

ATTACHMENT 1A

NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

NEO 2.17

SECONDARY WATER CHEMISTRY PROGRAM

APPROVED

J. F. Guber  
Senior Vice President,  
Nuclear Engineering and Operations

REVISION

0

DATE

May 30, 1985

CONCURRENCE

[Signature]  
Manager, Quality Assurance

# NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

## NEO 2.17

### SECONDARY WATER CHEMISTRY PROGRAM

#### 1.0 PURPOSE

The purpose of this procedure is to establish a secondary water chemistry program for all Northeast Utilities operating Pressurized Water Reactor (PWR) nuclear plants in accordance with Nuclear Engineering and Operations (NEO) Policy Statement No. 7, "Plant Water Chemistry Program." This program minimizes or eliminates corrosion/phenomena that are threatening to the long-term lifetime of significant plant equipment. Lower-tier implementing procedures are required.

#### 2.0 APPLICABILITY

This procedure applies to the NEO Group including the Northeast Nuclear Energy Company (NNECO) and the Connecticut Yankee Atomic Power Company (CYAPCO).

#### 3.0 REFERENCES

- 3.1 NEO Policy Statement No. 7 - Plant Water Chemistry Program, March 10, 1982.
- 3.2 Steam Generator Owners Group Secondary Water Chemistry Guidelines, Revision 1, June 1984.
- 3.3 Westinghouse Steam Side Water Chemistry Control Specifications, Update, August 1981.
- 3.4 Nuclear Steam Supply System Chemistry Manual, Combustion Engineering, Revision 3, September 1982.
- 3.5 American Society for the Testing of Materials (ASTM), 1984 Annual Book of Standards, Part 31, Water.
- 3.6 Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 15th Edition, 1980.
- 3.7 NEO Procedure 2.13, "Management of Nuclear Power Plant Records."

#### 4.0 DEFINITIONS

##### 4.1 Management Status Report on Water Chemistry

A report issued to NEO management, chemistry-related staff, and operations staff which evaluates the effectiveness of the

station water chemistry programs, and identifies any changes needed. This evaluation shall include an assessment of steam generator inspection/examination data with regard to any additional chemistry changes needed.

#### 4.2 Water Chemistry Action Plan (WATERCAP)

A brief summary of the efforts needed to implement the changes identified in the Management Status Report on Water Chemistry. The WATERCAP will be management approved and will serve as a tool for management support of the Water Chemistry Program.

#### 4.3 Chemistry Data Management System (CDMS)

A computerized system capable of managing and trending all major primary and secondary water chemistry parameters at all of the nuclear stations.

#### 4.4 NUSCO Chemistry Duty Officer

Designated by the Manager, Nuclear Materials and Chemistry, to provide the technical decision authority in the event that an exception to a power reduction/hold mandated by the station chemistry procedures is requested per Section 6.1.5.4.

### 5.0 RESPONSIBILITIES

#### 5.1 Senior Vice President, Nuclear Engineering and Operations

5.1.1 Responsible for providing the authority and resources for development, implementation, and maintenance of the Secondary Water Chemistry Program.

5.1.2 Responsible for approving any exceptions to power reductions/holds mandated by the station chemistry procedures which do not have a technical justification or as required by Section 6.1.5.5. Alternates are presented in Attachment 8.B.

5.1.3 Responsible for approving the WATERCAP.

#### 5.2 Vice President, Nuclear and Environmental Engineering

5.2.1 Responsible for ensuring that the Secondary Water Chemistry Program is developed, maintained, and implemented on the corporate level.

5.2.2 Responsible for approving the WATERCAP.

5.3 Vice President, Nuclear Operations

Responsible for ensuring implementation of the Secondary Water Chemistry Program at the stations.

5.4 Director, Nuclear Engineering and Operations Services

Responsible for approving the WATERCAP.

