

In the Matter of:

Entergy Nuclear Operations, Inc.  
(Indian Point Nuclear Generating Units 2 and 3)



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**Entergy**



Procedure Use Is:

- Continuous
- Reference
- Information

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**NON-QUALITY RELATED**

**0-CY-2310 Revision 16**

**REACTOR COOLANT SYSTEM  
SPECIFICATIONS AND FREQUENCIES**

**APPROVED BY:**

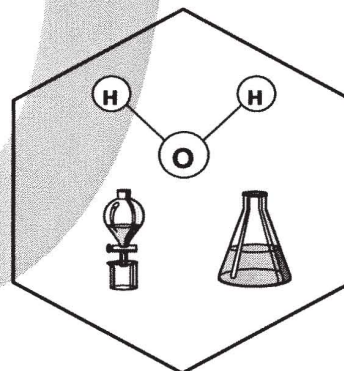
Robert Cullen Oct 03, 2011

Procedure Writer / Date

10/18/11

Procedure Owner / Date

**Indian Point**



**Chemistry**

**EDITORIAL REVISION**

## **REVISION SUMMARY**

### **1.0 REASON FOR REVISION**

- 1.1 Incorporate user feedback

### **2.0 SUMMARY OF CHANGES**

- 2.1 Added note description inadvertently omitted in last revision to Table "RCS Diagnostic Parameters During Startup" in Attachment 4 for "(a)" under lithium.
- 2.2 Removed requirement to log out of spec in CCR OOS logbook as this book has been discontinued.

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**Attachments**

- ATTACHMENT 1 - Chemistry Data Review Flowchart
- ATTACHMENT 2 - RCS Control Parameter Specifications
- ATTACHMENT 3 - RCS Control Parameter Sampling & Analysis Frequency
- ATTACHMENT 4 - RCS Diagnostic Parameters
- ATTACHMENT 5 - Primary Plant Action Levels
- ATTACHMENT 6 - Primary Plant Corrective Actions
- ATTACHMENT 7 - Reactor Coolant Boron/Lithium Specifications

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## 1.0 PURPOSE

- 1.1 This procedure establishes the requirements for the sampling, analysis and control of the Reactor Coolant System.
- 1.2 This procedure applies to the Chemistry control of the Reactor Coolant and Residual Heat Removal Systems.

## 2.0 PRECAUTIONS AND LIMITATIONS

### 2.1 Precautions and Limitations

- 2.1.1 The frequency and specifications for tests other than those required by Technical Specifications or the SPDES permit are recommended by Chemistry Management. The frequency of these tests may be altered at the discretion of Chemistry Management. Analyses with associated NSSS vendor requirements shall be evaluated prior to being altered.
- 2.1.2 For parameters that do not have a defined frequency or specification Chemistry Management will assign a frequency as dictated by plant conditions or historical trend.
- 2.1.3 Initially, laboratory analytical results are interpreted by the Watch Chemist or by the Watch Nuclear Plant Operator during their tours. Abnormal trends in the chemistry data either obtained or observed are evaluated by the Chemistry Technician given the status of that system at that time. Any significant abnormality or trend, as well as, out of specification or out of control band chemistry parameter shall be brought to the attention of the Shift Manager, Control Room Supervisor, and Chemistry Management.
- 2.1.4 Refer to Reference 5.3.4 for Dose Equivalent Iodine (DEI) and Dose Equivalent Xenon (DEX) and associated required actions for radiochemical analyses of RCS.
- 2.1.5 Prior to entering Mode 1, RCS at-temperature pH shall be greater than 6.9.

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- 2.1.6 The process of reviewing chemistry data that is NOT within chemistry specifications is flowcharted in Attachment 1, Chemistry Data Review Flowchart.
- 2.1.7 Attachment 7, Reactor Coolant Boron/Lithium Specifications, is used as directed in Attachment 3. Values for lithium limits other than those listed should be verified by use of the Chemistry database. Documentation for these calculations is found in the procedure basis file.
- 2.1.8 The critical procedures and sample points for monitoring the inhibition of steam generator degradation, as required by Plant Technical Specifications, are located in the Primary Strategic Water Chemistry Plan.
- 2.1.9 Data consistency checks may be performed using Chemworks Primary pH Calculator OR Smart Chemworks ensuring that the data set has been uploaded at the time of verification.
- 2.1.10 IF lithium is within specification listed in Attachment 7 for xenon equilibrium full power operation THEN at-temperature pH is within control and greater than 7.0.

