system components are of seismic Category I design and are installed within the confines of Category I structures. The diesel oil storage tanks and day tanks are located in separate cubicles and surrounded by a barrier with a minimum fire rating of 3 hours. 2

Complete physical redundancy of mechanical and electrical components is provided in the DGFOSTS, to assure it can withstand any single failure of an active component. Although any failure may result in loss of fuel to one diesel generator, the other diesel generator can provide sufficient capacity for emergency conditions, including safe shutdown of the reactor coincident with loss of offsite power. Electrical power is supplied through two separate engineered safeguard features channels so a single failure will not result in loss of independent sources of fuel supply. A failure mode and effects analysis of the DGFOSTS is presented in Table 9.5.4-3.

Each diesel generator fuel oil storage tank is provided with a distribution pipe inside the tank as shown on Figure 9.5.4-1 to minimize creation of turbulence of the sediment on the bottom of the fuel oil storage tank.

Question No.

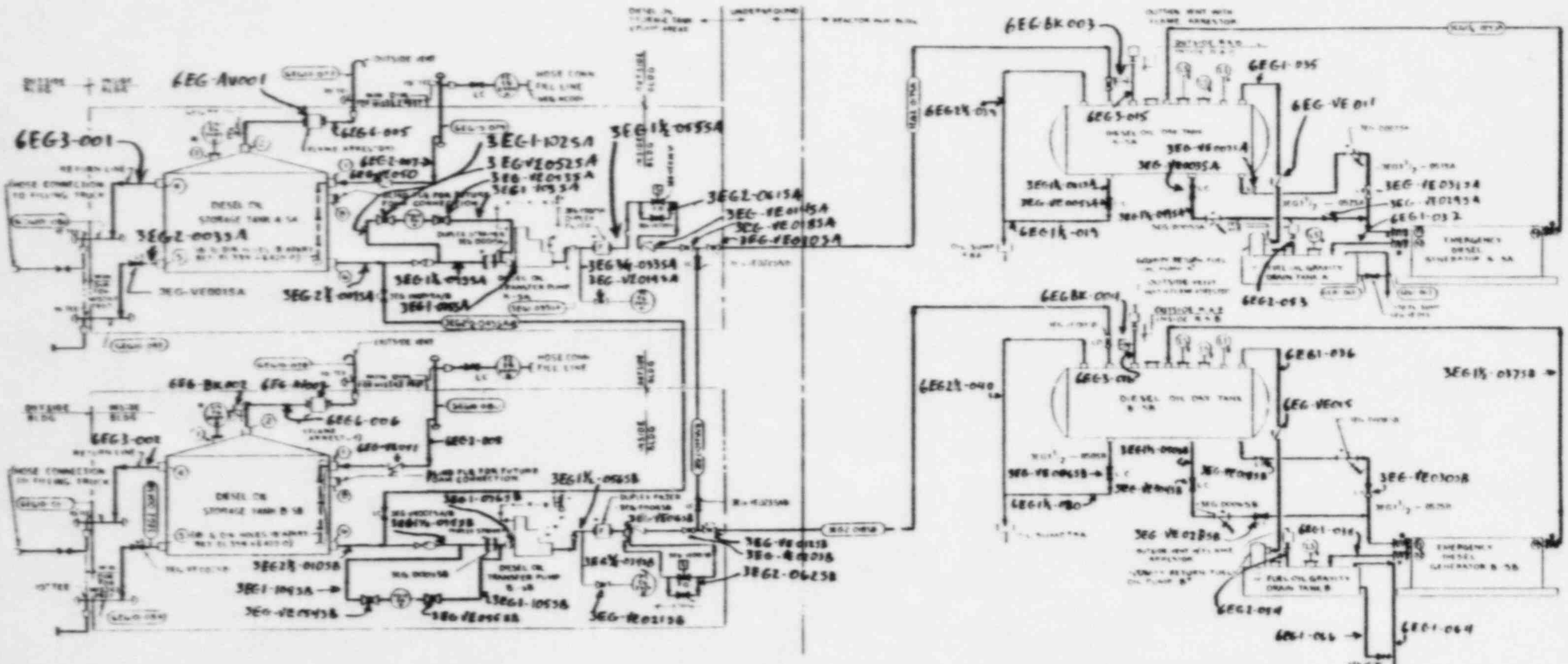
430.11
Response (Cont'd)

INSERT A

The diesel fuel oil storage tanks and day tanks are designed in accordance with ASME III Class 3 requirements. The diesel fuel oil gravity drain tanks are designed to ANSI B31.1 requirements since they are not essential for the operation of the diesel. The diesel fuel oil gravity drain tanks are, however, seismically analyzed.

All essential pressure retaining portions of the diesel fuel oil storage and transfer systems are designed to ASME Section III Class III requirements as shown in Figure 9.5.4-1.

The piping connected to the diesel fuel oil gravity drain tanks are designed to ANSI B31.1 requirements as are all nonessential portions of the diesel fuel storage and transfer system shown in Figure 9.5.4-1. These nonessential portions of the diesel fuel oil transfer system are however seismically supported.



EMERGENCY DIESEL GENERATOR LUBE OIL MAKE-UP SYSTEM

NOTE: LEGEND LISTED ON FIGURE 1.7.2.1

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AMENDMENT NO. 4 (12/83)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
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DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

FIGURE 9.5.4-1

Question No.

430.26 (SRP 9.5.5) You state in Section 9.5.5.2 the diesel engine cooling water is treated as appropriate to minimize corrosion. Provide additional details of your proposed diesel engine cooling water system chemical treatment, and discuss how your proposed treatment complies with the engine manufacturer's recommendations. Also, provide a discussion of the testing program you will implement to ensure proper cooling water chemistry and how you will maintain a clean cooling water system free of chemical sludge deposits.

Response

The water fill and makeup for the coolant solution for the diesel engine will be maintained within the following limits as prescribed by the equipment manufacturer:

	Not to Exceed Parts per million	Not to Exceed Grains per million
1) pH 8.5 to 9.5		
2) Total hardness as $CaCO_3$(max)	50	3
3) Chlorides (max)	50	3
4) Total dissolved solids (max)	150	8.7

The manufacturer recommends the addition of a borate-nitrite type corrosion inhibitor to the solution.

Diesel engine cooling water will be treated with NALCO 2100 RED, a boronitrite compound, to reduce corrosion rates. Colt Industries, the engine supplier, requires only that the inhibitor be procured from a reputable vendor normally engaged in such supply.

The cooling water will be checked for clarity and sludge buildup and analyzed for nitrite concentration once per month. Based on the manufacturers recommendations, the nitrite concentration will be maintained in the range of 1000 to 1500 ppm. The cooling water will be replaced or treated to remove suspended solids based on loss of clarity, greater than 10 ppm Total Suspended Solids, or sludge buildup.

Question No.

430.27 (SRP 9.5.5) Expand FSAR Table 9.5.5-1 to include the design margin excess heat removal capacity included in the design of the heat exchangers listed therein.

Response

The following are the design margins for the Diesel Generator Cooling Water System (DGCWS) intercooler heat exchanger and the DGCWS jacket water heat exchanger;

	OPERATING HEAT LOAD (BTU/HR)	DESIGN HEAT LOAD (BTU/HR)	DESIGN MARGIN %
Intercooler Water Exchanger	4,900,000	6,220,000	21%
Jacket Water Heat Exchanger	8,600,000	9,575,000	10%

FSAR Table 9.5.5-1 will be revised to include design and operating heat loads.

