RADIOLOGICAL AND ENVIRONMENTAL SERVICES PROCEDURES

Procedure No. RE - CS - 012 Rev. 2

Title: ROUTINE CHEMISTRY SPECIFICATIONS & FREQUENCY

Directed To:

Radiological and Environmental Services Staff	(X)
Health Physics	( )
Chemistry	(X)

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Effective Date: _____

ROUTINE CHEMISTRY SPECIFICATIONS & FREQUENCY

1.0 Objective:

To provide a procedure which outlines the non-radiological in-plant chemistry specifications and sample frequency.

2.0 Precautions & Limitations

2.1 All standard safety procedures shall be followed at all times.

2.2 All health physics rules and regulations shall be followed.

2.3 Reference Documents

2.3.1 Technical specification
2.3.2 Westinghouse specification
2.3.3 Final Safety Analysis Report
2.3.4 Westinghouse AVT guidelines INT-77-543
2.3.5 PWR Secondary Water Chemistry Quidelines EPRI-NP-2704-SR.

2.4 Refer to applicable sampling procedures for system sampling and applicable chemistry procedures to analyze each sample.

2.5 The frequency and specifications for tests other than those required by Technical Specifications or the SPDES permit are guidelines and not requirements. The frequency of these tests can be altered at the discretion of the Chemistry Supervisor or Radiological and Environmental Services Superintendent.

2.6 Chemistry guidelines are delineated to alert chemistry personnel of trends toward abnormal chemistry such that corrective action can be initated prior to exceeding other specifications that will limit plant operation. In addition, Steam Generator Owners Group specifications for secondary chemistry are delineated to inform personnel of industry wide guidelines.

2.7 Any results which are outside the limits specified here in shall be reported to Chemistry Supervisor and or Watch Foreman as soon as practical for evaluation and or correction.

2.8 SPDES limits delineated in this procedure are site limits.

2.9 Specifications and Action Limits for Key Parameters are further delineated in SOP-SG-2.

2.10 Identification of typical process sampling points for secondary water chemistry is shown in attachment A.

2.11 The following procedures are to be considered "key" or "critical" to control points:

CI-009 Calibration and Maintenance of the Cambridge Dissolved Oxygen Analyzer Model 5020
CA-052 Oxygen, Determination of Oxygen by Indigo Carmine in Water
CA-053 Dissolved Oxygen, Unmodified Winkler
CA-041 Hydrazine, Colorimetric Determination by Dimethyl-Aminobenyaldehyde

CA-071	Chlorides Determination by Specific Ion Electrode
CA-016	Chlorides, Titrimetric Determination with Mecuric Nitrate
CI-022	Operation of Orion Model 811 pH Meter
CI-044	Sodium Detector (Orion) Calibration & Operation
CI-046	Calibration of Conductivity Monitor
CI-070	Determination of Cell Constant
CI-063	Operation of Plasma Emission Spectrometer
CA-069	Silica, High Range Colorimetric
CA-070	Silica, Low Range Colorimetric

3.0 Procedure:

3.1 The attached table shows specification and sampling frequency.

3.2 All results shall be entered in either the CCR, chemistry log sheets, or chemistry watch log. All results of this procedure that refer to "key" or "critical" parameters and appendix "A" Technical Specification items shall be maintained by the Chemistry Supervisor for the life of the plant.

3.3 The attached table is a list of routine samples, additional samples may be required at the discretion of the Chemistry Supervisor or Shift Supervisor.

3.4 Secondary water chemistry data is initially interpreted by the Watch Chemist who will record data on a shift basis and will enter that data on the chemistry log sheet, in the chemistry log book, and in the Central Control Room log book. Any significant abnormal chemistry data shall be brought to the attention of the Shift Supervisor (the Chemistry Supervisor should also be informed). The Chemistry Supervisor should also inform the General Chemistry Supervisor who will in turn inform the Radiological and Environmental Services Superintendent. The R.E.S.S. informs the Superintendent of Power.

3.5 The sequence of administrative events required to initiate corrective action is as follows: When chemistry data is recorded it is evaluated by the Watch Chemist to see if it is within operating guidelines and in a steady state condition, or if an abnormal trend is developing. This data is reported to the Chemistry Supervisor (in addition to shift reporting requirements). If the Watch Chemist obtains data that is abnormal, but within his control to adjust, he will make the necessary adjustments and the corrected chemistry will be verified. For routine chemistry corrective actions, actions shall be in a timely manner. When routine chemistry corrective actions have not been effective, senior supervision will be notified immediately. (see Attachment B)

PRIMARY LIQUID SYSTEMS

SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
. Accumulators	Boron ≥ 2000 ppm	T.S.	1 per month	45 days	T.S.
	Chloride ≤ 0.15 ppm	W	1 per month		W
	Fluoride ≤ 0.15 ppm	W	1 per month		W
. Boric Acid Storage Tanks	Boric Acid 11.5-13.0%	T.S.	1 per week 2 per week	10 days	T.S. P
	Chloride ≤ 0.15 ppm	W.	1 per week 2 per week	10 days	T.S. P
	Fluoride ≤ 0.25 ppm	W	2 per week 2 per week		W P
	pH INFO	W	1 per month		W
	Cond. INFO	W	1 per month		W
	Silica ≤ 2.1 ppm	W	1 per month		W
	Aluminum ≤ 0.66 ppm	W	1 per month		W
	Calcium ≤ 0.66 ppm	W	1 per month		W
	Magnesium ≤ 0.66 ppm	W	1 per month		W
Boric Acid Injection Tank	Boric Acid 11.5-13.0%	T.S.	1 per week 2 per week	10 days	T.S. P
	Chloride ≤0.15 ppm	W	1 per week 2 per week	10 days	T.S. P
	Fluoride ≤ 0.25 ppm	P	2 per week		P