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**2.2 General Information**

2.2.1 Plant Modes

MODE	TITLE	REACTIVITY	% POWER	T <sub>ave</sub>
1	Power Ops	≥0.99	>5	NA
2	Startup	≥0.99	≤5	NA
3	Hot Standby	<0.99	NA	≥350
4	Hot Shutdown	<0.99	NA	350 > T <sub>ave</sub> >200
5	Cold Shutdown	<0.99	NA	≤200
6	Refueling	NA	NA	NA

2.2.2 The Out-Of-Specification Action Guidelines presented in Attachments 5 and 6 are not all-inclusive. Other actions may be appropriate for evaluation in some cases.

2.2.3 Boron/Lithium program is based on the low limit being pH 6.9 at 565°F.

2.2.4 T<sub>ave</sub> at 0 and 100% power are as follows:

- Unit 2

0% Power      T<sub>ave</sub> = 545°

100% Power    T<sub>ave</sub> = 565°

- Unit 3

0% Power      T<sub>ave</sub> = 549°

100% Power    T<sub>ave</sub> = 569°

**3.0 PREREQUISITES**

NONE

## 4.0 PROCEDURE

### 4.1 Reactor Coolant Chemistry Sampling and Analysis

4.1.1 Reactor Coolant chemistry shall be maintained within specifications in accordance with Attachment 2, RCS Control Parameter Specifications.

4.1.2 Reactor Coolant shall be sampled in accordance with Attachment 3, RCS Control Parameter Sampling & Analysis Frequency, and Attachment 4, RCS Diagnostic Parameter Sampling & Analysis Frequency.

### 4.2 Chemistry Parameters Out Of Specification

4.2.1 IF a parameter is out of specification, THEN PERFORM the following:

- INFORM the Control Room Supervisor (CRS).
- REFER TO Attachment 5, Primary Plant Action Levels, for required action.
- IF ANY chemistry parameter listed in this procedure can NOT be maintained within chemistry specifications, THEN INITIATE corrective action as soon as possible per Attachment 6, Primary Plant Corrective Actions.

## 5.0 REFERENCES

### 5.1 Commitment Documents

5.1.1 Technical Specifications

5.1.2 Technical Requirements Manual

5.1.3 Westinghouse Primary Chemistry Criteria and Specifications WCAP (5-1)

5.1.4 CR-IP3-2005-05471 concerning Crud-Induced Power Shift (CIPS)

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## **5.2 Development Documents**

- 5.2.1 EPRI TR-1014986-V1R6, PWR Primary Water Chemistry Guidelines Revision 6
- 5.2.2 NEI 97-06, Primary-Side Water Chemistry, December 1997
- 5.2.3 IPEC Strategic Primary Water Chemistry Plan
- 5.2.4 EN-NF-102, Corporate Fuel Reliability
- 5.2.5 EPRI 1015448, Fuel Reliability Guidelines: PWR Cladding Corrosion and Crud, March 2008