TABLE 9.5.5-1

DIESEL GENERATOR COOLING WATER EQUIPMENT DESIGN DATA

1. DGCWS Jacket Water Pump

Type	Centrifugal
Driver	Engine-Driven
Quantity/Engine	1
Total Dynamic Head, (TDH), ft	128
Design Flow, gpm	1354
Design Temp, F	0 to 200
Design Pressure, psi	150
Operating Temp, F	195
Seismic Category	I

2. DGCWS Jacket Water Heat Exchanger

Type	Horizontal Shell, Tube
Duty, BTU/Hr, DESIGN/OPERATING	9,575,000 / 8,600,000
Component Cooling Water Temp out, F	137
Component Cooling Water Flow Rate, gpm	2,300
Quantity/Engine	1
Seismic Category	I
Safety Classification	ASME Sec III

3. DGCWS Jacket Water Warmup Pump

Type	Centrifugal
Driver	Motor
Total Dynamic Head, (TDH), ft.	30
Flow, (gpm)	70
Quantity/Engine	1
Seismic Category	I
Motor Data	1 hp, 3 Phase, 60 Hz, 460V

4. DGCWS Jacket Water Temperature Control Valve

Type	Thermostatic Three-way Valve	
Quantity/Engine	1	
Temperature Valve Start to Open, F	165	1
Temperature Valve Full Open, F	180	
Seismic Category	I	
Safety Classification	ASME Section III	

5. DGCWS Jacket Warmup Heater

Type	Electric	
Regulator	Thermostatic Control	
Size, kW	75, 3 Phase, 60 Hz, 480V	1
Quantity/Engine	1	
Seismic Category	I	

TABLE 9.5.5-1 (Cont'd)

6. DGCWS Expansion Tank

Type	Horizontal Expansion
Tank volume, gal	100
Quantity/Engine	1
Design Pressure, psi	15
Design Temperature, F	0-200
Seismic Category	I
Safety Classification	ASME Sec III

7. DGCWS Intercooler Pump

Type	Centrifugal
Driver	Engine-Driven
Quantity/Engine	1
Total Dynamic Head (TDH), ft	128
Design Flow, gpm	1354
Design Temp, F	0-200
Design Pressure, psi	150
Operating Temp, F	195
Seismic Category	I

8. DGCWS Intercooler Heat Exchanger

Type	Horizontal Shell, Tube Type
Duty, BTU/Hr DESIGN/OPERATING	6,220,000 / 4,900,000
Comp Cooling Water Inlet Temp, F	120
Comp Cooling Water Flow Rate, gpm	2,200
Quantity/Engine	1
Seismic Category	I
Safety Classification	ASME Sec III

1

9. DGCWS Intercooler Temperature Control Valve

Type	Thermostatic Three-way Valve
Quantity/Engine	1
Temperature Valve Start to Open, F	95
Temperature Valve Full Open, F	110
Seismic Category	I
Safety Classification	ASME Sec III

Question No.

430.28 (SRP 9.5.5) In FSAR Section 9.5.5.2.2, you state "the location of the expansion tank ensures that the pump suction piping and most of the remaining system is initially filled with water." Expand your FSAR to provide clarification in this area. Is the expansion tank located higher than its associated diesel engine piping? Once trapped air has been displaced by the pump discharge, is there a possibility for air to enter the system again, or will the expansion tank positive head prevent air entering the system?

Response

The jacket water expansion tank center line is located 17' - 0" above the bottom of the diesel generator skid, per manufacturers recommendations, to preclude air from entering the system and to ensure that the make-up/surge line and associated engine mounted piping remain filled with water. The interconnecting pipe between the diesel generator skid and the jacket water expansion tank has been arranged to preclude traps or pockets thus allowing entrapped air to be vented during the initial filling operation.

FSAR Section 9.5.5.2.2 will be revised.

fuel injector nozzles it is directed to the expansion tank and then returns to the jacket water and intercooler systems through the pump surge lines. Block valves allow isolation of fuel injector nozzles for replacement without draining the major systems.

The Intercooler Water System also furnishes water to cool the alternator shaft outboard bearing.

The closed loop jacket water and intercooler water systems include an expansion tank with sufficient volume to provide for thermal expansion of the water and for minor leakages. ~~The location of the expansion tank ensures that the pump suction piping and most of the remaining system is initially filled with water. During startup, air trapped in the engine will be displaced by the pump discharge.~~ The expansion tank is sized for seven days of expected losses for continuous diesel operation.

Makeup water to the expansion tank of the DGCWS is provided by the safety-related condensate storage tank through the condensate makeup pump. A vacuum breaker is provided on the vent line of the tank to insure operation of the tank should the vent line become blocked. The expansion tank is sized for seven days of expected losses for continuous diesel operation.

In the event of loss of offsite power, the component cooling water system pumps, which supply cooling water to the diesel generator jacket water and intercooler heat exchangers, will begin operation automatically upon startup of the diesel engines.

The DGCWS will be protected from freezing and long-term corrosion by an Ethylene Glycol solution which will be maintained throughout the life of the unit. Since this is a closed system no organic fouling is expected. The design data for major components of this system is shown in Table 9.5.5-1 and the instrumentation and controls for this system are described in Section 7.4.

9.5.5.3 Safety Evaluation

The Diesel Generator Cooling Water System meets the single failure criterion in that if a failure of the system prevents the operation of its associated diesel generator, the remaining diesel generator will not be affected and will provide adequate power to safely shutdown the plant or to mitigate the effects of a LOCA during loss of offsite power conditions.

Failure of the non-safety portion of the system piping will not impact the operation of the system.

In the event of loss of offsite power, DGCWS pumps which supply cooling water to the heat exchangers will begin operation automatically upon startup of engines. Full flow of component cooling water will be available in 15 seconds.

A failure mode and effects analysis of the DGCWS is presented in Table 9.5.5-2.

The Jacket Water Expansion Tank Centerline is Located above the top of the Diesel Engine to Preclude Air from Entering the system and to ensure the make-up/Surge Line and associated Engine Mounted piping remain filled with water. The interconnecting pipe between the Diesel Generator Skid and the Jacket water Expansion tank has been arranged to preclude traps or pockets, thus allowing entrapped air to be vented during initial filling operations.

Question No.

430.29 (SRP 9.5.5) The diesel generators are required to start automatically on loss of all offsite power and in the event of a LOCA. The diesel generator sets should be capable of operation at less than full load for extended periods without degradation of performance or reliability. Should a LOCA occur with availability of off-site power, discuss the design provisions and other parameters that have been considered in the selection of the diesel generators to enable them to run unloaded (on standby) for extended periods without degradation of engine performance or reliability. Expand your FSAR to include and explicitly define the capability of your design with regard to this requirement.

Response

The operation of the engine at idle or light loads for extended periods of time is covered by a letter sent to the NRC dated September 11, 1975, from Colt Industries Operating Corp. (See Attached)

Colt Industries

Power Systems Division
701 Lawton Avenue
Beloit, Wisconsin 53511
608/364-4411

September 11, 1975

U.S. Nuclear Regulating Commission
Auxiliary & Power Conversion Systems Branch
Phillips Bldg.
7920 Norfolk Avenue
Bethesda, Md. 20014

Attention: Mr. Fred Clemenson

Dear Mr. Clemenson:

This letter is in reply to your verbal inquiry of our Mr. R. H. Beadle in regard to any problems that could be encountered or limitations we would impose on the operation of our engine generator sets for extended periods (up to 30 days - 720 hrs.) at various levels of load (from no load to full rated conditions) at rated speed for standby conditions. We have made a thorough restudy of this area and come to the following conclusions.

1. There exists no mechanical limitation within the engine or any of its supportive systems which would limit operation over extended periods of time at rated speed between no load and rated load with the exception of the possible accumulation of combustion and lube oil products in the exhaust system, at the lower loads.

2. This limitation can be overcome by the following method of operating the engine when it is necessary to keep it running over extended periods of time.

   a. For the PC2 model engine, we would suggest that if the engine were to be operated for periods of time extending over 24 hours and the loads were such that they did not exceed 20% of the engine rating, the engine should be run at above 50% load for at least one hour in each 24 hour period in order to minimize the accumulation of products of combustion and lubrication in the exhaust sytem. Above the 20% rating, the engine may be run continuously as required, with the recommendation that the engine parameters be monitored closely, and logged at least daily, so as to be able to discover any problems early. Changes in cylinder exhaust temperatures would be of particular interest.

   b. 8 1/8 OP models, the statement would read the same as for the PC2 models with the exception that the extended period should be 12 hours when the engine is operated from no load up to 30% load, with a one hour run at 50% load or greater, in each 12 hours. Above 30%

Q 430.29

load, the engine would require the same attention as indicated above for the Pielstick engine at above 20% load.

3. The consequences of allowing accumulation of combustion and lube oil products in the exhaust sytem would be primarily twofold:

   a. The possibility of fire hazard on resuming high load operation with exhaust temperatures above the flash point of the products accumulated.

   b. Fouling of the exhaust side of the turbochargers with probable effects on their performance and/or vibration due to upsetting the balance of the rotating assemblies.

4. We are including statements in the operating instruction manuals to cover this extended operation as indicated above.

5. We also recommend in our maintenance manuals, that there be an extensive inspection of the engine power parts after such extended operation to ascertain that all is in order and that the engine stays in readiness for further operations.