5.5 Station/Unit/Station Services Superintendents

- 5.5.1 Responsible for developing station procedures for implementing the Secondary Water Chemistry Program at the stations.
- 5.5.2 Responsible for ensuring implementation of corrective actions as required by Section 6.1.5.1.
- 5.5.3 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the Unit Duty Officer when the Unit and Station and Station Services Superintendents are unavailable.

5.6 Unit Duty Officer and NUSCO Chemistry Duty Officer

- 5.6.1 Responsible for ensuring initiation of corrective actions, as required by Section 6.1.5.1.
- 5.6.2 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. This responsibility is assumed by the Unit Duty Officer when the Station and Unit and Station Services Superintendents are not available, and by the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.

5.7 Station Chemistry Supervisors

- 5.7.1 Responsible for implementation of station chemistry procedures at the stations.
- 5.7.2 Responsible for initiating revisions to chemistry procedures as necessary to comply with the Secondary Water Chemistry Program and the WATERCAP.
- 5.7.3 Responsible for implementing the chemistry data management and trending as specified in Section 6.5.



- 5.7.4 Responsible for reviewing and commenting on the segments of the Management Status Report and the WATERCAP which apply to the plants under their responsibility.
- 5.7.5 Responsible for reviewing/interpreting chemistry data and initiating corrective actions as specified in Section 6.1.

5.8 Manager, Nuclear Materials and Chemistry

- 5.8.1 Responsible for designating the NUSCO Chemistry Duty Officer.
- 5.8.2 Responsible for approving and documenting any exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.
- 5.8.3 Responsible for compiling and approving the Management Status Report on Water Chemistry.
- 5.8.4 Responsible for compiling and approving the WATERCAP.
- 5.8.5 Responsible for assessing in-service inspection results to determine the effectiveness of the secondary water chemistry controls in minimizing or eliminating corrosion phenomena.
- 5.8.6 Responsible for ensuring that the secondary water chemistry controls defined in this procedure are adequate to minimize or eliminate corrosion phenomena.
- 5.8.7 Responsible for maintaining this procedure current.

5.9 Supervisors, Nuclear Materials and Chemistry

- 5.9.1 Responsible for performing technical reviews of revisions to the station secondary water chemistry procedures as specified in Section 6.1.6.
- 5.9.2 Responsible for developing and maintaining the Chemistry Data Management System (CDMS) computer programs.
- 5.9.3 Responsible for preparing the Management Status Reports on Water Chemistry.
- 5.9.4 Responsible for preparing the WATERCAP.

- 5.9.5 Responsible for preparing trend reports summarizing recent chemistry trends and recommending corrective actions on a regular basis, normally every two months, as specified in Section 6.5.3.

5.10 Manager/Supervisors

Responsible for ensuring that activities under their control are performed in accordance with the Water Chemistry Program, any related implementing procedures, and the WATERCAP.

6.0 INSTRUCTIONS

6.1 Station Chemistry Specifications and Corrective Actions

- 6.1.1 Station procedures shall identify station chemistry specifications which shall meet or exceed the Steam Generator Owners Group (SGOG) Secondary Water Chemistry Guidelines. Chemistry specifications which are not included in the SGOG guidelines shall meet or exceed the Nuclear Steam System Supplier (NSSS) vendor recommendations (References 3.3 and 3.4). Specific chemistry specifications for critical chemistry control parameters under full power operating conditions are listed in Attachment 8.A.
- 6.1.2 Station procedures shall identify specific corrective actions and/or power reductions/holds to be initiated upon exceeding station secondary water chemistry specifications including the sequence and timing of such corrective actions. These actions shall be based on the corrective actions recommended in the SGOG Secondary Water Chemistry Guidelines and NSSS vendor recommendations, as applicable. Corrective actions specified in the procedures shall include power reductions as specified in Attachment 8.A.
- 6.1.3 Chemistry specifications and/or corrective actions in addition to or more stringent than the guidelines referenced in Section 6.1.1 shall be instituted on a plant-specific basis. These specifications and corrective actions may be instituted directly by station chemistry or as recommended by Nuclear Materials and Chemistry. These specifications and corrective actions shall be based on specific concerns related to known corrosion phenomena and/or recent industry experience. Specifically, steam generator inspection/examination results shall be evaluated to determine if any additional secondary water chemistry controls are needed. The specifications shall also be based on a

proven capability to maintain a parameter at significantly lower levels than those specified in the referenced guidelines.