## **5.3 Interface Documents**

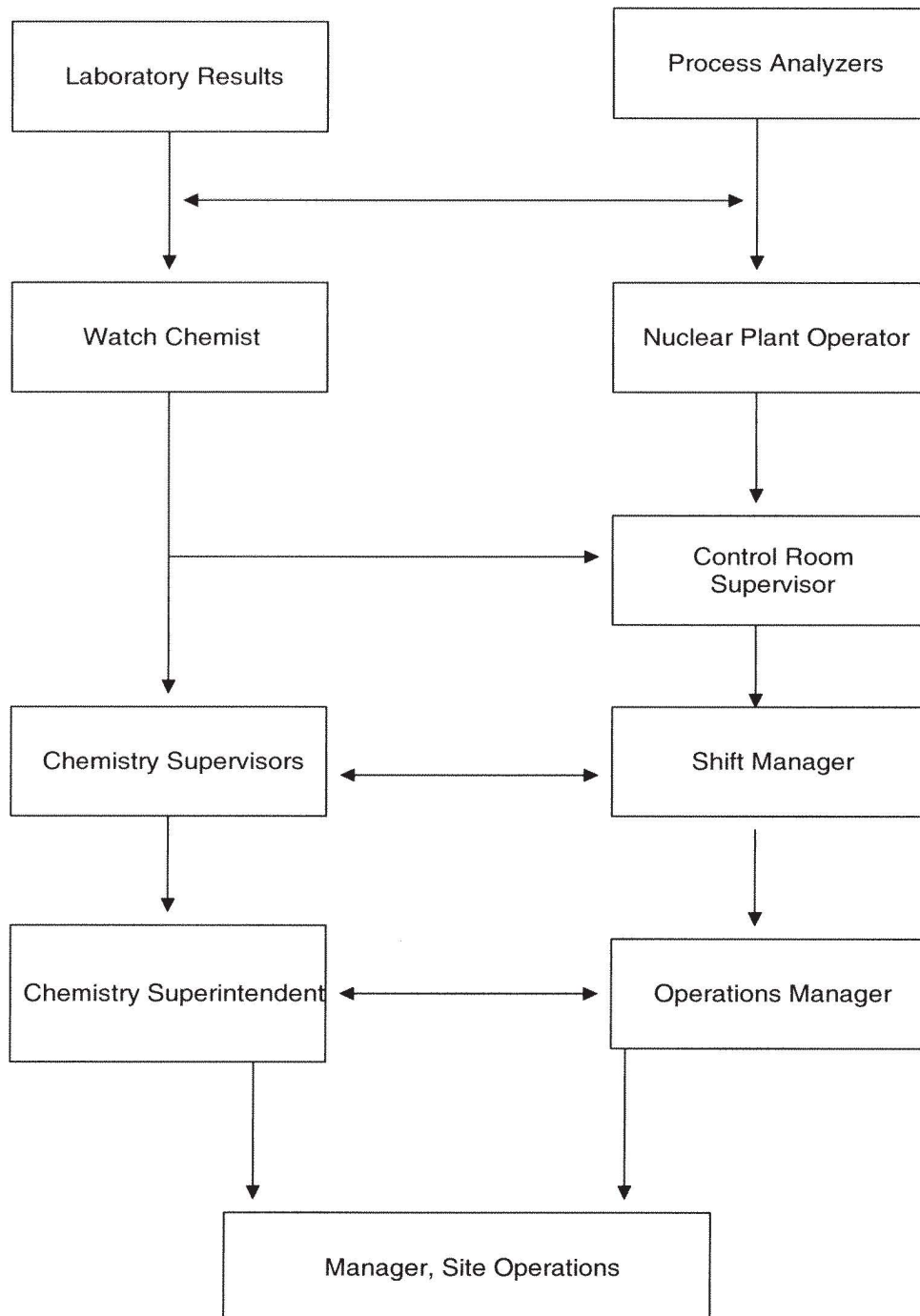
- 5.3.1 Technical Specifications
- 5.3.2 Technical Requirements Manual
- 5.3.3 EPRI TR-1014986-V1R6, PWR Primary Water Chemistry Guidelines Revision 6
- 5.3.4 0-CY-2765, Coolant Activity Limits – Dose Equivalent Iodine/Xenon

## **6.0 RECORDS AND DOCUMENTATION**

NONE



**CHEMISTRY DATA REVIEW FLOWCHART**



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## ATTACHMENT 2

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### RCS CONTROL PARAMETER SPECIFICATIONS

Refer to Attachment 6 for guidance while trying to maintain in specification

PARAMETER	RCS TEMPERATURE ≤ 250°F (MODES 4, 5 & 6)	HOLD POINT PRIOR TO EXCEEDING 250°F (MODE 4)	REACTOR SUBCRITICAL & RCS > 250°F (MODES 3 and 4)	HOLD POINT PRIOR TO CRITICALITY (MODE 3)	POWER OPERATION or STARTUP (MODES 1 and 2)	AL1	AL2	AL3
Boron, ppm	As required for reactivity control	As required for reactivity control	As required for reactivity control	As required for reactivity control	As required for reactivity control	None	None	None
Chloride, ppb	≤ 150	<150 <sup>(1)</sup>	<150	<150	≤ 20	>20	>150	>1500
Fluoride, ppb	≤ 150	<150 <sup>(1)</sup>	<150	<150	≤ 20	>20	>150	>1500
Sulfate, ppb	None	<150 <sup>(1)</sup>	<150	<150	≤ 20	>20	>150	>1500
Dissolved Oxygen (DO), ppb	None	<100	<100	<100	≤ 5	>5	-----	>100
Pressurizer DO, ppb	None	<100	None	None	None	None	None	None
Hydrogen, cc (STP)/kg H <sub>2</sub> O	None	None	None	> 15	≥ 25 AND ≤ 50	<25 OR >50	<15	<5
Lithium, ppm	None	None	None	None	Variable - Based on Boron Concentration (Refer to Attachments 7)	None	None	None
Silica ppm <sup>(2)</sup>	< 3	< 3	< 3	< 3	< 3	None	None	None
Aluminum, ppb								
Ca + Mg, (ppb)								
Magnesium (ppb)								
@ Temp pH <sup>(3)</sup>	None	None	None	None	≥ 6.9	< 6.9	None	None

- (1) Pressurizer liquid sample must also meet these values prior to exceeding 250°.
- (2) Westinghouse fuel warranty requirement for Modes 4 and above.
- (3) Calculated from RCS Boron, Lithium, Ammonia and RCS Tave at the time of sample.