We hope this information will satisfy your needs. In the event you need further information, please contact the writer.

Very truly yours,

COLT INDUSTRIES OPERATING CORP.
FAIRBANKS MORSE ENGINE DIVISION

V. T. Stonehocker
Manager Systems Engineering

VTS:b

Q430.29

IE loads to be supplied by, and which are used in determining the ratings of, the diesel generators.

Each diesel generator is capable of starting and operating the required safety-related loads under postulated accident conditions. In addition, each generator has reserve capacity, which is the difference between the diesel generator rating and the total safety loads, so that some non-Class IE loads may be manually started at the discretion of the operator. Such additional loading is limited to those loads listed in the manual loading sequence of Table 8.3-2 up to the rated capacity of the diesel generators. A wattmeter, a varmeter, and an ammeter are provided for continuous indication of diesel generator loading. Administrative control will be exercised to prevent loading the diesel generators over their rated capacities. One line and logic diagrams for the diesel generators are shown on Figures 8.3-2 and 7.3-42 respectively.

The diesel generators have open self-ventilated, drip-proof frames, class F insulation system and are wye connected, synchronous type with static excitation systems, capable of carrying rated load continuously without exceeding the rated temperature rise at a 50C ambient. Each diesel generator is furnished with automatic field flashing equipment for quick voltage buildup during the startup sequence. Each diesel generator is designed for fast starting and load acceptance, with a high degree of availability and reliability.

Insert Paragraph

The automatic voltage regulators maintain output voltage within ± 0.5 percent of set voltage under steady state conditions between no load and full load.

Each diesel generator is provided with a preheat system which maintains adequate engine temperature to ensure quick starts. The preheat system includes a jacket coolant water heater and a lubricating oil heater and their associated circulating pumps. Interlocks are provided to de-energize the lubricating oil and jacket coolant water heaters upon starting of the diesel generator.

The details of the Engine Fuel Oil System, Cooling Water System, Starting Air System, Lubricating System and Combustion Air Intake and Exhaust System are covered in Subsections 9.5.4, 9.5.5, 9.5.6, 9.5.7 and 9.5.8 respectively. The ventilation system provided for the diesel generator rooms is described in Subsection 9.4.5.

Upon receipt of a starting signal each diesel generator unit is designed to start automatically, reach rated speed and rated voltage in 10 seconds, and accept loads in sequence as shown in Table 8.3-2 without exceeding the limitations of voltage drop and frequency variation as stipulated by Regulatory Guide 1.9.

The automatic or manual operation of the diesel generators and the monitoring of their performance is accomplished by instrumentation and control in two

Question No.

430.29

Response (Cont'd)

INSERT 1

The WNP-3 Diesel Generator is capable of operation at no load or light load conditions for extended periods of time with no degradation of performance or reliability. This includes the case of a LOCA with off-site power available. The only mechanical limitation during this type of operation is the possiblity of an accumulation of unburned combustion and lube oil products in the exhaust system at lower engine loadings.

In order to ove.come this limitation the Engine manufacturer has recommended that the engine be run for at least 1 hour at 50% of rated load in each 24 hour period of continuous operation at or below 20% of rated capacity. The WNP-3 Operating Procedures will reflect this manufacturers recommendation.

Question No.

430.30 (SRP 9.5.5) Refer to FSAR Fig. 9.5.5-1 and 9.5.5-2. On 9.5.5-1, you show the expansion tank piping from the engine jacket water system to the engine skid boundary as non-ASME Section III. On the same figure, you also show the engine keep warm piping, between the normally open plug valves, as non-ASME Section III. This is not acceptable. We require all cooling water system piping, from the diesel engine interface out, to be ASME Section III, Class 3. Revise your design accordingly, or provide justification for noncomformance.

On both 9.5.5-1 and 9.5.5-2, you do not provide a classification for piping between the diesel engine skid and the expansion tank. We require that this piping also be ASME Section III, Class 3. Confirm that this piping meets this requirement, and revise FSAR Figs. 9.5.5-1 and 9.5.5-2 to show the piping classification. Also, provide a legend for the piping, valves, indication and instrumentation associated with the expansion tanks.

Response

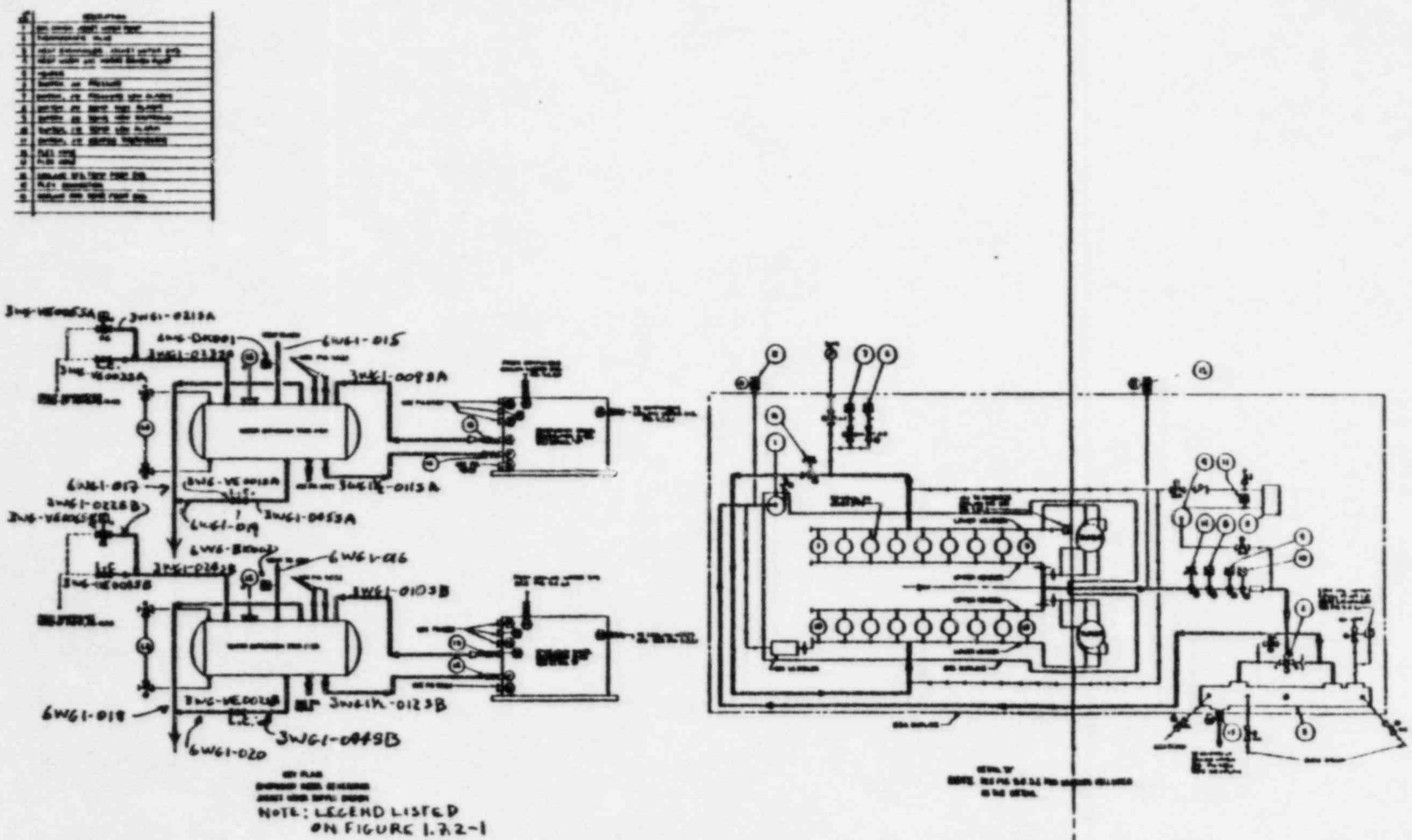
The piping between the jacket water expansion tank to the diesel generator skid interface points is designed to ASME III Class 3 requirements. FSAR Figure 9.5.5-1 and 9.5.5-2 will be revised to more clearly depict this.

Engine piping and components such as the cylinder heads, cylinder liners and jackets, etc., are made to the manufacturer's proprietary design requirements and are hydrostatically tested and manufactured in processes governed by Colt's NRC approved QA program. Such items can not be made to ASME or ANSI requirements due to the nature of their design.