6.1.4 Exceptions to the guidelines specified in Sections 6.1.1 through 6.1.3 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

6.1.5 Exceeding Chemistry Specifications

6.1.5.1 Upon exceeding a chemistry specification, the correct personnel shall be notified and corrective actions taken, including power reductions/holds, as described in Figure 7.1.

6.1.5.2 Station and corporate personnel shall identify alternates to carry the responsibility and authority identified in Figure 7.1 in their absence.

6.1.5.3 When not on site, key station and corporate personnel identified in Figure 7.1 shall be available for contact. This availability may be achieved by being at an established telephone number or by carrying a paging device. When these choices are not feasible, an alternate must be identified per Section 6.1.5.2.

6.1.5.4 If an action level condition occurs (or threatens to occur) which requires a power reduction/hold, and extreme or unusual circumstances occur which provide technical justification for not reducing or holding power, an exception to the action level requirements may be applied for. To obtain an exception from the action level requirements, technical justification must be provided which indicates that circumstances exist which were unforeseen or unaccounted for in the guidelines referenced in Section 6.1.1. Exceptions from the action level requirements, which are technically justified, must receive the prior approval of the Station or Unit or Station Services Superintendent, and the Manager of Nuclear Materials and Chemistry. When the Station and Unit and Station Services Superintendents are unavailable, responsibility for site approval of exceptions to power reductions rests with the Unit Duty Officer. When the Manager, Nuclear Materials and Chemistry,

is unavailable, responsibility for corporate approval of exceptions to power reductions rests with the NUSCO Chemistry Duty Officer.

6.1.5.5 Exceptions from the action level requirements which do not have a technical justification or for which the requirements of Section 6.1.5.4 are in any way not met must receive the prior approval of the Senior Vice President, Nuclear Engineering and Operations. Alternates are presented in Attachment 8.B (Reference 5.1.2 of this procedure).

6.1.6 Revisions to Chemistry Specifications and Corrective Actions

Revisions to station chemistry procedures which relate to secondary chemistry specifications, action level requirements, and corrective actions must be reviewed by Nuclear Materials and Chemistry, in addition to the normal PORC review and approval.

6.2 Frequency of Analysis

- 6.2.1 Station procedures shall identify sampling frequencies and sample points for each secondary water chemistry parameter which has an assigned chemistry specification. For simplicity, sampling frequencies should be on a daily, weekly, or monthly basis, if practical. Sampling frequencies should be increased as needed during chemistry transients. All sampling frequencies shall meet or exceed the SGOG secondary water chemistry guidelines. Sampling frequencies for secondary water chemistry parameters which do not fall into the above categories shall be based upon NSSS vendor recommendations.
- 6.2.2 Sufficient supplies of chemical reagents and spare parts for analytical equipment shall be maintained to insure, with reasonable confidence, that specified analysis frequencies can be maintained. Alternate means of chemical analysis can be used as a backup if it is impractical to maintain a spare parts inventory, however, the alternate analysis must be of sufficient accuracy to determine if chemistry specifications are being met.
- 6.2.3 Exceptions to the guidelines specified in Sections 6.2.1 and 6.2.2 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

### 6.3 Analytical Techniques

- 6.3.1 Station procedures shall exist which identify specific analytical procedures for determining the values of all parameters with secondary water chemistry specifications. The procedures shall identify the applicability of the technique, the accuracy, and the minimum sensitivity of the technique. These procedures shall be modified as new analytical techniques become required.
- 6.3.2 Analytical techniques shall follow the procedures set forth by the American Society for the Testing of Materials (ASTM), Reference 3.5, or the procedures set forth in "Standard Methods for the Examination of Water and Waste Water," Reference 3.6, where applicable. Otherwise, techniques shall follow vendor's and manufacturer's recommendations. The accuracy of all techniques shall be confirmed and documented by testing known standards prior to instituting analytical procedures.
- 6.3.3 Exceptions to the guidelines specified in Sections 6.3.1 and 6.3.2 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