**RCS CONTROL PARAMETER SAMPLING & ANALYSIS FREQUENCY**

PARAMETER	RCS TEMPERATURE $\leq 250^{\circ}\text{F}$ (MODES 4 and 5, 6)	REACTOR SUBCRITICAL & RCS $> 250^{\circ}\text{F}$ (MODES 3 and 4)	POWER OPERATION/STARTUP (MODES 1 and 2)
Boron, ppm	Daily <sup>(1)</sup>	Daily	Daily
Chloride, ppb	3/7 days <sup>(2)</sup> AND 3 days max	Three / Week	Three / Week
Fluoride, ppb	1/7 days <sup>(2)</sup> AND 10 days max	Three / Week	Three / Week
Sulfate, ppb	1/7 days <sup>(2)</sup>	Three / Week	Three / Week <sup>(4)</sup>
Dissolved Oxygen (DO), ppb	3/7 days AND 3 days max	Daily	Three / Week
Pressurizer DO, ppb	Daily <sup>(3)</sup>	Not Required	Not Required
Hydrogen, cc (STP)/kg H <sub>2</sub> O	Not Required	Three / Week	Three / Week <sup>(5)</sup>
Lithium, ppm	Not Required	Not Required	Daily <sup>(6)</sup>
Silica, ppm	1/7 days <sup>(7)</sup>	1/7 days <sup>(7)</sup>	1/7 days <sup>(7)</sup>

(1) WHEN the RCS/RHR, the Reactor Cavity, AND Refueling Canal are connected, THEN:

- AT UNIT 2, sample the Reactor Cavity AND the Refueling Canal once per 72 hours
- AT UNIT 3, sample the Reactor Cavity once per 72 hours

(2) Frequency should be increased during activities, such as refueling, when the likelihood of contamination is increased.

(3) Initiated during heatup. Pressurizer sampling is terminated when DO < 100 ppb.

(4) Frequency should be increased if evidence of resin ingress is noted (e.g., increasing sulfate concentrations).

(5) Frequency of sampling should be increased during operations that may significantly impact hydrogen concentration (e.g., feed and bleed, purging of pressurizer vapor space) or known periods of hydrogen instability.

(6) Frequency should be increased during operations that may significantly impact lithium concentration (e.g., feed and bleed).

(7) Initiated during heatup. At Unit 2 ONLY, sample daily from RCS >200°F until limit is achieved

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**ATTACHMENT 4**

**RCS DIAGNOSTIC PARAMETERS**

**RCS DIAGNOSTIC PARAMETERS DURING STARTUP**

<b>PARAMETER</b>	<b>Frequency</b>	<b>REACTOR SUBCRITICAL &amp; RCS &gt; 250°F (MODES 3 and 4)</b>
Lithium, ppm as Li	1/8 Hours	(a)
Silica	Daily	Variable
Aluminum, ppb	Once prior to securing RHR and once prior to criticality, ~300°F following RFOs	≤ 80
Calcium + Magnesium, ppb		≤ 80
Magnesium, ppb		≤ 40

NOTE (a): <1 ppm while on RHR and ≥ 2 ppm when >350°F.

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**RCS DIAGNOSTIC PARAMETERS**

**Power Operation**

**RADIOCHEMICAL DIAGNOSTIC PARAMETERS**

<b>PARAMETER</b>	<b>REQUIRED FREQUENCY</b>	<b>NORMAL FREQUENCY</b>
Gamma Isotopic with Simplified Dose Equivalent Iodine	N/A	4 / Week
Dose Equivalent Iodine (DEI)	1 / 14 Days <sup>(1)</sup>	1/7 Days
Dose Equivalent Xenon (DEX)	1/7 days <sup>(1)</sup>	1/7 Days
Decayed Isotopic	N/A	24 hr decay (I-131) Others 1/7 Days <sup>(2)</sup>
Dissolved Radiogas	N/A	1/7 Days
Decayed Suspended Solids	N/A	1/7 Days
Tritium	1/7 days <sup>(3)</sup>	1/7 Days
Total RCS Activity Summary	N/A	1/7 Days (WinCDMS)

(1) Tech Spec 3.4.16 and Reference 5.3.4

(2) Various RCS decay counts may be prescribed by Chemistry Management

(3) Required by UFSAR

**CHEMICAL DIAGNOSTIC PARAMETERS**

<b>PARAMETER</b>	<b>FREQUENCY</b>
Conductivity	Daily <sup>(3)</sup>
Total Suspended Solids	1/7 Days <sup>(3)</sup>
Silica	1/7 Days <sup>(3) (4)</sup>
Boron-10	Every 60 Days, Following Trips, and Prior to Startup from Refueling
Iron	1/31 Days <sup>(4) (5)</sup>
Nickel	1/31 Days <sup>(4) (5)</sup>

(4) EPRI Guidelines

(5) Weekly until < 1ppm, then monthly.

(6) Frequency increases to weekly 3 months prior to start of refueling outage.