The keepwarm pump and heater and immediately associated piping are made to the requirements of ANSI B.31 and are not ASME Section III code items due to their unavailability.

All other vendor supplied piping and mechanical components within this system, are designed and fabricated to ASME III Class 3 requirements.

All of the components and system piping are seismically qualified.



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JACKET WATER SUPPLY SYSTEM

FIGURE 9.5.5-1

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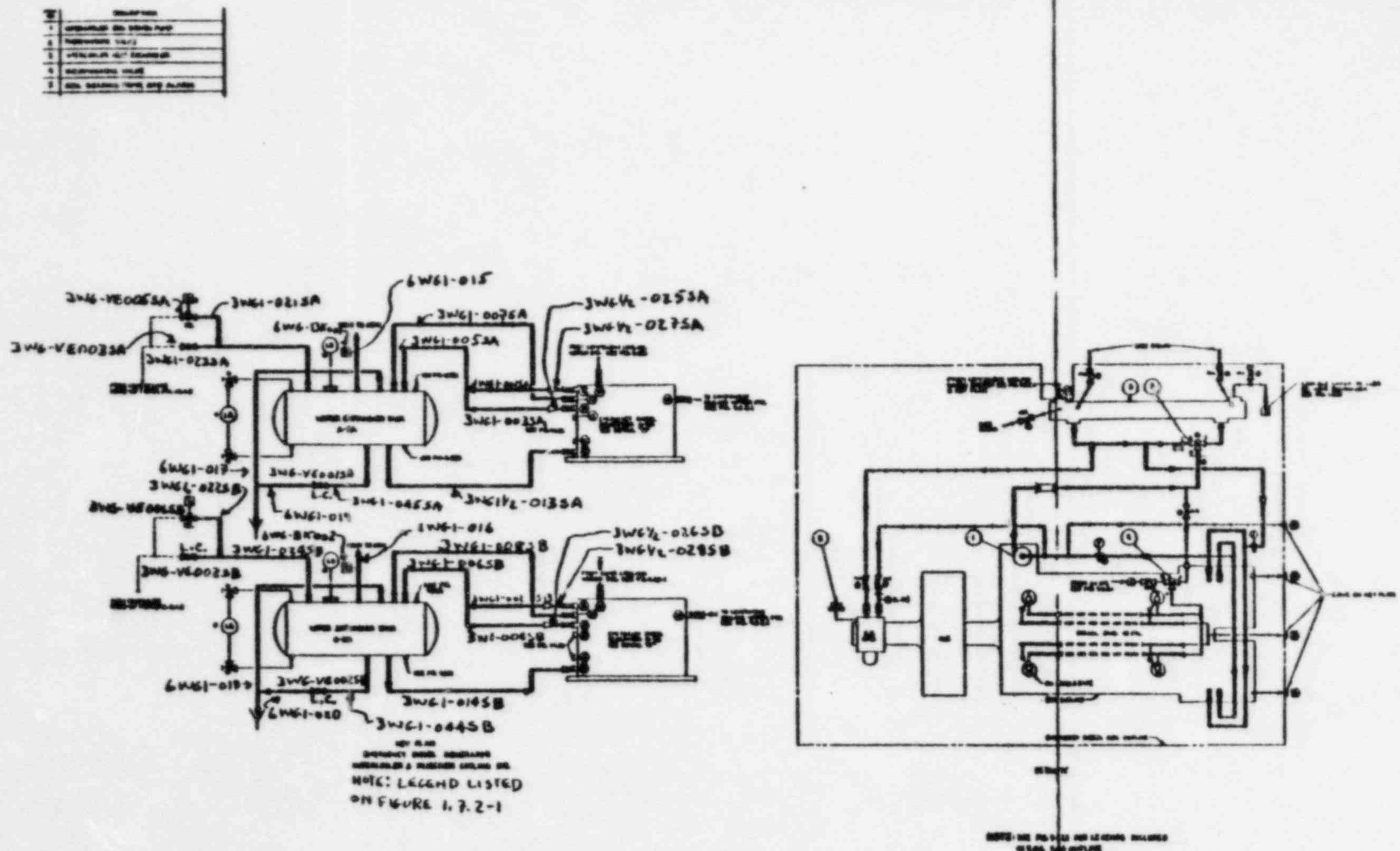

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INTERCOOLER & INJECTION COOLING SYSTEM

FIGURE 9.5.6-2

SCN 647

Question No.

430.31 (SRP 9.5.5, 9.5.6, 9.5.7, 9.5.8)

Recent licensee event reports have shown that tube leaks are being experienced in the heat exchangers of diesel engine jacket cooling water systems with resultant engine failure to start on demand. Provide a discussion of the means used to detect tube leakage and the corrective measures that will be taken. Include jacket water leakage into the lube oil system (standby mode), lube oil leakage into the jacket water (operating mode), jacket water leakage into the engine air intake and governor systems (operating or standby mode). Provide the permissable inleakage or outleakage in each of the above conditions which can be tolerated without degrading engine performance or causing engine failure. The discussion should also include the effects of jacket water/service water systems leakage.

Response

The three main heat exchangers on the diesel generator are procured to ASME Section III design and fabrication standards. They are hydrotested at pressures well above nominal operating pressures. The jacket water and component cooling water systems are tested and treated as required to minimize corrosion throughout the operating life of the plant.

Jacket water leakage into the lube oil system in the standby mode is not likely under the keepwarm system operating conditions. No common pressure boundary is shared at the main heat exchangers. In the operating mode, exposure to water in the lube oil is minimized by the separate rocker lube system. The separate rocker lube system provides lubrication in close proximity to sources of water (cylinder heads, rocker assemblies, etc.). Leakage of water into the rocker arm lube system would be detected by the high rocker arm tank level alarm and corrected before becoming detrimental to the rocker arm mechanism. In the unlikely event of jacket water leaking into the main lube system, a water detector is installed in the lube oil keep warm circulation system. The detector causes an alarm on the diesel generator panel and a trouble alarm in the control room upon detection of 2% or greater moisture in the lube oil. The lube oil circulates past the detector in both the keep warm and operational mode.

Generally, lube oil in the jacket water system has no detrimental effect on the engine. Presence of any lube oil in the water would be detected in the periodic sampling of the jacket water as noted in the response to NRC Question Number 430.26.

Question No.
430.31

Response (Cont'd)

Internal leakage between jacket water and component cooling water systems is unlikely to be detrimental to engine operation. The jacket water system makeup is from the condensate system and controlled by float switches in the expansion tank. Flow from component cooling to the jacket water system would cause overflow of the expansion tank to the floor drain. In either event, normal engine operation would continue.

Sufficient design margin is available in the heat exchangers to permit nominal plugging of leaking tubes.

Question No.

430.33 (SRP 9.5.5) Operating experience indicates that diesel engines have failed to start on demand due to water spraying on locally mounted electronic/electrical components in the diesel engine starting system. Describe what measures have been incorporated in the diesel engine electrical starting system to protect such electronic/electrical components from such potential environment.

Response

No starting failures of the diesel engine are anticipated due to possible water spraying on locally mounted electrical devices. All electrical/electronic components of the diesel starting system (such as pressure, temperature, level switches etc.) that are mounted on the diesel skid are housed in NEMA-4 water - and dusttight enclosures. On-skid terminal boxes for the interconnection wiring are NEMA-12 drip - and dusttight enclosures. For the control panels located in a separate room NEMA-12 enclosures are used. All wiring on the diesel skid is enclosed in conduits.

Question No.

430.38 (SRP 9.5.6) Diesel generators in many cases utilize air pressure or air flow devices to control diesel generator operation and/or emergency trip functions such as air operated overspeed trips. The air for these controls is normally supplied from the emergency diesel generator air starting system. Provide the following:

a) Expand your FSAR to discuss any diesel engine control functions supplied by the air starting system or any air systems. The discussion should include the mode of operation for the control function (air pressure and/or flow), a failure modes and effects analysis, and the necessary P&ID's to evaluate the system.

b) Since air systems are not completely air tight, there is a potential for slight leakage from the system. The air starting system uses a non-seismic air compressor to maintain air pressure in the seismic Category I air receivers during the standby condition. In case of an accident, a seismic event, and/or loop, the air in the air receivers is used to start the diesel engine. After the engine is started, the air starting system becomes non-essential to diesel generator operation unless the air system supplies air to the engine controls. In this case the controls must rely on the air stored in the air receivers, since the air compressor may not be available to maintain system pressure and/or flow. If your air starting system is used to control engine operation, with the compressor not available, show that a sufficient quantity of air will remain in the air receivers, following a diesel engine start, to control engine operations for a minimum of seven days assuming a reasonable leakage rate. If the air starting system is not used for engine control describe the air control system provided and provide assurance that it can perform for a period of seven days or longer.