### 6.4 Instrumentation and Sampling

- 6.4.1 Sufficient in-line secondary water chemistry instrumentation and sampling points shall be available to meet the guidelines set forth by the SGOG. Secondary water chemistry parameters which are not covered by the SGOG guidelines shall be based upon the NSSS recommendations.
- 6.4.2 All in-line secondary water chemistry instrumentation shall be interfaced to a means of recording data, either a chart recorder or a computer data logging system.
- 6.4.3 Instrument calibration and preventive maintenance shall be performed as recommended by the instrument manufacturer, or as needed to avoid instrument failure or inaccuracy. Plant procedures shall exist which delineate the procedures for calibration and maintenance, and shall state the minimum frequency of calibration and maintenance.
- 6.4.4 Exceptions to the guidelines specified in Sections 6.4.1 through 6.4.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.



## 6.5 Data Management and Trending

- 6.5.1 A computerized data management system shall be created by Nuclear Materials and Chemistry which will provide trending and analysis capabilities for all major primary and secondary water chemistry parameters. This system, called the Chemistry Data Management System (CDMS), shall be used to record data on a daily basis at all nuclear stations in addition to the normal log sheets.
- 6.5.2 Data analysis, recording, review, and trending shall follow the flowpath described in Figure 7.1. Data log sheets shall be submitted to the Nuclear Plant Records System for permanent storage as required by NEO 2.13, "Management of Nuclear Power Plant Records."
- 6.5.3 A trend report summarizing recent chemistry trends and recommending corrective actions, where needed, shall be prepared by Nuclear Materials and Chemistry on a regular basis, normally every two months, for each plant, except during refueling outages for that plant.
- 6.5.4 Exceptions to the guidelines specified in Sections 6.5.1 through 6.5.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

## 6.6 Management Status Report on Water Chemistry

- 6.6.1 A Management Status Report on Water Chemistry shall be prepared by the Supervisor, Nuclear Materials and Chemistry at least once per year. This status report shall provide an update to senior NEO management summarizing the effectiveness of the station secondary water chemistry programs and identifying corrective actions required. These corrective actions may include plant modifications, procedure upgrades, instrumentation upgrades, personnel requirements, and others as needed. The status report may address any aspect of the secondary water chemistry program; however, the following items shall be addressed:
  - 6.6.1.1 The extent to which the station procedures and operating practices meet the chemistry specifications and corrective actions outlined in Section 6.1.1.
  - 6.6.1.2 The extent to which the station procedures and operating practices meet the sampling frequencies outlined in Section 6.2.

- 6.6.1.3 The extent to which the station procedures and operating practices meet the analytical techniques outlined in Section 6.3:
- 6.6.1.4 The extent to which the station procedures, operating practices, instrumentation, and sampling points meet the guidelines outlined in Section 6.4.
- 6.6.1.5 The extent to which the station procedures and operating practices meet the data management flowpath outlined in Section 6.5.
- 6.6.1.6 The need for any additional chemistry changes based on an assessment of steam generator inspection/examination data.
- 6.6.2 As part of the Management Status Report, a summary of corrective actions needed shall be compiled by the Manager, Nuclear Materials and Chemistry, and a recommended WATERCAP for implementing the corrective actions will be established. The action plan shall attempt to take into account the constraints of manpower, time, and budget. An estimated cost shall be determined for items involving significant expenditures.
- 6.6.3 The station chemistry supervisor shall review and comment on the segments of the Management Status Report and WATERCAP which apply to the plants under their responsibility.
- 6.6.4 Any sections of the WATERCAP which involve plant modifications shall be reviewed and commented on by the appropriate Generation Engineering and Construction discipline.
- 6.6.5 The recommended WATERCAP shall be approved by the Manager, Nuclear Materials and Chemistry, the Director, Nuclear Engineering and Operations Services, the Vice President, Nuclear and Environmental Engineering, and the Senior Vice President, Nuclear Engineering and Operations. The WATERCAP can thereafter be referred to with regard to economic and technical justifications for the performance of the work described therein.