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
D. Component Cooling	pH 8.0-9.0	W	1 per month 2 per month	45 days	T.S. P
	Chromate 175-225 ppm (CrO_4)	W	1 per month 2 per month	45 days	T.S. P
	Chloride $\leq$ 0.15	W	1 per month		P
	Fluoride $\leq$ 0.15	W	1 per month		P
E Monitor Tanks (when in re-use)	pH 6.0-8.0	W	As Requested (Prior to re-use)		P
	Conductivity $\leq$ 2.0 umho/cm	W	As Requested (Prior to re-use)		P
	Diss. Oxygen $\leq$ 0.10	W	As Requested (Prior to re-use)		P
	Chloride and $\leq$ 0.10 ppm Total Fluoride	W	As Requested (Prior to re-use)		P
	Boron $\leq$10 ppm @ EOL	W	As Requested (Prior to re-use)		P
	$\leq$25 ppm @ BOL	W	As Requested (Prior to re-use)		P
F. Primary Water Storage Tank	pH 6.0-8.0	W	1 per week		P
	Diss. Oxygen 0.10	W	1 per week		P
	Boron $\leq$10 ppm @ EOL $\leq$25 ppm @ BOL	P	1 per week		P
	Suspended Solids $\leq$ 0.10	W	1 per week		P
	Silica $\leq$ 0.1 ppm	W	1 per month		P
	Calcium $\leq$ 0.020 ppm	W	1 per month		P
	Magnesium $\leq$ 0.020	W	1 per month		P

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SECONDARY LIQUID SYSTEMS

AMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
Auxiliary Feedwater (Hot standby)	Diss. Oxygen* $\leq$100 ppb	SGOG	daily		SGOG
	Hydrazine three times Diss. O_2	SGOG	daily		SGOG
Condensate Pump Discharge (Power Operation)	Diss. Oxygen* <10 ppb	SGOG	Continuous		SGOG
	$\leq$ 5 ppb	P		1 per shift	P
	Hydrazine (INFO) concentration	P	Continuous	1 per shift	P
	Cation Cond. <0.5 umho/cm	P	Continuous		P
	Sodium* <3 ppb	P	Continuous		P
	Ammonia <0.5 ppm	P	1 per day		P
Condensate Water Storage Tank	pH 6.0-8.0	P	1 per week		P
	Spec. Cond $\leq$ 4.0 umho/cm	P	1 per week		P
	Chloride <0.02 ppm	P	1 per week		P
	Fluoride <0.02 ppm	P	1 per week		P
	Silica $\leq$0.05 ppm	P	1 per week		W
	Diss. Oxygen* (degas outlet)	P	1 per week		P
	$\leq$ 0.10 ppm	SGOG	1 per week		P
	Ammonia $\leq$ 0.5 ppm	P	1 per week		P
	Sodium $\leq$0.01 ppm	P	1 per week		P
	Suspended Solids $\leq$ 0.10 ppm	P	1 per week		P
	Cation Cond. $\leq$0.5 uhmo/cm	P	continuous		P
	Ion Chromatographic INFO analysis	P	1 Per week		P

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* Key Parameter

SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
D. High Pressure Feed Water (Power Operation)	pH* 8.8-9.2 pH > 8.5 (Boron added to SG)	SGOG	Continuous		SGOG
	Spec. Cond. 1.8-5.0 umho/cm	P	Continuous		SGOG
	Diss Oxygen* <3 ppb	SGOG	Continuous	1 per shift	SGOG
	Hydrazine* Three times dis. Oxygen CPD	SGOG	Continuous	1 per shift	SGOG
	Cation Cond.*< 0.2 umho/cm < 0.5 umho/cm	SGOG P	Continuous	1 per shift	SGOG
	Ammonia ≤ 0.5 ppm	P	1 per day		P
	Sodium* ≤3 ppb	SGOG	Continuous	1 per week	SGOG
	Iron* ≤ 10 ppb	SGOG	1 per week (Integrated)	(grab)/Wk.	SGOG
	Copper* ≤ 2 ppb ≤ 10 ppb	SGOG P	1 per week (Integrated)	(grab)/Wk.	SGOG P
E. Main Steam (Power Operation)	pH 8.8-9.5	W	Continuous	1 per shift	P
	Chloride ≤ 5 ppb	W	Continuous	1 per day	P
	Diss. Oxygen ≤ 10 ppb	W	Continuous	1 per shift	P
	Sodium ≤ 5 ppb	W	Continuous		P
	Silica ≤ 10 ppb	W	Continuous	1 per week	P
	Cation Cond.≤ 0.3 umhos/cm	W	Continuous		P
	Copper ≤ 2 ppb	W	1 per week		P
	Iron ≤ 20 ppb	W	1 per week		P