Response

a) The diesel generator starting system is an integral part of the diesel generator package and is supplied by the diesel generator manufacturer. The arrangement of the DGSS is shown on Figure 9.5.6-1.

This item was completely addressed in the Supply System Response to NRC Question 430.34 transmitted via letter #G03-83-0711, dated September 2, 1983.

Question No.
430.38

Response (Cont'd)

b) The primary function of the air starting system is to start the diesel engine. Once the engine is started (running) no other control function is required to be supplied from the air start system that would be critical to the operation of the engine. The main air start system is used to charge an accumulator tank for a supply of air that is used to stop the engine. The accumulator holds enough air to stop the engine 5 to 7 times in the event that air from the starting air system was unavailable.

The only other use of the starting air is for an instrumentation function which is not essential to the operation of the diesel generator unit.

Question No.

430.39 (SRP 9.5.6) Refer to Fig. 9.5.6-1. Not all of the compressed air piping within the engine skid outline is shown as ASME Section III Class 3. This is not acceptable. We require all compressed air piping from the diesel engine interface out to be ASME Section III Class 3. Revise your design accordingly, or provide justification for non-conformance.

Response

All piping on the diesel engine skid is ASME III Class 3 piping with the exception of "On-Engine" piping and some small size instrumentation tubing.

The "On-Engine" piping and Non-ASME instrument tubing are made to Colt's proprietary design requirements and are manufactured with processes governed by Colt's NRC approved Quality Assurance Program. All of this system is seismically qualified and pressure tested.

Question No.

430.42 (SRP 9.5.7) Several fires have occurred at some operating plants in the area of the diesel engine exhaust manifold and inside the turbocharger housing which have resulted in equipment unavailability. The fires were started from lube oil leaking and accumulating on the engine exhaust manifold and accumulating and igniting inside the turbocharger housing. Accumulation of lube oil in these areas, on some engines, is apparently the result of continuous, or long periods of prelubrication prior to operating the diesel engine. Since the design of your diesel generator lubrication system calls for continuous prelubrication, expand your FSAR to show that oil will not accumulate in the exhaust manifolds and/or turbocharger housing, and will not create a fire hazard which would impair the diesel generator safety function.

Response

The source of combustible materials in the areas of concern most likely is the result of prolonged operation of an engine at idle or low loads. Operation of the engines in accordance with the Colt operating instructions and as indicated in the Response to NRC Question 430.29 will minimize the probability of the indicated problem.

The construction of this engine is such that the accumulation of lube oil in the exhaust manifold or turbocharger due to pre-lubrication is extremely remote if the engine is maintained in good order. The turbocharger has a self contained lubrication system and does not require pre-lubrication.

To protect the crankcase oil from contamination by possible cooling water and fuel leaks at the cylinder head upper deck level, the valve rockers are lubricated and drained by a separate rocker lube system. A crankcase evacuation system is provided to extract accumulated combustible gases in order to reduce the hazards of crankcase explosions. A number of explosion covers are provided on the diesel engine crankcase to permit controlled release of gases in the unlikely event of an explosion. A gear-type pump, mounted at the free end of the engine, is driven by the engine crankshaft. The pump draws oil from an engine-mounted reservoir and discharges under pressure through a duplex filter to a header. Pipes from the header feed each cylinder head rocker assembly with lube oil. Drain pipes return the oil through a drain header back to the reservoir. The system includes a small AC motor-driven pre-lubrication pump mounted on the engine. Alarms are provided for indicating low and high engine lube oil sump level.

The AC motor-driven pre-lubricating pump mounted on the diesel engine skid draws oil from the main sump through a suction strainer and discharges it through an electric heater and a 5 micron filter into the main lube system. For engine standby this system provides continuous pre-lubrication and filtering of the oil charge at the keep-warm temperature. During engine operation, the system is used for continuous filtration of the oil charge. On engine initial startup, the pump is used for filling the external system and for pre-lubrication of the engine. For maintenance operations, the auxiliary pump is used for draining the engine sump.
The construction of this engine is such that the accumulation of lube oil in the exhaust manifold or turbocharger due to prelubrication is extremely remote. The turbocharger has a self contained lubrication system and does not require prelubrication.
The cooling water for lube oil heater exchanger is provided by the component cooling water system through the diesel generator cooling water system.

The diesel generator lubrication system includes a safety-related lube oil makeup tank with the vent pipe routed outside of the RAB, and equipped with a flame arrestor, fill line, drain line, and overflow line. The lube oil makeup tank feeds the diesel engine sump by gravity through a safety-related solenoid valve which provides makeup for oil losses of the system during required emergency operation. A vacuum breaker is provided on the vent pipe of the tank to ensure operation of the tank in the event the vent pipe becomes blocked. The design data and classification for major components of this system is shown in Table 9.5.7-1. Instrumentation for the DGLS is described in FSAR Subsection 8.3.1.

9.5.7.2.1 Instrumentation and Controls

The instrumentation, controls, sensors and alarms provided for monitoring the Diesel Generator Lubrication System are as follows.

9.5.7.2.1.1 Water Detector

This detector is provided in the Prelube/Keepwarm System to detect the presence of water in the Lube Oil System. It is located in the line, on the inlet side of the lube oil filter. This detector will be set to detect the presence of two percent of water. When activated this detector will energize the annunciator. 4

Question No.

430.43 (SRP 9.5.7) Provide the source of power for the main prelube pump, the rocker prelube pump, and the lube oil heater. Expand your FSAR to include a detailed description of these components and their operation for 1) standby mode, 2) a diesel generator start sequence, and 3) during operation of the diesel generator.

Response

The source of power for the main prelube and the rocker prelube pumps for the emergency diesel generators 3A and 3B is provided from 480V, Class 1E Motor Control Centers (A323-SA adn B-323-SB respectively). The lube oil heaters are supplied from Non-Class 1E MCC's (A121 and B121).

Description of the Operation of Rocker Arm Prelube Pump - The Rocker Arm Prelube Pump is operated manually on a timed duration circuit. The pump can be operated by push-button switches mounted in a panel on the diesel skid, or remotely, at the engine control panel. The operator initiates operation by depressing one of the push buttons. Operation will be automatically terminated after 5 minutes (adjustable 3 to 30 min) by the timer circuit. The operator can terminate operation within the timed period by depressing the "Stop" push button. The pump cannot be operated (or operation will be terminated) if there is an emergency shutdown initiated on the engine.

The prelube pump will start and run automatically as a backup pump to the engine pump if there is a loss of rocker arm lube oil pressure while the engine is in operation. In this mode, the pump will shut off automatically when the engine is subsequently shutdown.

Description of the Operation of the Main Prelube (Lube Oil Keep warm Pump and Heater) - The item refers to "the main prelube pump", which Colt refers to as the keepwarm pump. While this pump does circulate lube oil thru the engine while it is shutdown, thus keeping it continuously prelubricated, its primary function is to keep the lube oil at a ready-to-start temperature to support the fast starting requirements. This pump also runs while the engine is running to circulate oil continuously thru the lube oil filter.

The lube oil keepwarm pump runs continuously, whether the engine is running, or not. The pump can be turned off manually, thru its circuit breaker, for maintenance purposes. The lube oil heater is operated automatically and is on as required by thermostatic demand when the engine is not running. It is shut off automatically when the engine is running and may be turned off manually. It is also interlocked with the pump control such that the heater will not turn on if the keep warm pump motor is not turned on.

FSAR Section 9.5.7.2 will be revised as shown to reflect the response to this question. Refer to the response to NRC Question 430.44 for the FSAR revision pertaining to the Rocker Arm Prelube Pump.