7.0 FIGURES

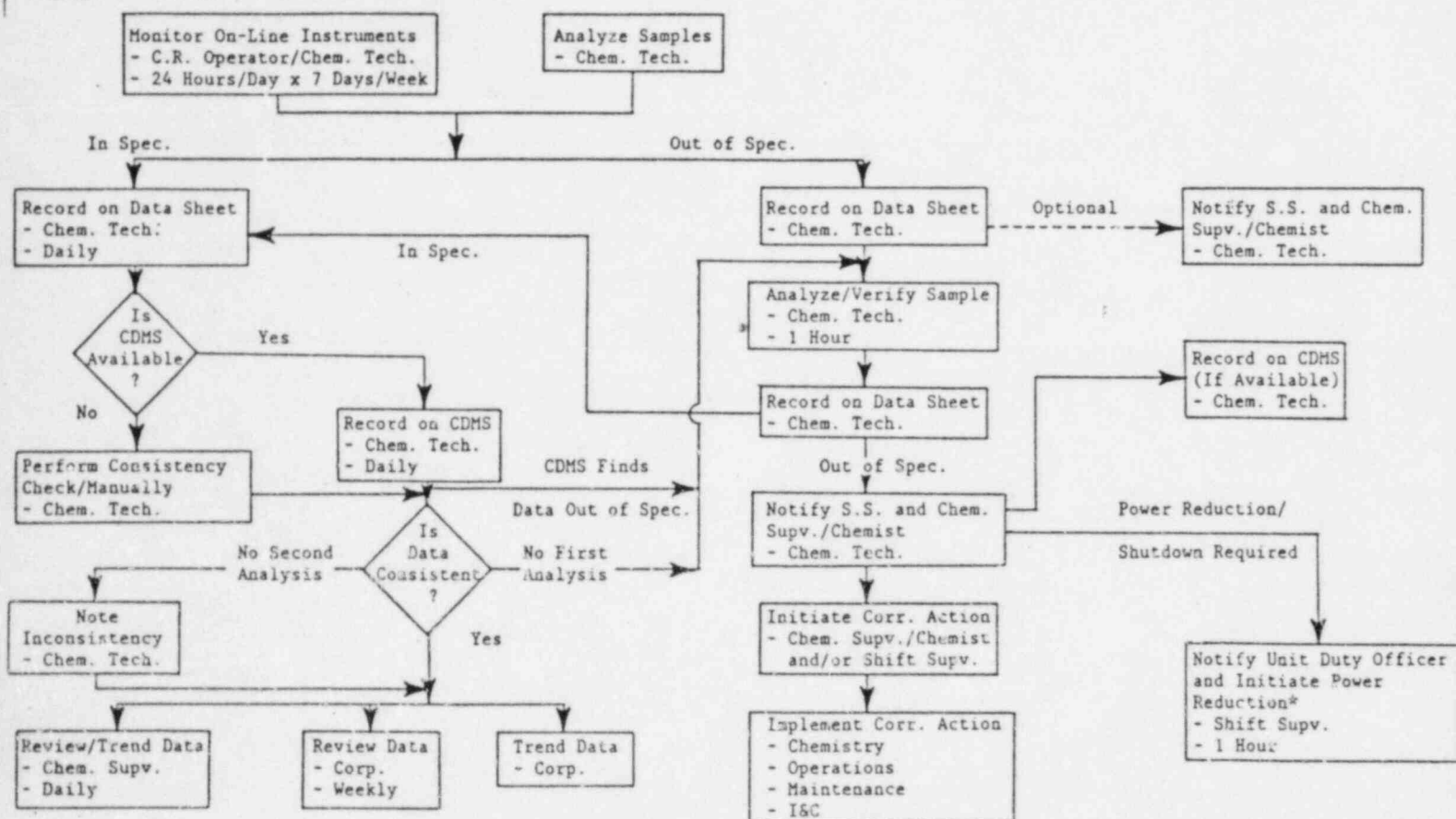
<u>Figure No.</u>	<u>Figure Title</u>
7.1	Data Management and Response.