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
E. Main Steam con't	Ion Chromatographic Analysis				
	sulfates . sulfites < detectable	W	1 per week		P
F. Make up water (water factory & other sources	Spec. Cond. < 0.2 umhos/cm	P	1 per week		P
	pH 6.0-8.0	P	1 per week		P
	Sodium < 0.01	P	1 per week		P
	Silica < 0.05 ppm	P	1 per week		P
	Diss. Oxygen < 0.1 ppm	P	1 per week		P
G. Steam Generators (Power Operation)					
	Boron (if added) 5-10 ppm	P	1 per Shift		P
	pH 8.5-9.2*	SGOG	1 per Shift		P
	> 7.0 (if Boron added)	P			
	Cation Cond.* $\leq$0.8 umhos/cm	SGOG	1 per Shift		P
	$\leq$10.0 umhos/cm	P			
	Chloride* <0.02 ppm	SGOG	1 per Shift		P
	<0.100 ppm	P	2 per Shift (if greater than .15 ppm Cl^-)		P
	Silica $\leq$ 0.300 ppm	SGOG			
	$\leq$ 0.500 ppm	P	1 per week		P
	Sodium* $\leq$.02 ppm	SGOG	1 per week		P

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MPLE POINT	SPECFIICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
Steam Generators (Power Operation)	Ion Chromatographic Analysis	P	1 per week		P
Steam Generators (Hot Standby)					
	pH* 8.5-9.2 (SU)	SGOG	continuous		SGOG
	>7.0 SU(if Boric Acid is added)	P	1 per shift		P
	Cation Cond.* <2.0 umho/cm	SGOG	continuous		SGOG
	< 10.0 umho/cm	P			
	Diss. Oxygen*< 5 ppb	SGOG	1 per day		SGOG
	Sodium* < 100 ppb	SGOG	continuous		SGOG
	Chloride* ≤ 100 ppb	SGOG	1 per day		SGOG
	≤ 150 ppb	P	1 per shift		P
Steam Generators (Cold Shutdown)					
	pH* 9.8-10.5(SU)	SGOG	3 per week	1 per week	SGOG
	> 9.8	P			P
	Hydrazine* 75-200 ppm	SGOG	3 per week	1 per week	SGOG
	> 75 ppm	P			P
	Sodium* < 1000 ppb	SGOG	3 per week	1 per week	SGOG
	Cation Cond.* <10 umho/cm	SGOG	3 per week	1 per week	SGOG
	<20 umho/cm	P			
	Diss. Oxygen* <100 ppb	P	3 per weel	1 per week	P
	Chloride* < 500 ppb	P	2 per week	1 per week	P

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
J. Condenser Hotwell (Power Operation)	Sodium - (Monitoring)	N/A	Continuous	N/A	N/A
	Specific Cond. (Monitoring)	N/A	Continuous	N/A	N/A
	Cation Cond. (Monitoring)	N/A	Continuous	N/A	N/A

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III AUXILIARY SYSTEMS

SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
A. Instrument Air Closed Cooling	Drewgard 960-2000 ppm	P	2 per month		P
	pH (INFO)	P	2 per month		P
B. Turbine Hall Closed Cooling	Drewgard 960-2000 ppm	P	2 per month		P
	pH (INFO)	P	2 per month		P
C. Turbine Lub Oil (main turbine & Boiler Feed pump)	Viscosity 150-165 SSU @ 100°F	MOBIL	1 per week		P
	% Sludge < .1	P	1 per week		P
	% Water < .1	P	1 per week		P
	Particles: 10 - 25 42,000/100ml 25 - 50 6,000/100ml 50 - 100 1,000/100ml 100 92/100ml	ASME CLASS 6	1 per week		P
1. Turbine Gen Lub. Oil Purifier Outlet	% Water (INFO)	P	1 per week		P
	% Sludge (INFO)	P	1 per week		P
	Particle (INFO)	P	1 per week		P
2. Main Boiler Feed Pump Lub. Oil Purifier Outlet	% Water (INFO)	P	1 per week		P
	% Sludge (INFO)	P	1 per week		P
	Particle (INFO)	P	1 per week		P
D. Diesel Gen. Closed Cooling (emergency diesels 31-33 only)	pH 8.5-10.0	ALCO Manual	2 per month		P
	Chromate 800-1600 ppm	ALCO Manual	2 per month		P