(7) Required per Reference 5.1.4.

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**ATTACHMENT 4**

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**RCS DIAGNOSTIC PARAMETERS**

**RCS Sampling Prior To Initiating Zinc Addition**

Parameter	Frequency	Expected Value <sup>(1)</sup>
Total Nickel	1/7 Days	< 2 ppb, first zinc cycle ≤ 6 ppb, subsequent zinc cycles
Silica	1/7 Days	≤ 1 ppm

**RCS Sampling During Zinc Addition**

Parameter	Frequency <sup>(2)</sup>	Target Control Range	Action Level
Zinc	1/day until target reached and stable then weekly	15 to 25 ppb	< 15 ppb <sup>(3)</sup> or >25 ppb <sup>(3)</sup>
Total Nickel	1/7 Days	≤ 6 ppb	> 6 ppb <sup>(4)</sup>
Silica	1/7 Days	≤ 1 ppm	> 1 ppm <sup>(5)</sup>

- (1) Average of 2 consecutive samples, taken at least two days apart.
- (2) Increased sample frequency to daily during at-power plant or zinc transients. Westinghouse should be notified if zinc samples averaged over 2 days exceed 80 ppb.
- (3) The zinc injection rate (grams/hr) should be adjusted to restore zinc within target control range. If zinc samples averaged over 2 days exceed 80 ppb, contact Westinghouse for re-evaluation and to define any additional actions.
- (4) If average of 2 successive samples results in >6 ppb nickel, evaluate for possible CIPS by evaluating flux map. Contact the fuel vendor to determine if additional actions are required.
- (5) If average of monthly samples results in >1 ppm silica, suspend zinc addition and contact the fuel vendor to determine if additional actions are required.

**RCS / RHR Following Fill & Vent to Reactor Critical**

Parameter	Frequency
Corrosion Products <sup>(6)</sup>	Daily
Mixed Bed DF <sup>(7)</sup>	Daily
Hydrazine, ppb	As required
Ammonia, ppb	1 per 3 days

- (6) Analyze for elemental Fe and Ni from ≥150°F until 500°F. Sample may be drawn on a predetermined schedule and preserved for analysis at a later time. Analyze for isotopic Co-58, Co-60, Mn-54 and Cr-51.
- (7) Sample mixed bed effluent chloride and sulfate. Calculate DF from daily RCS/RHR sample.

**PRIMARY PLANT  
ACTION LEVELS**

**Action Level 1**

- a) Efforts should be made to bring the parameter within the appropriate limit within seven days.
- b) If the parameter has not been restored to below the Action Level 1 value within seven days, a technical review shall be performed and a program for implementing corrective measures instituted. Such a program may require equipment additions or modifications over the long term.

**Action Level 2**

- a) Efforts should be made to bring the parameter within the appropriate Action Level 2 value within 24 hours.

**NOTE**

IF the chemistry is improved to within the requirements of Action Level 2 prior to plant shutdown, THEN full power operation may be resumed.

- b) If the parameter has not been restored to below the Action Level 2 value within 24 hours, an orderly shutdown shall be initiated and the plant shall be brought to a coolant temperature < 250°F (121°C) as quickly as permitted by other plant constraints.
- c) Following a unit shutdown caused by exceeding the time limit on an Action Level 2 value, a technical review of the incident should be performed and appropriate corrective measures taken before the unit is restarted.

**Action Level 3**

- a) An orderly unit shutdown should be initiated immediately, with reduction of coolant temperature to less than 250°F as rapidly as other plant conditions permit.
- b) Following a unit shutdown caused by entering an Action Level 3 condition, a technical review of the incident should be performed and appropriate corrective measures taken before the unit is restarted.

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**ATTACHMENT 6**

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**PRIMARY PLANT  
CORRECTIVE ACTIONS**

<b>REACTOR COOLANT SYSTEM</b>	
<b>Parameter Out of Range</b>	<b>Corrective Actions</b>
Chloride/Fluoride	<ol style="list-style-type: none"> <li>1. CHECK ion exchange beds in purification system for flow and removal efficiencies.</li> <li>2. <u>IF</u> indicated, <u>THEN</u> request Operations place the standby mixed bed Demineralizer in service.</li> <li>3. Request Operations to INCREASE letdown and charging flow.</li> <li>4. CHECK for high RCS ammonia or conductivity that may cause chloride or fluoride release from resin.</li> <li>5. CHECK makeup water purity.</li> <li>6. ISOLATE makeup water source or change to alternate source if required.</li> <li>7. SEEK other potential sources of fluoride.</li> </ol>
Sulfate	<ol style="list-style-type: none"> <li>1. CHECK for indications of resin released from the purification system.</li> <li>2. CHECK ion exchanger removal efficiency and isolate if necessary.</li> <li>3. CHECK makeup water purity.</li> </ol>
Lithium	<ol style="list-style-type: none"> <li>1. CHECK to ensure reactor coolant dilution OR boration is NOT in progress.</li> <li>2. ENSURE that a lithiated mixed bed is in service.</li> <li>3. VERIFY flow through cation OR other purification ion exchangers.</li> <li>4. ADJUST lithium as required to bring within station control program.</li> </ol>