8.0 ATTACHMENTS

<u>Attachment No.</u>	<u>Attachment Title</u>
8.A	Critical Secondary Water Chemistry Specifications for Power Operation (> 30 percent).
8.B	Alternates Identified for Senior Vice President, Nuclear Engineering and Operations.

Figure 7.1

Data Management and Response



\*For exceptions to power reductions or shutdowns, see Sections 6.1.5.4 and 6.1.5.5 of this procedure. The specified time limit of one hour should not be exceeded while pursuing approvals of exceptions.

# ATTACHMENT 8.A

## Critical Secondary Water Chemistry Specifications for Power Operations ( > 30 Percent)

<u>Unit</u>	<u>System</u>	<u>Parameter</u>	<u>Normal</u>	<u>Action Level 1</u>	<u>Action Level 2</u>	<u>Action Level 3</u>
CY	Steam Generator Blowdown	Sodium (ppb)	≤ 20	> 20	> 100	> 500
		Chloride (ppb)	≤ 20	> 20	> 100	
		Cat. Cond. (umhos/cm)	≤ 0.8	> 0.8	> 2.0	> 7.0
	Condensate	Oxygen (ppb)	≤ 5	> 5	> 30	
MP2	Steam Generator Blowdown	Sodium (ppb)	≤ 20 <sup>(1)</sup>	> 20 <sup>(1)</sup>	> 100	> 500
		Chloride (ppb)	≤ 20 <sup>(1)</sup>	> 20 <sup>(1)</sup>	> 100	
		Cat. Cond. (umhos/cm)	≤ 0.8 <sup>(2)</sup>	> 0.8 <sup>(2)</sup>	> 2.0 <sup>(2)</sup>	> 7.0
	Condensate	Oxygen (ppb)	≤ 10	> 10	> 30	
		Sodium (ppb)	≤ 0.4	> 0.8	> 1.3 <sup>(3)</sup>	> 12.0 <sup>(3)</sup>

### Action Level 1:

Correct problem within one week or go to Action Level 2.

### Action Level 2:

Reduce power to 30 percent or less. Correct within 100 hours or go to Action Level 3 (Sodium and Cation Conductivity only).

### Action Level 3:

Shutdown within 12 hours and correct the problem.

- (1) These limits increase to 30 ppb when operating with condensate polishers.
- (2) Greater than a pre-established baseline.
- (3) Action Levels 2 and 3 for condensate sodium apply only when plant is at full power and condensate polishers are not in service.

ATTACHMENT 8.B

Alternates Identified for Senior Vice President,  
Nuclear Engineering and Operations

- 1) Vice President, Nuclear and Environmental Engineering.
- 2) Vice President, Nuclear Operations.
- 3) Vice President, Generation Engineering and Construction.

NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

NEO 2.17

SECONDARY WATER CHEMISTRY PROGRAM

APPROVED

*A. F. Gubler*  
Senior Vice President,  
Nuclear Engineering and Operations

REVISION

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DATE

May 30, 1985

CONCURRENCE

*[Signature]*  
Manager, Quality Assurance

# NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

## NEO 2.17

### SECONDARY WATER CHEMISTRY PROGRAM

#### 1.0 PURPOSE

The purpose of this procedure is to establish a secondary water chemistry program for all Northeast Utilities operating Pressurized Water Reactor (PWR) nuclear plants in accordance with Nuclear Engineering and Operations (NEO) Policy Statement No. 7, "Plant Water Chemistry Program." This program minimizes or eliminates corrosion/phenomena that are threatening to the long-term lifetime of significant plant equipment. Lower-tier implementing procedures are required.