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
E. Diesel Fuel Oils	% Water .1	P	1 per quarter		T.S.
			2 per month		P
1. Emergency Diesels			1 per quarter		T.S.
2. Fire Pro. Diesel	% Sludge .1	P	2 per month		P
3. TSC Diesel			1 per quarter		T.S.
	Viscosity 32-42 SSU	P	2 per month		P
F. Diesel Lub. Oil	Viscosity 900-1250	MOBIL	1 per month		P
	% Water .1	P	1 per month		P
	% Sludge .1	P	1 per month		P
G. Glycol Protected Systems					
1. Chill Water	Freeze Pt. -30°F	P	1 per month during Heating Season		P
2. Evaporator Cooling	Freeze Pt. -30°F	P	1 per month during Heating Season		P
3. Steam Heating	Freeze Pt. -30°F	P	1 per month during Heating Season		P
4. Counting Room A/C cooling	Freeze Pt. -30°F	P	1 per month during Heating Season		P
5. TSC A/C Cooling	Freeze Pt. -30°F	P	1 per month during Heating Season		P
H. House Serv. Boiler					
	pH 9.50-10.0 SU	P	1 per week		P
	PO_4 20-80 ppm	P	1 per week		P
	Cond. 1400 umho/cm	P	1 per week		P
	Total Sus. Solids 300 ppm	P	1 per week		P
	Diss. Oxygen 0.10 ppm	P	1 per week		P

T.S. = Technical Specifications H = Heating P = RASCW

SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	RE-CS-012/2 REFERENCE CODE
I. Transformer Insulating Cooling Oil	Dissolved Gas	P	1 per quarter		DOBLE
	Screen Test	P	1 per year		DOBLE
IV SEWAGE TREATMENT PLANT					
A. Equalization Tank	pH (INFO)	P	1 per day		SPDES
	Settleable Solids	P	1 per day		SPDES
B. Aeration Tank	pH (INFO)	P	1 per day		P
	Settleable Solids 20%	P	1 per day		P
	Dissolved Oxygen (INFO)	P	1 per day		P
C. Secondary Clarifier	pH (INFO)	P	1 per day		P
	Dissolved Oxygen (INFO)	P	1 per day		P
D. Effluent					
1. Flow	20, 000 gpd	SPDES	Continuous Recorder		SPDES
2. BOD_5	30 mg/l monthly Avg.	SPDES	Monthly (6 Hour Composite)		SPDES
	45 mg/l daily max.*	SPDES	weekly (6 Hour Composite)		P
3. Total Sus. Solids	30 mg/l monthly Avg.	SPDES	Monthly (6 Hour Composite)		SPDES
	45 mg/l daily max.*	SPDES	Weekly (6 Hour Composite)		P
4. Settleable Solids	0.3 ml/l daily max.	SPDES	Weekly grab		SPDES
			1 per day		P
5. Fecal Coliform	200 monthly Avg. **				
	400 daily Max.				
	MPN/100 ml	SPDES	1 per week		SPDES
6. pH Range	6.0 - 9.0 S.U.	SPDES	1 per week		SPDES
			1 per day		P

* 7 day and 30 day arithmetic mean respectively

** 7 day and 30 day geometric mean

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V. SPDES LIMITATIONS

SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
A. Discharge Canal	Total Residual chlorine 0.5 mg/l	SPDES	continuous during chlorination		SPDES
	Total Chromium 30 lbs/day	SPDES	1 per week		SPDES
	200 lbs/yr	SPDES	(controlled by calculation of rad. waste tanks)		SPDES
	Lithium Hydroxide 0.01 mg/l	SPDES	1 per week (controlled by calculation of rad. waste tanks)		SPDES
	Boron 1.0 mg/l	SPDES	1 per week EACH RELEASE*		SPDES P
	Boron 525 lbs/day	SPDES	1 per week EACH RELEASE*		SPDES P
	pH 6.0-9.0 S.U.	SPDES	1 per week		SPDES
	* By calculation of samples of S/G blowdown and rad waste				
B. Plant Effluent (Composite of steam gen. rad. waste tanks, waste neut.tank flash evap. and house service boiler)	Flow (INFO)	SPDES	1 per week		SPDES
	total sus. sol. 30 mg/l monthly avg. 50 mg/l daily max.	SPDES	1 per month		SPDES
C. Radioactive Waste Tanks	Flow (INFO)	SPDES	1 per week		SPDES
	Total Chromium 1.0 mg/l daily max.	SPDES	1 per week		SPDES
	0.5 mg/l daily avg.	SPDES	1 per week		SPDES
	Oil and Grease $\leq$15 mg/l	SPDES	1 per week		SPDES
	Surfactants 6 lbs/day daily max	SPDES	1 per week		SPDES
	Hexavalent Chromium .05 mgl Daily Avg.	SPDES	1 per week		SPDES
	.1 Daily Max	SPDES	1 per week		SPDES

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
D. Flash Evaporator blowdown (when in service with river water feed)	Total Sus. Solids				
	50 mg/l daily max.	SPDES	1 per week		SPDES
	30 mg/l daily avg.	SPDES	1 per week		SPDES
E. Waste Neut. tank	pH 6.0-9.0 S.U.	SPDES	1 per week		SPDES
F. House Service Boiler Blowdown	Phosphate (as P)				
	38 lbs/day daily max.	SPDES	1 per week		SPDES
	16 lbs/day daily avg.	SPDES	1 per week		SPDES
G. Turbine Hall Floor Drains	Oil/Grease Sample	SPDES	1 per week		SPDES
VI GAS SYSTEMS					
A. Blanket Gases	H_2 Variable	FSAR	1 per week		P
1 Reactor Coolant Drain Tank	*O_2 < 2.0%	P	1 per week		P
2 Vol. Control	H_2 Variable*	FSAR	1 per week		P
	*O_2 < 2.0%	P	1 per week		P
3 Pressurizer	H_2 Variable	FSAR	1 per week		P
	O_2 < 2.0%	P	1 per week		P
4 Resin Storage	H_2 Variable	FSAR	1 per week		P
	O_2 < 2.0%	P	1 per week		P
5 Large Gas Decay Tank	H_2 Variable	FSAR	1 per week		P
	O_2 < 2.0%	P	1 per week		P
6 Small gas Decay Tank	H_2 Variable	FSAR	1 per week		P
	O_2 < 2.0%	P	1 per week		P
7 CVCS Hold up tanks	H_2 variable	FSAR	1 per week		P
	O_2 < 2.0%	P	1 per week		P