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**PRIMARY PLANT  
CORRECTIVE ACTIONS**

<b>REACTOR COOLANT SYSTEM</b>	
<b>Parameter Out of Range</b>	<b>Corrective Actions</b>
Hydrogen	<ol style="list-style-type: none"> <li>1. <u>IF</u> RCS hydrogen is low <u>THEN</u> INCREASE hydrogen pressure in the VCT AND/OR INCREASE hydrogen purity in the VCT. INCREASE sample frequency to assess adequacy of actions.</li> <li>2. Ensure letdown flow rate is sufficient to increase hydrogen concentration in the RCS. 120 gpm is recommended especially during large manual dilutions.</li> <li>3. CHECK for indications of leaking valves or check for air ingress to the charging system.</li> <li>4. <u>IF</u> RCS hydrogen is high, <u>THEN</u> DECREASE hydrogen pressure in the VCT. CONSIDER venting pressurizer gas space via sample line. INCREASE sample frequency to assess adequacy of actions.</li> </ol>
Dissolved Oxygen	<ol style="list-style-type: none"> <li>1. VERIFY hydrogen concentration.</li> <li>2. CHECK for air leaks into CVCS.</li> <li>3. <u>IF</u> hydrogen regulator to VCT is in service, <u>THEN</u> request Operations to INCREASE VCT hydrogen pressure.</li> <li>4. <u>IF</u> nitrogen regulator to the VCT is in service, AND RCS temperature is less than 180°F, <u>THEN</u> consider hydrazine addition to reduce oxygen concentration.</li> </ol>

(1) Following startup or power changes restore lithium to specifications by xenon equilibration.

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**ATTACHMENT 7**

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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

**NOTE:** Prior to 100% power and xenon equalization, Chemistry Management will calculate the lithium necessary to maintain at least a 6.9 at-temperature pH.

BORON	LITHIUM, ppm			
	High Limit	Admin High limit	Admin Low Limit	Low Limit
1800	3.88	3.80	3.70	3.70
1795	3.87	3.79	3.69	3.69
1790	3.86	3.77	3.67	3.67
1785	3.84	3.76	3.66	3.66
1780	3.83	3.75	3.65	3.65
1775	3.82	3.74	3.64	3.64
1770	3.81	3.72	3.62	3.62
1765	3.79	3.71	3.61	3.61
1760	3.78	3.70	3.60	3.60
1755	3.77	3.69	3.59	3.59
1750	3.75	3.68	3.58	3.58
1745	3.74	3.66	3.56	3.56
1740	3.73	3.65	3.55	3.55
1735	3.72	3.64	3.54	3.54
1730	3.70	3.63	3.53	3.53
1725	3.69	3.61	3.51	3.51
1720 - 1400	3.68	3.60	3.50	3.50
1395	3.68	3.60	3.48	3.48
1390	3.68	3.60	3.46	3.46
1385	3.68	3.60	3.45	3.45
1380	3.68	3.60	3.43	3.43
1375	3.68	3.60	3.41	3.41
1370	3.68	3.60	3.40	3.40
1365	3.68	3.60	3.40	3.38
1360	3.68	3.60	3.40	3.37
1355	3.68	3.60	3.40	3.36
1350	3.68	3.60	3.40	3.35
1340	3.68	3.60	3.40	3.34
1335 -1115	3.68	3.60	3.40	3.33
1110	3.65	3.58	3.38	3.31
1105	3.63	3.56	3.36	3.29
1100	3.62	3.55	3.35	3.27

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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
1095	3.60	3.53	3.33	3.26
1090	3.58	3.51	3.31	3.24
1085	3.57	3.50	3.30	3.23
1080	3.55	3.48	3.28	3.21
1075	3.53	3.46	3.26	3.20
1070	3.52	3.45	3.25	3.18
1065	3.50	3.43	3.23	3.17
1060	3.48	3.42	3.22	3.15
1055	3.46	3.40	3.20	3.14
1050	3.45	3.38	3.18	3.12
1045	3.43	3.37	3.17	3.10
1040	3.41	3.35	3.15	3.09
1035	3.40	3.34	3.14	3.07
1030	3.38	3.32	3.12	3.06
1025	3.36	3.30	3.10	3.04
1020	3.35	3.29	3.09	3.03
1015	3.33	3.27	3.07	3.01
1010	3.31	3.25	3.05	3.00
1005	3.30	3.24	3.04	2.98
1000	3.28	3.22	3.02	2.96
995	3.26	3.21	3.01	2.95
990	3.25	3.19	2.99	2.93
985	3.23	3.17	2.97	2.92
980	3.21	3.16	2.96	2.90
975	3.20	3.14	2.94	2.89
970	3.18	3.13	2.93	2.87
965	3.16	3.11	2.91	2.86
960	3.15	3.09	2.89	2.84
955	3.13	3.08	2.88	2.83
950	3.11	3.06	2.86	2.81
945	3.10	3.05	2.85	2.79
940	3.08	3.03	2.83	2.78