#### 2.0 APPLICABILITY

This procedure applies to the NEO Group including the Northeast Nuclear Energy Company (NNECO) and the Connecticut Yankee Atomic Power Company (CYAPCO).

#### 3.0 REFERENCES

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- 3.4 Nuclear Steam Supply System Chemistry Manual, Combustion Engineering, Revision 3, September 1982.
- 3.5 American Society for the Testing of Materials (ASTM), 1984 Annual Book of Standards, Part 31, Water.
- 3.6 Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 15th Edition, 1980.
- 3.7 NEO Procedure 2.13, "Management of Nuclear Power Plant Records."

#### 4.0 DEFINITIONS

##### 4.1 Management Status Report on Water Chemistry

A report issued to NEO management, chemistry-related staff, and operations staff which evaluates the effectiveness of the

station water chemistry programs, and identifies any changes needed. This evaluation shall include an assessment of steam generator inspection/examination data with regard to any additional chemistry changes needed.

#### 4.2 Water Chemistry Action Plan (WATERCAP)

A brief summary of the efforts needed to implement the changes identified in the Management Status Report on Water Chemistry. The WATERCAP will be management approved and will serve as a tool for management support of the Water Chemistry Program.

#### 4.3 Chemistry Data Management System (CDMS)

A computerized system capable of managing and trending all major primary and secondary water chemistry parameters at all of the nuclear stations.

#### 4.4 NUSCO Chemistry Duty Officer

Designated by the Manager, Nuclear Materials and Chemistry, to provide the technical decision authority in the event that an exception to a power reduction/hold mandated by the station chemistry procedures is requested per Section 6.1.5.4.

### 5.0 RESPONSIBILITIES

#### 5.1 Senior Vice President, Nuclear Engineering and Operations

5.1.1 Responsible for providing the authority and resources for development, implementation, and maintenance of the Secondary Water Chemistry Program.

5.1.2 Responsible for approving any exceptions to power reductions/holds mandated by the station chemistry procedures which do not have a technical justification or as required by Section 6.1.5.5. Alternates are presented in Attachment 8.B.

5.1.3 Responsible for approving the WATERCAP.

#### 5.2 Vice President, Nuclear and Environmental Engineering

5.2.1 Responsible for ensuring that the Secondary Water Chemistry Program is developed, maintained, and implemented on the corporate level.

5.2.2 Responsible for approving the WATERCAP.



5.3 Vice President, Nuclear Operations

Responsible for ensuring implementation of the Secondary Water Chemistry Program at the stations.

5.4 Director, Nuclear Engineering and Operations Services

Responsible for approving the WATERCAP.

5.5 Station/Unit/Station Services Superintendents

5.5.1 Responsible for developing station procedures for implementing the Secondary Water Chemistry Program at the stations.

5.5.2 Responsible for ensuring implementation of corrective actions as required by Section 6.1.5.1.

5.5.3 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the Unit Duty Officer when the Unit and Station and Station Services Superintendents are unavailable.

5.6 Unit Duty Officer and NUSCO Chemistry Duty Officer

5.6.1 Responsible for ensuring initiation of corrective actions, as required by Section 6.1.5.1.

5.6.2 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. This responsibility is assumed by the Unit Duty Officer when the Station and Unit and Station Services Superintendents are not available, and by the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.

5.7 Station Chemistry Supervisors

5.7.1 Responsible for implementation of station chemistry procedures at the stations.

5.7.2 Responsible for initiating revisions to chemistry procedures as necessary to comply with the Secondary Water Chemistry Program and the WATERCAP.

5.7.3 Responsible for implementing the chemistry data management and trending as specified in Section 6.5.

- 5.7.4 Responsible for reviewing and commenting on the segments of the Management Status Report and the WATERCAP which apply to the plants under their responsibility.
- 5.7.5 Responsible for reviewing/interpreting chemistry data and initiating corrective actions as specified in Section 6.1.