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
I Refueling Water Storage Tank	Boron ≥ 2000 ppm	T.S.	1 per month	45 days	T.S.
	pH 3.0-11.0	W	1 per month	45 days	T.S.
	Chloride ≤ 0.15 ppm	W	1 per month	45 days	T.S.
	Fluoride ≤0.15 ppm	W	1 per month		W
	Suspended Solids ≤ 2.0 ppm	W	1 per month		P
	Silica ≤ 0.30 ppm	W	1 per month		W
	Aluminum ≤ 0.08 ppm	W	1 per month		W
	Calcium ≤ 0.08 ppm	W	1 per month		W
	Magnesium ≤ 0.08 ppm	W	1 per month		W
I Spent Fuel Pool Demineralizer Inlet	Boron ≥ 1000 ppm	T.S.	1 per month (Daily During Refueling) 1 per week	45 days	T.S. T.S. W
	Chloride ≤ 0.15 ppm	T.S.	1 per month 1 per week	45 days	T.S. W
	Fluoride ≤ 0.15 ppm	W	1 per week		W
	Calcium ≤ 1.0 ppm	W	1 per month		W
	Magnesium ≤ 1.0 ppm	W	1 per month		W
Demineralizer Outlet	Chloride <.02 ppm	P	1 per week		W
	Fluoride <.02 ppm	P	1 per week		W
J Spray Additive Tank	Sodium Hydroxide ≥ 30%	T.S.	1 Per month	45 days	T.S.

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SAMPLE POINT	SPECIFICATION	REFERENCE CODE	NORMAL FREQUENCY	MAX FREQUENCY	REFERENCE CODE
& Gas Stripper	H_2 variable	FSAR	1 per week		P
* During normal operation, the RCS dissolved oxygen limit is more restrictive					
B. Battery Rm & Hydrogen Cribs	$\leq$ .08% LEL Combustables	P	2 per month		P
C. Containment	.50% LEL Combustables	FSAR	1 per month		P
D. Transformer Gas	$\leq$ .08% LEL Combustables	P	1 per month		P
E. Turbine Gen.	$\leq$ .08% LEL Combustables	P	2 per month		P
F. Turbine Gen.	Hydrogen $\geq$ 96%	P	Continuous -	1 per shift	P
G. Instrument Air					
1. Refrigerant Drier out	Dewpoint Less than Sys. Temp.	P	2 per month		P
2. Desicator out	Dewpoint Less than Sys. Temp.	P	2 per month		P
H. Breathing Air Systems					
1. Carbon Monoxide	20 ppm	ANSI Z86.1	1 per week (during op.)*		P
			and After Extended (1 week) shutdown		P
2. Carbon Dioxide	1000 ppm	ANSI Z86.1	1 per week*		P
3. Water vapor	200 ppm	P	1 per week		P
4. oil/grease	5 mg/m3	ANSI Z86.1	1 per week		P
5. Oxygen	19.5%-23.5%	ANSI Z86.1	1 per week *		P

