



CHARLES CENTER • P. O. BOX 1475 • BALTIMORE, MARYLAND 21203

October 30, 1984

ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

Director of Nuclear Reactor Regulation
Attention: Mr. J. R. Miller, Chief
Operating Reactors Branch #3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2; Dockets Nos. 50-317 and 50-318
NUREG-0737 Item II.B.3, Post Accident Sampling System

- References:
1. NRC Memorandum from W. Johnston to G. Lainas, "Safety Evaluation of Post-Accident Sampling System of Calvert Cliffs Nuclear Power Plant," dated June 24, 1983.
 2. Combustion Engineering Report CE-NPSD-241, "Development of Comprehensive Procedure Guidelines for Core Damage Assessment," dated July 1983.

Gentlemen:

At your request, the following additional information is provided to assist you in your review of the Calvert Cliffs post-accident sampling system regarding conformance with system criteria #2 and #10 as evaluated in Reference 1:

Criterion 2

A core damage assessment procedure based on the generic guidelines developed for the CE Owners Group (Reference 2) is being written for Calvert Cliffs. We will submit a copy of the completed procedure for your information by December 31, 1984.

Criterion 10

The attached excerpts from the Calvert Cliffs Post-Accident Sampling System Technical Manual (Combustion Engineering Report CENTM-14) indicate the post-accident environmental conditions for which the system was designed. Also shown are the accuracies and ranges specified for the boron meter, the pH meter, the reactor coolant hydrogen meter and the oxygen meter.

Periodic system operability testing and operator refresher training will be performed in accordance with the technical specification proposed in our license amendment request dated June 29, 1984.

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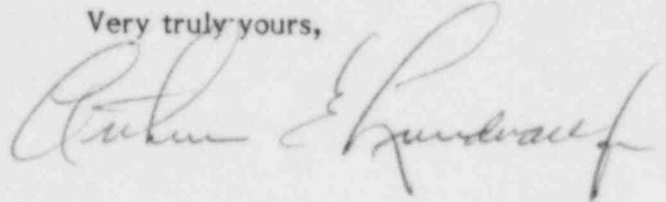
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October 30, 1984

The design of the post-accident sampling system, in conjunction with the procedures and training discussed above, provide reasonable assurance that the system will be available when required.

If you should have any questions concerning these matters, please do not hesitate to contact us.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Arthur E. Hunsicker". The signature is fluid and cursive, with a large initial "A" and a long, sweeping underline.

AEL/BSM/vf

Attachment

cc: D. A. Brune, Esq.
G. F. Trowbridge, Esq.
Mr. D. H. Jaffe, NRC
Mr. T. Foley, NRC

bcc: Messrs. A. E. Lundvall, Jr.
V. F. Stricklin (3)
J. A. Tiernan
C. H. Cruse
R. E. Denton
P. T. Crinigan
J. M. Moreira
R. F. Ash
J. M. Dahlquist, Jr.
R. C. L. Olson
R. P. Heibel
T. E. Forgette
J. F. Shire
B. S. Montgomery
M. T. Navin

APPENDIX A - ENVIRONMENTAL CONDITIONS

<u>Valve List Category</u>	<u>Location</u>	<u>Condition</u>	<u>Temp.</u>	<u>Pressure</u>	<u>Time After Event Initiation</u>	<u>Humidity</u>	<u>Radiation</u>
D	Aux. Bldg.	Post-LOCA	120°F	atmospheric	0-4 hrs	(a)	(b)
			104°F	atmospheric	4-24 hrs	(a)	(b)
C		Normal	60-104°F*	atmospheric	N/A	(a)*	(b)
A	Inside Containment	Post-LOCA	300°F (max)	60 psig (max)	(c)	saturated steam/air mixture	(d)
B		Normal	60-120°F	0-5 psig	N/A	(a)	(e)

Notes:

(a) 60-80°F: 95% RH

80°F to max. temperature: fixed moisture content equivalent to 95% RH @ 80°F

(b)	<u>Sample Station</u>		<u>Control Panel</u>
	<u>Reactor Coolant **</u>	<u>Cont. Atmosphere</u>	
Dose Rate :	5×10^4 R/Hr @ t = 0	2×10^2 R/Hr @ t = 0	-
Decays to :	5×10^3 R/Hr @ t = 5 days	20 R/Hr @ t = 6 days	-
and Decays Further to :	5×10^2 R/Hr @ t = 40 days	2 R/Hr @ t = 20 days	-
Total Integrated Dose	7×10^5 Rads	1×10^4 Rads	1×10^4 Rads

(c) Environment conditions decay to normal by t=10 days after the event initiation.

(d) Total integrated dose is 10^8 rads.

(e) Total integrated dose is 10^7 rads.

*Containment Isolation Valve PS-230 has a specified environmental temperature of 220°F in a saturated steam/air mixture for a period of a week after a main steamline break.

