PALO VERDE NUCLEAR GENERATING STATION MANUAL	PROCEDURE NO. 74AC-9ZZ04	
SYSTEMS CHEMISTRY SPECIFICATIONS	REVISION 0	Page 1 of 25

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1.0 PURPOSE

1.1 This procedure provides system operating, makeup, standby and layup chemistry parameters for those systems requiring chemistry control.

2.0 REFERENCES

2.1 Implementing

2.1.1 Procedure 74PR-9ZZ01, Chemistry Control Program

2.1.2 Station Manual, Section 74 Procedures

2.1.3 Procedure 74AC-9ZZ03, Chemistry Control Instructions.

2.1.4 Procedure 74AC-9ZZ02, Laboratory Operations

2.2 Developmental

2.2.1 PVNGS Technical Specifications, December 6, 1983

2.2.2 Combustion Engineering Nuclear Steam Supply System Chemistry Manual, CENPD-28, Revision 3

2.2.3 Design and Operating Guidelines to Minimize Steam Generator Corrosion, EPRI-SGOG, November, 1980

2.2.4 BTC Procedure AD-127, Revision 0, System Cleanness and Verification Instruction

2.2.5 ASTM Standards, Part 23, 1980

2.2.6 Procedure 74AC-0ZZ01, Specifications For Bulk Chemicals

2.2.7 Water Quality Criteria, CEND-353

2.2.8 Water Quality Criteria, ANSI N45.2.1

2.2.9 Regulatory Guide 1.137, Specifications for Diesel Fuel Oils, Revision 0

FOR INFORMATION ONLY

3.0 DEFINITIONS AND ABBREVIATIONS

NOTE

PVNGS chemistry limits are categorized into three (3) distinct groups:

(1) Specifications
(2) Operating Ranges
(3) Typical Values

Although the analyses/limits are categorized into three (3) distinct groups, all are treated with equal importance in the laboratory.

3.1 Definitions

3.1.1 Specifications are those operating limits to which PVNGS is legally committed by regulatory requirements. Operation outside specifications requires notifications and/or actions as dictated by the appropriate regulations. Because prolonged operation outside specification limits can have severe safety and/or operational consequences, specifications have top priority.

3.1.2 Proper system chemistry control is rightly the domain of PVNGS management. Therefore, PVNGS defines the term operating ranges to designate those limits mandated and enforced by PVNGS management. The operating ranges include all limits necessary to adequately control the chemistry of plant systems. While these operating ranges may not specifically be governed by the technical specifications, these are strictly followed as plant management dictates.

3.1.3 There are many other parameters which the chemistry section desires to monitor in order to determine long term trends and subtle changes in plant chemistry. Analyses in this category are defined as being those typical values possessing significance, generally, only to the chemistry section. Operation outside the range of typical values does not require immediate action if the values are within operating ranges and specifications. However, typical values may indicate possible adverse conditions which the chemistry section should further evaluate for the purposes of developing a total understanding of the significance of the conditions.

3.1.4 There are five (5) action levels which are used by the chemistry section for chemistry control of the plant systems:

3.1.4.1 Action level No. 1's objective is to promptly identify the cause of a value to be out-of-range or out-of-specification without causing a need for power reduction. The action is to return the parameter to within the normal value range or specification within one (1) week following the confirmed excursion. Parameters not within the normal range or specification within one (1) week require progression to Action Level No. 2 (for those parameters having an Action Level No. 2 value).

3.1.4.2 The objective of Action Level No. 2 is to minimize system degradation by operation at reduced power while corrective actions are taken. Action Level No. 2 requires a power reduction (typically 30% or less) within 4.0 hours of initiation and a change to Action Level No. 3 for parameters not within the operating range or specification within 100 hours.

3.1.4.3 The intent of Action Level No. 3 is to correct conditions which may result in rapid system degradation. The action required is shutdown within four (4.0) hours and clean up by feed and bleed or drain and refill, as appropriate, until the operating range or specification is obtained.

3.1.4.4 Action Level No. 4 requires, or may require, that the source, system, tank, etc., be isolated and actions commenced to bring the specification within the appropriate limit prior to continued use. The action may require feed and bleed, blowdown, drain and fill, chemical additions, regeneration, etc.

3.1.4.5 Action Level No. 5 requires immediate verbal notification of the Shift Supervisor and the Unit Supervising Chemist for parameters suspected to be outside of the technical specification limits. An immediate follow-up sample is required for verification as per Procedure 74AC-9ZZ02. In addition, it is also required that verbal and written communication of the follow-up analysis be immediately given to the Shift Supervisor. Exceeding Action Level No.5 may require the issuance of a Chemistry Control Instruction (CCI) which will delineate the remedial actions required to bring the OOS condition to within the Technical Specification, and which will describe the applicable LCO.

3.2 Abbreviations

3.2.1 LLD - lower level of detection as specified by Technical Specification 3/4.12.1, table 4.12-1, item b.

3.2.2 NTU - nephlometric turbidity units

3.2.3 Grade A and Grade B demineralized water - waters used during startup and operation where utmost purity is required.

3.2.4 Inhibited water - water used for surface passivation of plant systems or water used to inhibit corrosion (containing hydrazine as an oxygen scavenger).

4.0 RESPONSIBILITES

4.1 Chemistry Supervisor

4.1.1 Reviews the overall performance of the Chemistry laboratory Operations.

4.1.2 Provides overall direction to the Supervising Chemist.

4.1.3 Provides assistance with problem solutions during periods where such action is warranted by plant operating demands.