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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
935	3.06	3.01	2.81	2.76
930	3.05	3.00	2.80	2.75
925	3.03	2.98	2.78	2.73
920	3.01	2.96	2.76	2.72
915	3.00	2.95	2.75	2.70
910	2.98	2.93	2.73	2.69
905	2.96	2.92	2.72	2.67
900	2.95	2.90	2.70	2.66
895	2.93	2.88	2.68	2.63
890	2.92	2.87	2.67	2.62
885	2.90	2.85	2.65	2.60
880	2.89	2.84	2.64	2.59
875	2.87	2.82	2.62	2.57
870	2.86	2.81	2.61	2.56
865	2.84	2.79	2.59	2.54
860	2.83	2.78	2.58	2.53
855	2.81	2.76	2.56	2.51
850	2.80	2.75	2.55	2.50
845	2.78	2.73	2.53	2.48
840	2.77	2.72	2.52	2.47
835	2.75	2.70	2.50	2.45
830	2.74	2.69	2.49	2.44
825	2.72	2.67	2.47	2.42
820	2.71	2.66	2.46	2.41
815	2.69	2.64	2.44	2.39
810	2.68	2.63	2.43	2.38
805	2.66	2.61	2.41	2.36
800	2.65	2.60	2.40	2.35
795	2.63	2.58	2.38	2.33
790	2.62	2.57	2.37	2.32
785	2.60	2.55	2.35	2.30
780	2.59	2.54	2.34	2.29

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BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
775	2.57	2.52	2.32	2.27
770	2.56	2.51	2.31	2.26
765	2.54	2.49	2.29	2.24
760	2.53	2.48	2.28	2.23
755	2.51	2.46	2.26	2.21
750	2.50	2.45	2.25	2.20
745	2.49	2.44	2.24	2.19
740	2.47	2.42	2.22	2.17
735	2.46	2.41	2.21	2.16
730	2.44	2.39	2.19	2.14
725	2.43	2.38	2.18	2.13
720	2.41	2.36	2.16	2.11
715	2.40	2.35	2.15	2.10
710	2.38	2.33	2.13	2.08
705	2.37	2.32	2.12	2.07
700	2.35	2.30	2.10	2.05
695	2.34	2.29	2.09	2.04
690	2.32	2.27	2.07	2.02
685	2.31	2.26	2.06	2.01
680	2.29	2.24	2.04	1.99
675	2.28	2.23	2.03	1.98
670	2.26	2.21	2.01	1.96
665	2.25	2.20	2.00	1.95
660	2.23	2.18	1.98	1.93
655	2.22	2.17	1.97	1.92
650	2.20	2.15	1.95	1.90
645	2.18	2.13	1.93	1.88
640	2.16	2.11	1.91	1.86
635	2.15	2.10	1.90	1.85
630	2.14	2.09	1.89	1.84
625	2.12	2.07	1.87	1.82
620	2.11	2.06	1.86	1.81

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BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
615	2.09	2.04	1.84	1.79
610	2.08	2.03	1.83	1.78
605	2.07	2.02	1.82	1.77
600	2.05	2.00	1.80	1.75
595	2.04	1.99	1.79	1.74
590	2.03	1.98	1.78	1.73
585	2.01	1.96	1.76	1.71
580	2.00	1.95	1.75	1.70
575	1.99	1.94	1.74	1.69
570	1.97	1.92	1.72	1.67
565	1.96	1.91	1.71	1.66
560	1.95	1.90	1.70	1.65
555	1.93	1.88	1.68	1.63
550	1.92	1.87	1.67	1.62
545	1.91	1.86	1.66	1.61
540	1.89	1.84	1.64	1.59
535	1.88	1.83	1.63	1.58
530	1.86	1.81	1.61	1.56
525	1.85	1.80	1.60	1.55
520	1.84	1.79	1.59	1.54
515	1.82	1.77	1.57	1.52
510	1.81	1.76	1.56	1.51
505	1.80	1.75	1.55	1.50
500	1.78	1.73	1.53	1.48
495	1.77	1.72	1.52	1.47
490	1.76	1.71	1.51	1.46
485	1.74	1.69	1.49	1.44
480	1.73	1.68	1.48	1.43
475	1.72	1.67	1.47	1.42
470	1.70	1.65	1.45	1.40
465	1.69	1.64	1.44	1.39
460	1.67	1.62	1.42	1.37