**Also applicable to all PASS equipment outside the sample station in the auxiliary building.

APPENDIX B - CHEMISTRY LIMITS

Reactor Coolant Chemistry Limits

<u>Parameter</u>	<u>Limit</u>
pH	3.8-10.6
Hydrazine (N_2H_4)	0-50 ppm
Ammonia (NH_3)	0-50 ppm
Lithium	0-2.5 ppm
Dissolved Hydrogen	0-2000cc(STP) H_2 /Kg H_2O
Dissolved Oxygen	Air Saturated (max)

Dissolved Nitrogen	0-100 cc (STP) N_2 /kg H_2O
Suspended Solids	0-2 ppm
Chloride	0-.15 ppm Cl
Fluoride	0-.1 ppm F
Boron	0-5000 ppm B

INSTRUMENTATION REQUIREMENTS

1. Channel Number A-502
2. Channel Name Boron Meter (1)
3. Quantity 1
4. System Post Accident Sampling
5. P&ID's E-PAS-310-152
6. Instrument Function Indicate
- Parameter Measured Boron Concentration
 Parameter Controlled none
 Component (s) Controlled none
7. Performance: (S.G. Sensitivity)
 Accuracy +2% = ± .000025
 Response -
8. Location: Control Room Remote S/D Local
 Indication Room Local Location (s) Panel
 Alarm x
 Totalize -
 Record -
9. Scale: See #19
 Range 0-5000 ppm (measured S.G.=0.98 to 1.015)
 Linear x
 Logarithmic -
 Square Root -
10. Alarm/Trip Setpoints:
 HH Trip Above -
 H Trip Above -
 L Trip Below -
 LL Trip Below -
 Other Trip -
 HH Reset Below -
 H Reset Below -
 L Reset Above -
 LL Reset Above -
 Other Reset -
11. External Environment (see Appendix A)
 Sensor Auxiliary Bldg.
Normal and LOCA
12. Sensor Working Fluid: Normal Design
 Pressure (psig) 80 100
 Temperature (°F) 120 200
 Fluid Type Post-Accident Reactor Coolant
 Chemistry Appendix B
13. Normal Operating Range 100-4400 ppm
14. Control (on/off or open/closed)
 Component -
 On (open Setpoint Above -
 Below -
 Off (closed) Setpoint Above -
 Below -
15. Control (Regulated)
 Component -
 Manual Range -
 Automatic Range -
 Auto Setpoint -
 Proportional -
 Integrated -
 Rate -
16. Pipe Run (size/schedule/end connection)
3/8" O.D. in. / 16 BWG/Swagelok
 ASME III, Class none
17. Emergency Power none
18. Requirements for Abnormal Operation:
 Post LOCA Yes ☒ No ☐
 Post SLB Yes ☐ No ☒
 Post Seismic Event Yes ☐ No ☒
 Safe Shutdown Yes ☐ No ☒
 Other: -
19. Other Requirements: Sample flow rate = 1 gpm; temperature compensation is required between 80°F and 160°F; for calibr. 0 1200°F, 0 ppm boron = .9915 S.G. 5000 ppm boron = 1.0017 S.G. (relation is linear)

Note (1) Plant Engineering recommends a "Dynatrol" specific gravity (S.G.) device for this application calibrated to boron concentration in ppm. After initiation of containment sump recirculation, interfering constituents will be accounted for by a Plant Engrg. supplied curve.

INSTRUMENTATION REQUIREMENTS

1. Channel Number A-503
2. Channel Name pH Meter
3. Quantity 1
4. System Post-Accident Sampling
5. P&ID's E-PAS-310-152
6. Instrument Function Indicate
- Parameter Measured pH
- Parameter Controlled none
- Component (s) Controlled none
7. Performance:
- Accuracy + .5 units
- Response -
8. Location: Control Room Remote S/D Local
- | Indication | Room | Local | Remote S/D Location (s) | Local Panel |
|------------|------|-------|-------------------------|-------------------------------------|
| Alarm | | | | <input checked="" type="checkbox"/> |
| Totalize | | | | |
| Record | | | | |
9. Scale:
- Range 3 - 12
- Linear ☒
- Logarithmic ☐
- Square Root ☐
10. Alarm/Trip Setpoints:
- HH Trip Above -
- H Trip Above -
- L Trip Below -
- LL Trip Below -
- Other Trip -
- HH Reset Below -
- H Reset Below -
- L Reset Above -
- LL Reset Above -
- Other Reset -
11. External Environment (see Appendix A)
- Sensor Aux. Building - Normal & LOCA

12. Sensor Working Fluid: Normal Design
- | | Normal | Design |
|------------------|------------|------------|
| Pressure (psig) | <u>80</u> | <u>100</u> |
| Temperature (°F) | <u>120</u> | <u>200</u> |
- Fluid Type Post-Accident Reactor Coolant
- Chemistry Appendix B
13. Normal Operating Range 4.5 - 10.0
14. Control (on/off or open/closed)
- Component -
- On (open Setpoint Above - Below -)
- Off (closed) Setpoint Above - Below -
15. Control (Regulated)
- Component -
- Manual Range -
- Automatic Range -
- Auto Setpoint -
- Proportional -
- Integrated -
- Rate -
16. Pipe Run (size/schedule/end connection)
- 3/8" O.D.in / 16 BWG/Swagelok
- ASME III, Class none
17. Emergency Power none
18. Requirements for Abnormal Operation:
- Post LOCA Yes ☒ No ☐
- Post SLB Yes ☐ No ☒
- Post Seismic Event Yes ☐ No ☒
- Safe Shutdown Yes ☐ No ☒
- Other: -
19. Other Requirements: Sample
- flow rate is 1 gpm