To protect the crankcase oil from contamination by possible cooling water and fuel leaks at the cylinder head upper deck level, the valve rockers are lubricated and drained by a separate rocker lube system. A crankcase evacuation system is provided to extract accumulated combustible gases in order to reduce the hazards of crankcase explosions. A number of explosion covers are provided on the diesel engine crankcase to permit controlled release of gases in the unlikely event of an explosion. A gear-type pump, mounted at the free end of the engine, is driven by the engine crankshaft. The pump draws oil from an engine-mounted reservoir and discharges under pressure through a duplex filter to a header. Pipes from the header feed each cylinder head rocker assembly with lube oil. Drain pipes return the oil through a drain header back to the reservoir. The system includes a small AC motor-driven pre-lubrication pump mounted on the engine. Alarms are provided for indicating low and high engine lube oil sump level.

The AC motor-driven pre-lubricating pump mounted on the diesel engine skid draws oil from the main sump through a suction strainer and discharges it through an electric heater and a 5 micron filter into the main lube system. ~~For engine standby this system provides continuous pre-lubrication and filtering of the oil charge at the keep-warm temperature. During engine operation, the system is used for continuous filtration of the oil charge.~~ "INSERT A" On engine initial startup, the pump is used for filling the external system ~~and for pre-lubrication of the engine~~. For maintenance operations, the auxiliary pump is used for draining the engine sump.

The cooling water for lube oil heater exchanger is provided by the component cooling water system through the diesel generator cooling water system.

The diesel generator lubrication system includes a safety-related lube oil makeup tank with the vent pipe routed outside of the RAB, and equipped with a flame arrestor, fill line, drain line, and overflow line. The lube oil makeup tank feeds the diesel engine sump by gravity through a safety-related solenoid valve which provides makeup for oil losses of the system during required emergency operation. A vacuum breaker is provided on the vent pipe of the tank to insure operation of the tank in the event the vent pipe becomes blocked. The design data and classification for major components of this system is shown in Table 9.5.7-1. Instrumentation for the DGLS is described in FSAR Subsection 8.3.1.

9.5.7.2.1 Instrumentation and Controls

The instrumentation, controls, sensors and alarms provided for monitoring the Diesel Generator Lubrication System are as follows.

9.5.7.2.1.1 Water Detector 4

This detector is provided in the Prelube/Keepwarm System to detect the presence of water in the Lube Oil System. It is located in the line, on the inlet side of the lube oil filter. This detector will be set to detect the presence of two percent of water. When activated this detector will energize the annunciator.

Question No.
430.43

Response (Cont'd)

INSERT A

While this pump does circulate lube oil thru the engine while it is shutdown, thus keeping it continuously prelubricated, its primary function is to keep the lube oil at a ready-to-start temperature to support the fast starting requirements. This pump also runs while the engine is running to circulate oil continuously thru the lube oil filter.

The lube oil prelubricating pump runs continuously, whether the engine is running, or not. The pump can be turned off manually, thru its circuit breaker, for maintenance purposes. The lube oil heater is operated automatically and is on as required by thermostatic demand when the engine is not running. It is shut off automatically when the engine is running and may be turned off manually. It is also interlocked with the pump control such that the heater will not turn on if the keepwarm pump motor is not turned on.

Question No.

430.44 (SRP 9.5.7) In the FSAR, you state that the valve rockers are lubricated by a separate rocker lube system to "protect the crankcase oil from contamination by possible cooling water and fuel leaks at the cylinder head upper deck level." Expand your FSAR to include a more detailed description of the rocker lube system. Explain how contamination from cooling water and fuel leaks does not degrade rocker lube oil quality to the extent it can no longer perform its function, thereby causing excessive wear and possible premature failure of the valve rockers. Describe how the presence of water and/or diesel fuel is detected in the rocker lube system.

Response

The rocker arm lubrication system consists of a tank, with a float valve and a level switch. Oil is admitted to the tank from the main lubrication system via the float valve. The system includes two pumps, one driven by the engine (thru a connection to the camshaft), and the other is motor driven. The motor driven pump is used for prelubrication and as a standby to the engine driven pump. For a description of the operation of the rocker arm prelube pump, see the response to NRC Question 430.43. The system is protected from overpressure. The pumps deliver lube oil from the tank to the rocker arm lube oil headers on each bank of the engine.

The lube oil headers deliver oil to the rocker arm assemblies in each cylinder head. After providing lubrication for these parts, the lube oil drains back into the rocker lube oil tank. In the event of a water or fuel oil leak in the cylinder head area, this fluid would also drain into the rocker lube oil tanks, but would result in an increase of the level of fluid in this system, which would, after enough had accumulated, be indicated by the high rocker lube oil level switch which is alarmed on the local annunciator.

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To protect the crankcase oil from contamination by possible cooling water and fuel leaks at the cylinder head upper deck level, the valve rockers are lubricated and drained by a separate rocker lube system. A crankcase evacuation system is provided to extract accumulated combustible gases in order to reduce the hazards of crankcase explosions. A number of explosion covers are provided on the diesel engine crankcase to permit controlled release of gases in the unlikely event of an explosion. "INSERT A" A gear-type pump, mounted at the free end of the engine, is driven by the engine crankshaft. The pump draws oil from an engine-mounted reservoir and discharges under pressure through a duplex filter to a header. Pipes from the header feed each cylinder head rocker assembly with lube oil. Drain pipes return the oil through a drain header back to the reservoir. The system includes a small AC motor-driven pre-lubrication pump mounted on the engine. Alarms are provided for indicating low and high engine lube oil sump level.

The AC motor-driven pre-lubricating pump mounted on the diesel engine skid draws oil from the main sump through a suction strainer and discharges it through an electric heater and a 5 micron filter into the main lube system. For engine standby this system provides continuous pre-lubrication and filtering of the oil charge at the keep-warm temperature. During engine operation, the system is used for continuous filtration of the oil charge. On engine initial startup, the pump is used for filling the external system and for pre-lubrication of the engine. For maintenance operations, the auxiliary pump is used for draining the engine sump.

The cooling water for lube oil heater exchanger is provided by the component cooling water system through the diesel generator cooling water system.

The diesel generator lubrication system includes a safety-related lube oil makeup tank with the vent pipe routed outside of the RAB, and equipped with a flame arrestor, fill line, drain line, and overflow line. The lube oil makeup tank feeds the diesel engine sump by gravity through a safety-related solenoid valve which provides makeup for oil losses of the system during required emergency operation. A vacuum breaker is provided on the vent pipe of the tank to insure operation of the tank in the event the vent pipe becomes blocked. The design data and classification for major components of this system is shown in Table 9.5.7-1. Instrumentation for the DGLS is described in FSAR Subsection 8.3.1.

9.5.7.2.1 Instrumentation and Controls

The instrumentation, controls, sensors and alarms provided for monitoring the Diesel Generator Lubrication System are as follows.

9.5.7.2.1.1 Water Detector

This detector is provided in the Prelube/Keepwarm System to detect the presence of water in the Lube Oil System. It is located in the line, on the inlet side of the lube oil filter. This detector will be set to detect the presence of two percent of water. When activated this detector will energize the annunciator. 4

Question No.
430.44

Response (Cont'd)

INSERT A

The rocker arm lubrication system consists of pumps, a duplex filter, and a tank, with a float valve and a level switch. Oil is admitted to the tank from the main lubrication system via the float valve. The system includes two pumps, one driven by the engine (thru a connection to the camshaft), the other is motor driven. The motor driven pump is used for prelubrication and as a standby to the engine driven pump.

The Rocker Arm Prelube pump is operated manually on a timed duration circuit. The pump can be operated by push-button switches mounted in a panel on the diesel skid, or remotely, at the engine control panel. The operator initiates operation by depressing one of the push buttons. Operation will be automatically terminated after 5 minutes (adjustable 3 to 30 min) by the timer circuit. The operator can terminate operation within the timed period by depressing one of the "Stop" push buttons. The pump cannot be operated (or operation will be terminated) if there is an emergency shutdown initiated on the engine.

The prelube pump will start and run automatically as a backup pump to the engine pump is there is a loss of rocker arm lube oil pressure while the engine is in operation. In this mode, the pump will shut off automatically when the engine is subsequently shutdown. The system is protected from overpressure by a relief valve. A pressure switch is included to alarm loss of pressure. The pumps deliver lube oil from the tank and discharges under pressure through a duplex filter to the rocker arm lube oil headers on each bank of the engine.

The lube oil headers deliver oil to the rocker arm assemblies in each cylinder head. After providing lubrication for these parts, the lube oil drains back into the rocker lube oil tank. In the event of a water or fuel oil leak in the cylinder head area, this fluid would also drain into the rocker lube oil tanks, but would result in an increase of the level of fluid in this system, which would, after enough had accumulated, be indicated by the high rocker lube oil level switch (alarmed on the local annunciator) prior to an accumulation of water or fuel that would be detrimental to the system.