* CO, CO_2,O_2 prior to use for an unused station

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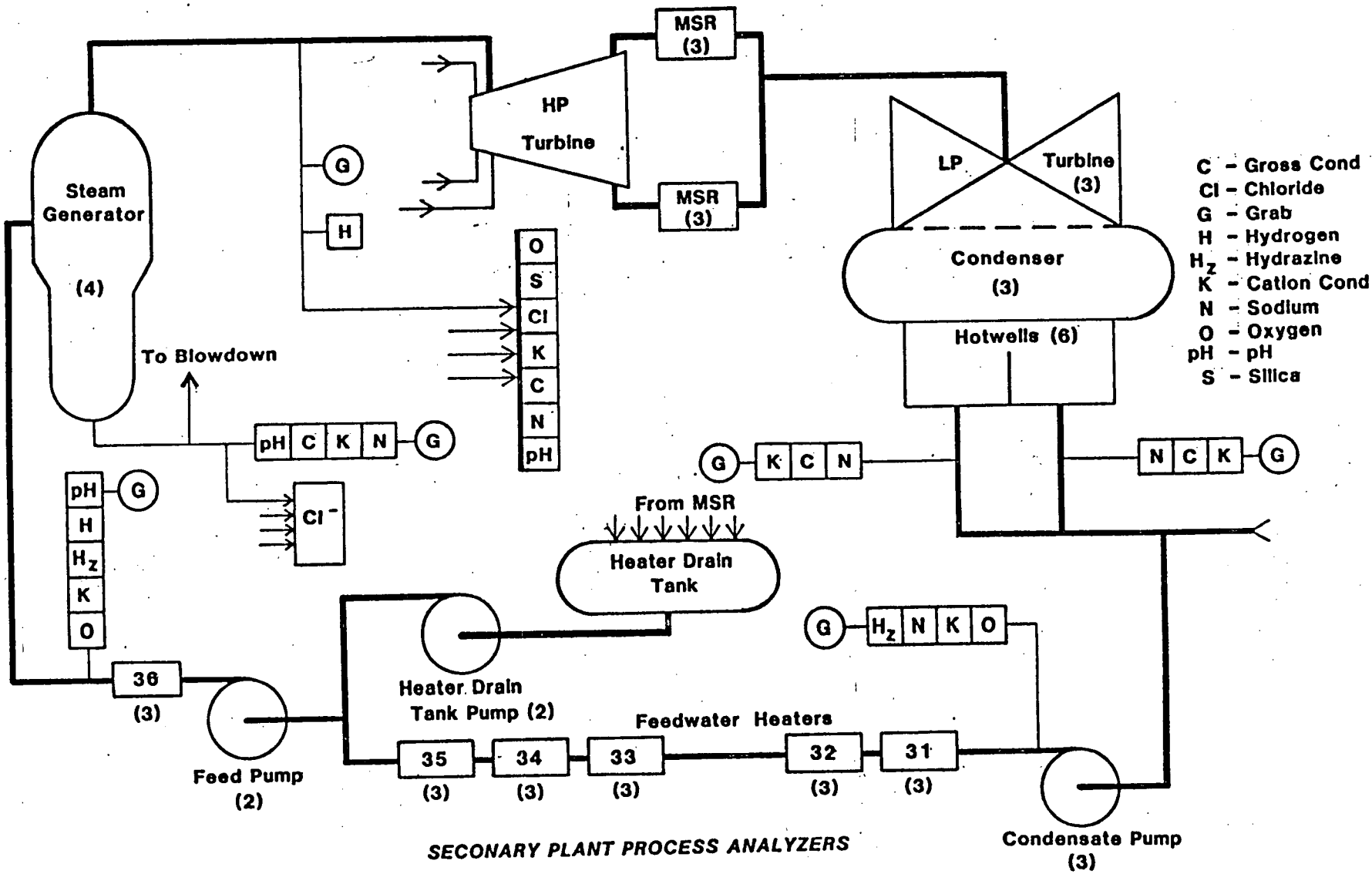
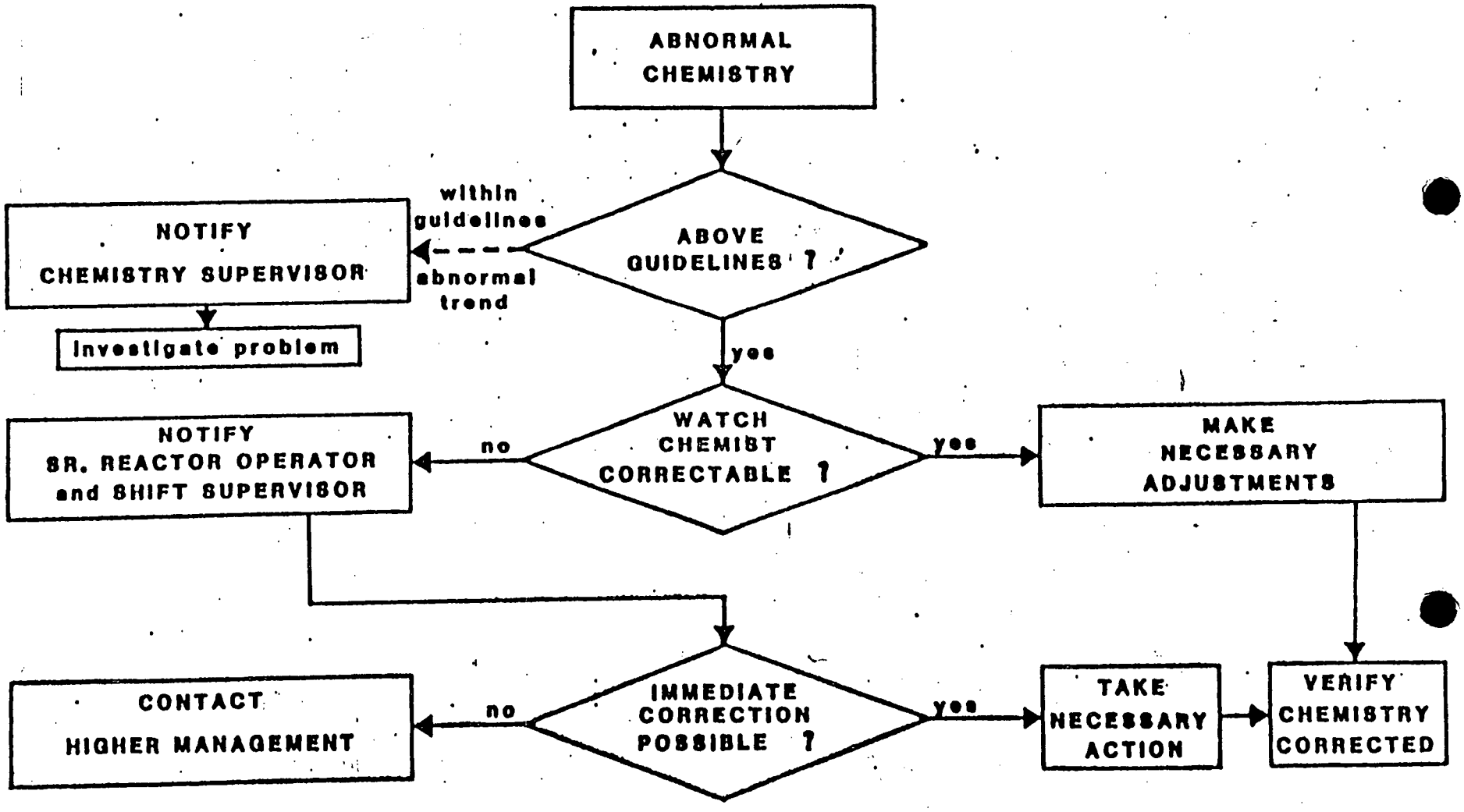