INSTRUMENTATION REQUIREMENTS

1. Channel Number A-504
2. Channel Name Reactor Coolant Hydrogen
Meter
3. Quantity 1
4. System Post-Accident Sampling
5. P&ID's E-PAS-310-152
6. Instrument Function Indicate
- Parameter Measured Volume % H₂
 Parameter Controlled none
 Component (s) Controlled none
7. Performance:
 Accuracy ± 2%
 Response —
8. Location: Control Room Remote S/D Local
 Room Local Location (s) Panel
- | | | | | |
|------------|--|--|--|---|
| Indication | | | | x |
| Alarm | | | | |
| Totalize | | | | |
| Record | | | | |
9. Scale: 0-10 Volume %
0-100 Volume %
 Linear x
 Logarithmic —
 Square Root —
10. Alarm/Trip Setpoints:
- HH Trip Above —
 H Trip Above —
 L Trip Below —
 LL Trip Below —
 Other Trip —
 HH Reset Below —
 H Reset Below —
 L Reset Above —
 LL Reset Above —
 Other Reset —
11. External Environment (see Appendix A)
 Sensor Auxiliary Bldg. - Normal & LOCA

*R.H. = 0 - 100%

12. Sensor Working Fluid: Normal Design
 Pressure (psig) 5 100
 Temperature (°F) 120 200
 Fluid Type *N₂, H₂, O₂ Fission Products
 Chemistry N/A
13. Normal Operating Range 0-100 volume %
14. Control (on/off or open/closed)
 Component —
 On (open Setpoint Above —
 Below —)
 Off (closed) Setpoint Above —
 Below —
15. Control (Regulated)
 Component —
 Manual Range —
 Automatic Range —
 Auto Setpoint —
 Proportional —
 Integrated —
 Rate —
16. Pipe Run (size/schedule/end connection)
3/8" O.D. in / 16 BWG/Swagelok
 ASME III, Class none
17. Emergency Power none
18. Requirements for Abnormal Operation:
 Post LOCA Yes x No —
 Post SLB Yes — No x
 Post Seismic Event Yes — No x
 Safe Shutdown Yes — No x
 Other: —
19. Other Requirements: Sample flow rate
is 50-350 cc/min

Appendix C (cont'd)

INSTRUMENTATION REQUIREMENTS

1. Channel Number A-505
2. Channel Name Oxygen Meter
3. Quantity 1
4. System Post-Accident Sampling
5. P&ID's E-PAS-310-152
6. Instrument Function Indicate
- Parameter Measured Volume % O₂
 Parameter Controlled None
 Component (s) Controlled None
7. Performance:
 Accuracy + 2%
 Response -
8. Location: Control Room Remote S/D Local
 Room Local Location (s) Panel
- | | | | | |
|------------|--|--|--|---|
| Indication | | | | x |
| Alarm | | | | |
| Totalize | | | | |
| Record | | | | |
9. Scale: 0-5 Volume %
0-25 Volume %
 Range
 Linear x
 Logarithmic -
 Square Root -
10. Alarm/Trip Setpoints:
- HH Trip Above -
 H Trip Above -
 L Trip Below -
 LL Trip Below -
 Other Trip -
 HH Reset Below -
 H Reset Below -
 L Reset Above -
 LL Reset Above -
 Other Reset -
11. External Environment (see Appendix A)
 Sensor Aux. Bldg.- Normal & LOCA

*R.H. = 0-100%

12. Sensor Working Fluid: Normal Design
 Pressure (psig) 5 100
 Temperature (°F) 120 200
 Fluid Type *N₂, H₂, O₂, Fission Products
 Chemistry N/A
13. Normal Operating Range 0-5 Volume %
14. Control (on/off or open/closed)
 Component -
 On (open Setpoint Above -
 Below -)
 Off (closed) Setpoint Above -
 Below -
15. Control (Regulated)
 Component -
 Manual Range -
 Automatic Range -
 Auto Setpoint -
 Proportional -
 Integrated -
 Rate -
16. Pipe Run (size/schedule/end connection;
3/8" O.D. in / 16 BWG / Swagelok
 ASME III, Class none
17. Emergency Power none
18. Requirements for Abnormal Operation:
 Post LOCA Yes ☒ No ☐
 Post SLB Yes ☐ No ☒
 Post Seismic Event Yes ☐ No ☒
 Safe Shutdown Yes ☐ No ☒
 Other: -
19. Other Requirements: Sample flow rate is 50-350 cc/min