4.2 Unit Supervising Chemist

4.2.1 Allocates technician resources to support unit operations/startup including the completion of scheduled chemistry program duties.

4.2.2 Reviews and evaluates the overall unit chemistry performance.

4.2.3 Ensures that out-of-specification conditions are properly detected, reported and corrected in a timely manner.

4.2.4 Determines methods to reduce the frequency and duration of periods when systems chemistry is out-of-specifcation.

4.2.5 Reviews reports of unit systems chemistry performance and approves recommended corrective actions.

4.2.6 Reviews Chemistry Control Instructions (Procedure 74AC-9ZZ03) for proper corrective actions to out-of-specification conditions.

4.3 Chemistry Technicians

4.3.1 Performs laboratory tasks of sampling and analysis of the designated systems.

4.3.2 Assist unit supervising chemist and operations staff in the surveillance of the unit systems in order ot maintain systems within prescribed chemistry specifications or operating ranges.

4.3.3 Uses Chemistry Control Intructions (Procedure 74AC-9ZZ03) to provide recommendations and assistance to the Shift Supervisor when systems are out-of-specification or trending toward out-of-specification.

4.3.4 Provides immediate notification of the Unit Supervising Chemist and Shift Supervisor of all values exceeding Technical Specification values.

5.0 INSTRUCTIONS

5.1 Flush Water Criteria

NOTE

Three water quality grades are specified for use in cleaning and flushing of primary and secondary systems. The quality of grade "A" water is in compliance with the requirements of CEND-353, section 6.3 and of ANSI N45.2.1, section 3.2.

5.1.1 Grade "A" Demineralized Water

	Specification	Operating Range	Typical Value	Action Level #4
pH @ 25°C	6.0 to 8.0 ≠	-	-	6.0 or 8.0
Conductivity @ 25°C, umhos/cm	2.0	-	-	2.0
Chloride, as Cl, ppm	0.15	-	-	0.15
Silica, as SiO_2, ppm	0.05	-	-	0.05
Fluoride, as F, ppm	0.1	-	-	0.1
Sulfide, as S, ppm	1.0	-	-	1.0
Suspended Solids, ppm	0.5	-	-	0.5
Turbidity, NTU	1.0	-	-	1.0
Oil	None visible	-	-	Visible

5.9 Circulation Water System

5.9.1 Makeup Water

Parameter	Specification	Operating Range	Typical Value
pH @25°C	-	-	9.0 to 10.0
Calcium, as $CaCO_3$, ppm	-	-	70
Magnesium, as $CaCO_3$, ppm	-	-	8.0
Bicarbonate, $CaCO_3$, ppm	-	-	100
Sulfate, as SO_4, ppm	-	-	200
Chloride, as Cl, ppm	-	-	265
Fluoride, as F, ppm	-	-	1.8
Ammonia, as NH_3, ppm	-	-	10
Silica, as SiO_2, ppm	-	-	10
Phosphate, as PO_4, ppm	-	-	0.5
Nitrate, as NO_3, ppm	-	-	150
Dissolved O_2, ppm	-	-	7.0 to 8.0
Suspended Solids, ppm	-	-	800

5.9.2 Recirculating Water ≠

See PCN #02

Parameter	Specification	Operating Range	Typical Value	Action Level #4
pH @25°C	-	6.8 to 7.2	-	6.8 or 7.2
Conductivity @ 25°C umhos/cm	-	-	10,000 to 18,000	-
Total Dissolved Solids, ppm	-	-	15,000	
Phosphate, as PO_4, ppm	-	10	-	10
Calcium, as $CaCO_3$, ppm	-	1500	-	1500
Dispersant, ppm	-	-	25 to 50	25 or 50
Free Chlorine as Cl_2, ppm	-	2.0 to 5.0	-	2.0 or 5.0
Silica, as SiO_2, ppm	-	150	-	150
SureCool 1370, ppm	-	25 to 35	-	25 or 35

≠ Filtered sample.

FOR INFORMATION ONLY

5.10 Essential Spray Pond System

5.10.1 Makeup Water

5.10.1.1 The specifications for makeup water for the Essential Spray Pond System is identical to those values indicated for the makeup to the Circulating Water System designated in section 5.9.1.

5.10.2 Essential Spray Pond

Parameter	Specification	Operating Range	Typical Value	Action Level #4
pH @ 25°C	-	7.6 to 8.0	-	-
Conductivity umho/cm @ 25°C	-	≤1200	-	>1200
Tolytriazole ppm	-	2 to 4	-	-
HEDP ppm as organophosphorous	-	3 to 5	-	-
Silica ppm	-	≤20	-	>20
Copper ppb	-	≤100	-	>100
Turbidity NTU	-	≤ 10	-	-
Chlorine ppm*	-	0.5 to 1.0	-	-
Phosphate ppm	-	≤1.5	-	>1.5
Alkalinity ppm	-	-	30 to 60	-

PCN 03 PCN 04

* As free available chlorine. The range 0.5 to 1.0 ppm is to be utilized when the chlorine injection pumps are operated on a continuous basis. If chlorine is shot fed via polysphere or hypochlorite bypass, the range should be raised to 2 to 5 ppm.

5.11 Oil Characteristics for Lube Oils

5.11.1 Physical Properties

Parameter	Specification	Operating Range	Typical Value	Action Level #4
Saybolt Viscosity, @ 38°C	140 to 170 SSH	-	-	140 or 170
Saybolt Viscosity, @ 99°C	43 to 45 SSH	-	-	43 or 45
Minimum Flash Point, °C	190	-	-	190
Maximum Neutralization Value, mg, KOH	0.2	-	-	0.2