SECONARY PLANT PROCESS ANALYZERS

ABNORMAL CHEMISTRY CORRECTIVE ACTION



ATTACHMENT B

f. Open the ball valve (SGN-6 for Steam Generator No. 31, SGN-5 for Steam Generator No. 32, SGN-7 for Steam Generator No. 33 or SGN-8 for Steam Generator No. 34) and bubble the contents of the nitrogen truck through the steam generator for approximately 20 minutes.

4.1.6 Have Shift Chemist sample the steam generator to assure that chemistry will be within specifications when the steam generator is completely filled.

4.1.7 Start the motor driven auxiliary feed water pump and fill the steam generator until water issues from drain then secure the pump if the motor driven aux. boiler feed pump was.

4.2 Adding Chemicals While in Wet Layup

4.2.1 Partially drain the steam generator(s) via the steam generator blowdown system as required, then close the blowdown valve.

CAUTION

Observe precautions on chemical release to river.

4.2.2 Have Shift Chemist adjust Steam Generator chemistry as required by adding chemicals to Steam Generators as per chemistry department procedures.

4.2.3 Start the Auxiliary feedwater pump(s), for the steam generator(s) to which chemicals have just been added. When the water level increases to approximately 100% stop the pump(s).

4.2.4 To mix the chemicals throughout the steam generator(s) using the nitrogen circulation system.

a. Open the isolation valves on each side of the N_2 ball valve for the appropriate steam generator(s).

Steam Generator 31 - SGN-2 and SGN-14
Steam Generator 32 - SGN-1 and SGN-13
Steam Generator 33 - SGN-3 and SGN-15
Steam Generator 34 - SGN-4 and SGN-16

b. Close the sample line isolation valves (989) for the appropriate steam generator(s).

c. Close the manual blowdown angle valves in the blowdown storage tank room for the appropriate steam generator.

d. Place nitrogen truck in service and open SGN-41.

e. Adjust nitrogen pressure control valve (PCV-1321) to maintain 50 psi as indicated on local pressure indicator PI-1407.

f. Open the ball valve (SGN-6 for Steam Generator No. 31, SGN-5 for Steam Generator No. 32, SGN-7 for Steam Generator No. 33 or SGN-8 for Steam Generator No. 34) and bubble the contents of the nitrogen truck through the steam generator.

4.2.5 Have Shift Chemist sample the steam generator to assure that chemistry will be within specifications when the steam generator is refilled.

4.2.6 Start the motor driven auxiliary feed water pump and fill the steam generator until water issues from drain then secure the pump.

Chemistry Specifications

1.0 Intent

To detail the secondary chemistry specifications and action limits for cold shutdown, hot shutdown and power operation.

2.0 Initial Conditions

2.1 None

3.0 Precautions and Limitations

3.1 As the concentrations of contaminants in the steam generators increases, immediate corrective action, in the form of increased blowdown, shall be initiated.

3.2 If steam generator blowdown alone is not sufficient to bring the steam generator chemistry within chemical specifications, additional corrective action, up to and including bringing the plant to cold shutdown, shall be immediately initiated by the Shift Supervisor in accordance with sections 4.4.1 and 4.4.2. The rate of load reduction of cooldown should be based upon the level of contaminants and its rate of change.

3.3 Excessive hydrazine addition must be avoided as the residual hydrazine decomposes to ammonia which in turn increases copper corrosion in the feedwater heater and condenser tubes.

3.4 If one or more sextant gross conductivity monitors read greater than 20 micromhos in conjunction with the condensate pump discharge sodium greater than 1000 ppb and the high pressure feedwater cation conductivity greater than 5 micromhos, the CST should be immediately isolated from the hotwells and the unit should be tripped immediately and brought to a cold shutdown condition in accordance with appropriate operations procedures.

3.5 Secondary water chemistry data review as referred to in Attachment A is maintained by the following:

3.5.1 The Nuclear Plant Operator will record chemistry data during his shift.

3.5.2 The Senior Reactor Operator will initial the Control Room Chemistry Data Log Book which is maintained by the Watch Chemist.