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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
455	1.66	1.61	1.41	1.36
450	1.65	1.60	1.40	1.35
445	1.63	1.58	1.38	1.33
440	1.62	1.57	1.37	1.32
435	1.61	1.56	1.36	1.31
430	1.59	1.54	1.34	1.29
425	1.58	1.53	1.33	1.28
420	1.57	1.52	1.32	1.27
415	1.55	1.50	1.30	1.25
410	1.54	1.49	1.29	1.24
405	1.53	1.48	1.28	1.23
400	1.51	1.46	1.26	1.21
395	1.50	1.45	1.25	1.20
390	1.49	1.44	1.24	1.19
385	1.47	1.42	1.22	1.17
380	1.46	1.41	1.21	1.16
375	1.44	1.39	1.19	1.14
370	1.43	1.38	1.18	1.13
365	1.42	1.37	1.17	1.12
360	1.40	1.35	1.15	1.10
355	1.39	1.34	1.14	1.09
350	1.38	1.33	1.13	1.08
345	1.36	1.32	1.12	1.07
340	1.35	1.30	1.11	1.06
335	1.33	1.29	1.09	1.05
330	1.32	1.28	1.08	1.04
325	1.31	1.27	1.07	1.03
320	1.29	1.25	1.05	1.02
315	1.28	1.24	1.04	1.00
310	1.26	1.23	1.03	0.99
305	1.25	1.22	1.02	0.98
300	1.24	1.20	1.00	0.97

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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
295	1.22	1.19	0.99	0.96
290	1.21	1.18	0.98	0.95
285	1.19	1.17	0.96	0.94
280	1.18	1.15	0.95	0.93
275	1.17	1.14	0.94	0.92
270	1.15	1.13	0.93	0.90
265	1.14	1.11	0.91	0.89
260	1.12	1.10	0.90	0.88
255	1.11	1.09	0.89	0.87
250	1.09	1.08	0.87	0.86
245	1.08	1.06	0.86	0.85
240	1.07	1.05	0.85	0.84
235	1.05	1.04	0.84	0.83
230	1.04	1.03	0.82	0.82
225	1.02	1.01	0.81	0.80
220	1.01	1.00	0.80	0.79
215	1.00	0.99	0.79	0.78
210	0.98	0.98	0.77	0.77
205	0.97	0.97	0.76	0.76
200	0.95	0.95	0.75	0.75
195	0.94	0.94	0.74	0.74
190	0.93	0.93	0.73	0.73
185	0.91	0.91	0.72	0.72
180	0.90	0.90	0.71	0.71
175	0.89	0.89	0.70	0.70
170	0.87	0.87	0.69	0.69
165	0.86	0.86	0.68	0.68
160	0.85	0.85	0.67	0.67
155	0.83	0.83	0.65	0.65
150	0.82	0.82	0.64	0.64
145	0.81	0.81	0.63	0.63
140	0.79	0.79	0.62	0.62



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**REACTOR COOLANT BORON / LITHIUM SPECIFICATIONS**

BORON	LITHIUM, ppm			
	High Limit	Admin High Limit	Admin Low Limit	Low Limit
135	0.78	0.78	0.61	0.61
130	0.77	0.77	0.60	0.60
125	0.75	0.75	0.59	0.59
120	0.74	0.74	0.58	0.58
115	0.73	0.73	0.57	0.57
110	0.71	0.71	0.56	0.56
105	0.70	0.70	0.55	0.55
100	0.69	0.69	0.54	0.54
95	0.67	0.67	0.53	0.53
90	0.66	0.66	0.52	0.52
85	0.65	0.65	0.51	0.51
80	0.63	0.63	0.50	0.50
75	0.62	0.62	0.49	0.49
70	0.61	0.61	0.48	0.48
65	0.59	0.59	0.47	0.47
60	0.58	0.58	0.46	0.46
55	0.57	0.57	0.45	0.45
50	0.55	0.55	0.44	0.44
45	0.54	0.54	0.42	0.42
40	0.53	0.53	0.41	0.41
35	0.51	0.51	0.40	0.40
30	0.50	0.50	0.39	0.39
25	0.49	0.49	0.38	0.38
20	0.47	0.47	0.37	0.37
15	0.46	0.46	0.36	0.36
10	0.45	0.45	0.35	0.35
5	0.43	0.43	0.34	0.34
0	0.42	0.42	0.33	0.33