A rocker lube oil tank low level switch is also provided which alarms on the local annunciator.

Question No.

430.45 (SRP 9.5.7) In FSAR Table 9.5.7-1, you list the lube oil makeup tank as having 375 gallon capacity. Expand your FSAR to describe the minimum lube oil inventory (gals) that will be maintained for each diesel generator at all times. Show by analysis that this amount is adequate for seven days operation of the diesel generator(s) while powering the maximum post LOCA electrical loads. State how lube oil level in the storage tank is checked, and how frequently a level check is made.

Response

The nominal published lube oil consumption rate for these engines is 4000 to 5500 BHP-HRS/gal, at rated load conditions. (The lube oil consumption rate in gallons per hour does not vary appreciably with load level). At rated load conditions, 8360 KW (10615 BHP) & 514 RPM (60 Hz), the lube oil consumption rate would be 1.9 to 2.7 gallons per hour.

Using the worst case condition (2.7 gals/hr) between the full running level and the low running level (low alarm level) the engine could run 114 hours without lube oil makeup (309 gals). With the 375 gallons, available from the L.O. Makeup Tank, the engine is capable of running for 253 hours (309 + 375 = 684 gals). To run 168 hrs. would require 454 gallons.

The level in the lube oil make-up tank can be checked via the lube oil make-up level gauge which is located on the local diesel generator control panel.

The tank level will be checked subsequent to each engine operation but not less than once per week.

Question No.

430.46 (SRP 9.5.7) The rocker lube system for the diesel generator is separate from the main lube system, but does not have its own lube oil cooler. Expand your FSAR to include a discussion of how acceptable operating temperatures are maintained in the rocker lube system.

Response

There is very little heat generated in the components lubricated by the rocker arm lubrication system. What heat is generated in this area is dissipated thru the cylinder heads into the jacket water cooling system. The rocker arm lubrication system does not require heating or cooling.

Question No.

430.47 (SRP 9.5.7) Refer to FSAR Fig. 9.5.7-1. Some lube oil piping witnin tne outline of the diesel generator is shown as non-ASME Section III. Provide the industry standard that was followed in the design, inspection, and fabrication of this lube oil piping. Also, revise the FSAR and Fig. 9.5.7-1 to snow the lube oil makeup tank piping, including fill, vent, drain, and make up lines as Seismic Category I ASME Section III, Class 3.

Response

Most of the lube oil piping in the diesel generator lubrication system does meet the design, procurement and fabrication requirements of ASME Section III Class 3.

Piping between the lube oil makeup tank and the diesel generator are designed as follows:

The makeup line and the portion of the drain line from the makeup tank to the first isolation valve are designed and fabricated to ASME III Class 3 and Seismic Category I requirements.

The fill and overflow lines are not essential for tne operation of the lube oil makeup tank and are therefore designed to ANSI 31.1 requirements.

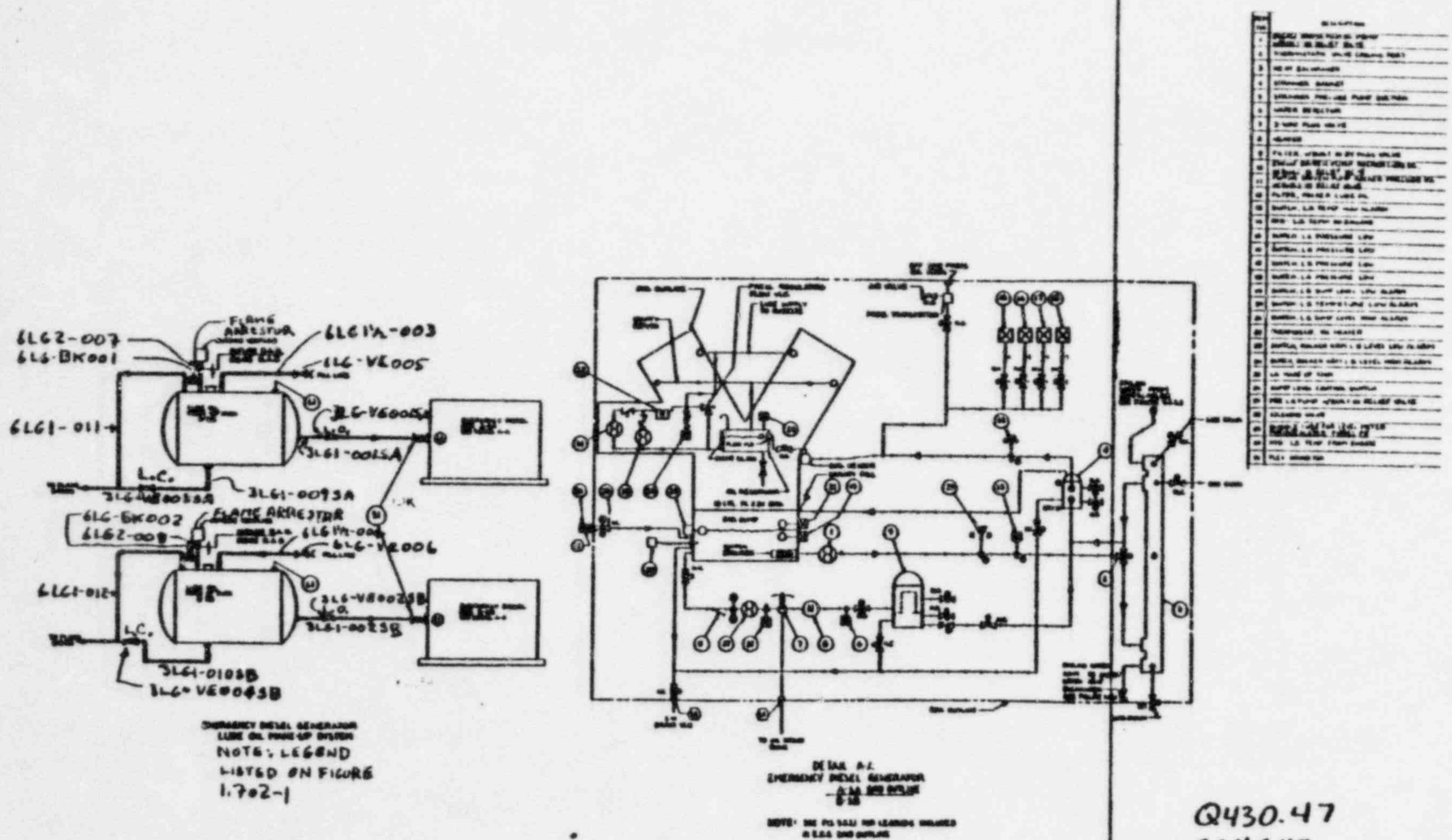
The vent line is not part of tne lube oil makeup system pressure boundary as it is non pressure retaining. The vent is therefore designed to ANSI B31.1 and seismically supported to withstand tne effects of an SSE.

Mechanical components within the diesel manufacturer's scope of supply are designed and fabricated to ASME III Class 3 requirements with 2 exceptions.

1) The lube oil circulating pump, keepwarm neater, and the immediately associated piping are not ASME, Section III due to the unavailability of such components to tne code. They are seismically qualified and manufactured per ANSI B.31 standards. These components and piping are pressure tested simultaneously with the ASME components and systems.

2) Parts and piping on the engine are made to the manufacturer's proprietary design requirements and are controlled by engineering drawings, and manufactured with processes governed by Colt's NRC approved QA program. Such proprietary design has been acceptable to the NRC in the past.

FSAR Figure 9.5.7-1 will be revised to indicate industry standards used in design, fabrication and inspecton of lube oil makeup piping.



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Nuclear Projects 3 & 5
FINAL SAFETY ANALYSIS REPORT

L.O. MAKE-UP SYSTEM

FIGURE 9.5.7-1

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Question No.

430.43 (SRP 9.5.7) In the FSAR, you briefly discuss a crankcase evacuation system. Expand your FSAR to provide a diagram and additional descriptive information on this system as follows: 1) what components make up the evacuation system, 2) what is the source of power for the evacuation system, 3) where are crankcase gases discharged, and 4) does the evacuation system operate on the rocker lube system reservoir.