3.5.3 The Shift Supervisor shall be informed of any abnormal chemistry data and the Shift Supervisor should notify the Operations Superintendent of abnormal chemistry data.

3.5.4 The Operations Superintendent shall notify the Superintendent of Power of any significant abnormal chemistry data.

4.0 PROCEDURE

4.1 Status Modes

4.1.1 Steam Generator status modes are as follows: Cold Shutdown, Hot Shutdown Power Operation.

A) Partial Drain, Lay-up Cold Shutdown is when the Steam Generator/RCS temperature is $\geq 200^{o}$F.

The steam generator should be placed in full wet layup with chemically treated water when ever practical, and a nitrogen overpressure applied to minimize air ingress. Mixing of the bulk water shall be accomplished by nitrogem sparging. The cold shutdown period shall be utilized to reduce the steam generator impurity inventory.

B) Partial Drain is a cold shutdown condition where the S/G level is less than normal operating water level.

C) Dry Lay-up

The Steam Generator is completely drained and a nitrogen blanket/overpressure should be maintained whenever practical.

B and C are the least desirable condition for steam generator protection. If partial drain is necessary for maintenance the period of a partial drain/dry lay-up condition should be minimized.

D) Hot Shutdown is when the Steam Generator/RCS temperature is $> 200^{o}$.

E) Power Operation is when steam is admitted to the main turbine electrical generator and reactor power is > 2% rated power.

4.2 Maintain the following Chemical Specifications:

4.2.1 Cold Shutdown

Parameter	Frequency (Max. Freq.)	Normal Value	Initiate action	Value Prior to Heat Up
pH	3/week*	> 9.8	< 9.8	8.5 - 9.2
Hydrazine (ppm)	3/week*	> 75	< 75	
Chloride ppb	3/week*	-	-	
Sodium (ppb)	3/week* (-)	< 1000	> 1000	< 100
Diss. Oxygen (ppb)	3/week*	-		
Cation Cond. umho/cm	3/week* (-)	< 20.0	> 20.0	< 10.0

* Every other day until stable then weekly.

4.2.2 Cold Shutdown, Auxiliary Feed Water

Parameter	Frequency	Normal Value	Initiate Action
Dissolved Oxygen	Weekly	**	**

** - Dissolved oxygen concentration in the Condensate Storage Tank shall be minimized by the addition of hydrazine and/or recirculating the CST on the makeup water degasifier.

4.3 Hot Shutdown

Parameter	Frequency (max. Freq.)	Normal Value	Initiate Action	Value Prior to Power Escalation
pH	continuous (3/daily)	8.5-9.2 ($>7.0^1$)	<8.5 ($<7.0^1$) >9.2	- - -
Cation Cond. umho/cm	continuous (-)	<10.0	>10.0	<10.0
Diss. Oxy. (ppb)	3/daily	<5	>10	-
Sodium (ppb)	continuous (-)	<100	>100	<100
Chloride (ppb)	3/daily	<150	>150	<150

1 - If Borid Acid added to steam generator.

4.3.1 Hot Shutdown Auxiliary Feed Water

Parameter	Frequency	Normal Value	Initiate Action
Dissolved Oxygen (ppb)	daily	**	**

4.4 Power Operation

Power Operation

Parameter	Frequency (max. Freq.)	Normal Value	Action Level 1	2	3
pH	continuous (3/daily)	8.5 - 9.2 ($>7.0^1$)	<8.5 ($<7.0^1$) >9.2		
Cation Cond. umho/cm	continuous (-)	<10.0	>10	-	
Sodium (ppb)	continuous (-)	<50	>100		
Chloride (ppb)	3/daily	<100	≥ 150	≥ 500	≥ 750
Silica (ppb)	Weekly	<500	>500		

Feedwater
Power Operation

Parameter	Frequency	Normal Value	Action Level 1
pH	Continuous	8.8-9.2	>9.2, <8.8
Sodium (ppm)	Continuous	<3	>3
Dissolved Oxygen (ppb)	Continuous	<3	>5
Hydrazine	Continuous	3 X 0_2	$<$ 3 X 0_2
Ammonia	Daily	*	
Total Iron (ppb)	Weekly Integrated	<20	>20
Total Copper (ppb)	Weekly Integrated	<10	>15
Cation Cond.	Continuous	<0.8	≥ 1.0

* Consistent with pH.

4.4.2 Condensate
Power Operation

Parameter	Frequency (max. Freq.)	Normal Value	Level 1
Diss. oxy. (ppb)	Continuous (3/Daily)	< 10	> 15

Action Level 1

a) Identify and correct the cause for the out of normal parameter.

b) Return parameter to within normal value range within seven days after initial detection.

c) If parameter is not within normal range after seven days of initial detection go to action level 2 if applicable.

Action Level 2

a) Reduce power to 60% within eight hours of initiation of action level 2.

b) Return parameter to within normal value within 100 hrs after initiation of level 2 or go to level 3.

Action Level 3

3) Proceed to hot shutdown within six hours and clean up to within normal values by feed and bleed and draining and refilling.

CHEMISTRY DATA REVIEW