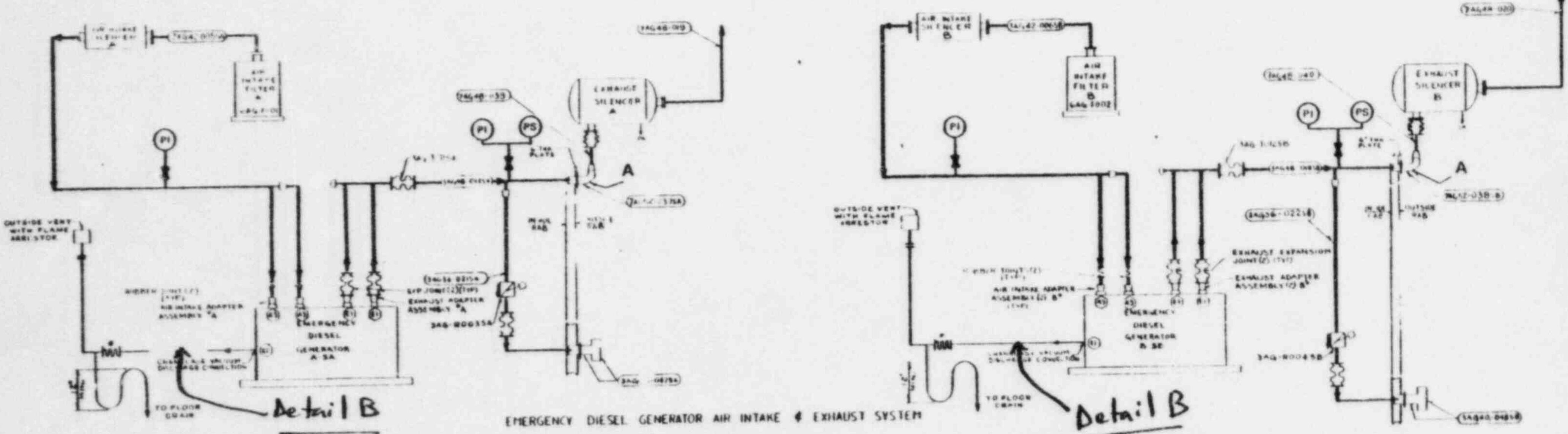
Response

The terms crankcase evacuation system and crankcase vacuum system are used synonymously. It is desirable to maintain the crankcase under a slight vacuum (1 to 2" H_2O) in order to cause a slight flow of air into the crankcase at seals, such as at the crankshaft seal, crankcase covers, etc. Without this, there would be a slight pressure inside the crankcase due to normal piston ring blowby, and lube oil and vapor would tend to leak from the seals and gasketed areas. The slight vacuum minimizes outward weepage and results in a cleaner engine.

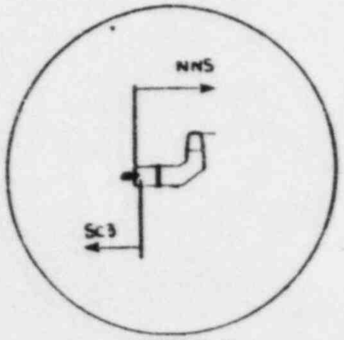
The crankcase vacuum is maintained by means of an ejector. Energy for the ejector is derived from the turbocharger compressor discharge. Failure of any part of this system would be of no consequence to the operation of the unit. The ejector exhausts to the atmosphere. An oil separator is included. Any oil collected is returned to the crankcase. This system is Skid Mounted (colt designed).

The rocker arm lube system is connected to the engine crankcase thru the rocker arm push rod tubes and cam housing.

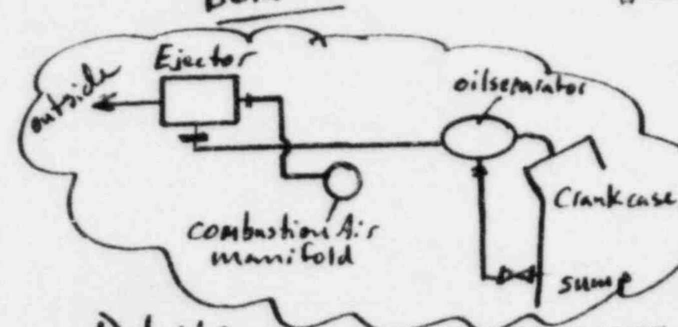
This system is not essential for the operation of the diesel. FSAR Figure 9.5.8-1 will be revised to reflect the response to this question.



EMERGENCY DIESEL GENERATOR AIR INTAKE & EXHAUST SYSTEM



DETAIL A



Detail B

AMENDMENT NO. 4 (12/83)

SCN 656

Q430.48

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
Nuclear Projects 3 & 5
FINAL SAFETY ANALYSIS REPORT

EMERGENCY DIESEL GENERATOR
AIR INTAKE & EXHAUST SYSTEM

FIGURE 9.5.8-1

REF DWG: PART OF WPPS-3240-G-1071 SH2

Question No.

430.50 (SRP 9.5.7) Provide the design margin included in the lube oil heat exchanger heat removal capability as listed in FSAR Table 9.5.7-1.

Response

The following is the design margin for the diesel generator lube oil heat exchanger.

	OPERATING HEAT LOAD (BTU/HR)	DESIGN HEAT LOAD (BTU/HR)	DESIGN MARGIN %
Lube Oil Heat Exchanger	2,600,000	2,919,000	11%

FSAR Table 9.5.7-1 will be revised to include design and operating heat loads.

TABLE 9.5.7-1

DIESEL GENERATOR LUBRICATION SYSTEM EQUIPMENT DESIGN DATA

1. DGLS Main Lube Oil Pump

Type	Positive Displacement
Driver	Engine-Driven
Quantity/Engine	1
Built-in Relief Valve Set Press, psig	110-115
Design Flow, GPM	631
Design Temperature, F	0-175
Design Pressure, psi	135
Operating Temperature, F	135
Seismic Category	I

2. DGLS Heat Exchanger

Type	Horizontal Shell-Tube
Duty, Btu/Hr, DESIGN/OPERATING	2,919,000/2,600,000
Quantity/Engine	1
Seismic Category	I
Safety Classification	ASME Section III

3. DGLS Temperature Control Valve

Type	Thermostatic Three-Way
Quantity/Engine	1
Valve Starts to Open, F	145
Valve Full Open, F	160
Seismic Category	I
Safety Classification	ASME Section III

4. DGLS Heater

Type	Electric
Size/kW	444 kW/3 pH, 60 Hz, 480V
Quantity/Engine	1
Seismic Category	I

5. DGLS Lube Oil Makeup Tank

Type	Horizontal
Tank Volume, gallons	375
Quantity/Engine	1
Design Pressure, psig	15
Design Temperature, F	139
Seismic Category	I
Safety Classification	ASME Section III

Question No.

430.59 (SRP 9.5.8) The staff has been advised that diesel engines of the type used at WNP 3 may foul out and stall if operated at no load with combustion air (ambient) temperatures below 50°F. Considering that temperatures at the WNP 3 site will regularly be below 50°F, and that the diesel generators may be required to operate for extended periods of time at no load, provide a detailed discussion of the capability of your diesel generators to operate under the above conditions. If no load operation at low ambient temperatures is a problem, discuss the provisions you have made in your design to eliminate this problem.

Response

The WNP-3 diesel generator is capable of operation at no load or light loads for extended periods of time without degradation of performance or reliability when operated in accordance with guidelines provided by the manufacturer. See also the response to NRC Question 430.29.

There is not a well defined relationship between ambient temperature and the rate of combustion product deposition in the exhaust system. The corrective action provided by the manufacturer in the Operating instructions is effective at all ambient temperatures encountered at WNP-3.

Question No.

430.84 (SRP 8.3.1)

Section 6.4.2 of IEEE Standard 387-1977 requires, in part, that the load acceptance test consider the potential effects on load acceptance after prolonged no load of light load operation of the diesel generator. Provide the results of load acceptance tests or analysis that demonstrates the capability of the diesel generator to accept the design accident load sequence after prolonged no load operation. This capability should be demonstrated over the full range of ambient air temperatures that may exist at the diesl engine air intake. If this capability cannot be demonstrated for minimum ambient air temperature, condition, describe design provision that will assure an acceptable engine air intake temperature during no load operation.

Response

The Supply System considers its responses to NRC Questions 430.29 and 430.59 adequate response to this Question.