5.8 Manager, Nuclear Materials and Chemistry

- 5.8.1 Responsible for designating the NUSCO Chemistry Duty Officer.
- 5.8.2 Responsible for approving and documenting any exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.
- 5.8.3 Responsible for compiling and approving the Management Status Report on Water Chemistry.
- 5.8.4 Responsible for compiling and approving the WATERCAP.
- 5.8.5 Responsible for assessing in-service inspection results to determine the effectiveness of the secondary water chemistry controls in minimizing or eliminating corrosion phenomena.
- 5.8.6 Responsible for ensuring that the secondary water chemistry controls defined in this procedure are adequate to minimize or eliminate corrosion phenomena.
- 5.8.7 Responsible for maintaining this procedure current.

5.9 Supervisors, Nuclear Materials and Chemistry

- 5.9.1 Responsible for performing technical reviews of revisions to the station secondary water chemistry procedures as specified in Section 6.1.6.
- 5.9.2 Responsible for developing and maintaining the Chemistry Data Management System (CDMS) computer programs.
- 5.9.3 Responsible for preparing the Management Status Reports on Water Chemistry.
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- 5.9.5 Responsible for preparing trend reports summarizing recent chemistry trends and recommending corrective actions on a regular basis, normally every two months, as specified in Section 6.5.3.

5.10 Manager/Supervisors

Responsible for ensuring that activities under their control are performed in accordance with the Water Chemistry Program, any related implementing procedures, and the WATERCAP.

6.0 INSTRUCTIONS

6.1 Station Chemistry Specifications and Corrective Actions

- 6.1.1 Station procedures shall identify station chemistry specifications which shall meet or exceed the Steam Generator Owners Group (SGOG) Secondary Water Chemistry Guidelines. Chemistry specifications which are not included in the SGOG guidelines shall meet or exceed the Nuclear Steam System Supplier (NSSS) vendor recommendations (References 3.3 and 3.4). Specific chemistry specifications for critical chemistry control parameters under full power operating conditions are listed in Attachment 8.A.
- 6.1.2 Station procedures shall identify specific corrective actions and/or power reductions/holds to be initiated upon exceeding station secondary water chemistry specifications including the sequence and timing of such corrective actions. These actions shall be based on the corrective actions recommended in the SGOG Secondary Water Chemistry Guidelines and NSSS vendor recommendations, as applicable. Corrective actions specified in the procedures shall include power reductions as specified in Attachment 8.A.
- 6.1.3 Chemistry specifications and/or corrective actions in addition to or more stringent than the guidelines referenced in Section 6.1.1 shall be instituted on a plant-specific basis. These specifications and corrective actions may be instituted directly by station chemistry or as recommended by Nuclear Materials and Chemistry. These specifications and corrective actions shall be based on specific concerns related to known corrosion phenomena and/or recent industry experience. Specifically, steam generator inspection/examination results shall be evaluated to determine if any additional secondary water chemistry controls are needed. The specifications shall also be based on a

proven capability to maintain a parameter at significantly lower levels than those specified in the referenced guidelines.

6.1.4 Exceptions to the guidelines specified in Sections 6.1.1 through 6.1.3 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

6.1.5 Exceeding Chemistry Specifications

6.1.5.1 Upon exceeding a chemistry specification, the correct personnel shall be notified and corrective actions taken, including power reductions/holds, as described in Figure 7.1.

6.1.5.2 Station and corporate personnel shall identify alternates to carry the responsibility and authority identified in Figure 7.1 in their absence.

6.1.5.3 When not on site, key station and corporate personnel identified in Figure 7.1 shall be available for contact. This availability may be achieved by being at an established telephone number or by carrying a paging device. When these choices are not feasible, an alternate must be identified per Section 6.1.5.2.

6.1.5.4 If an action level condition occurs (or threatens to occur) which requires a power reduction/hold, and extreme or unusual circumstances occur which provide technical justification for not reducing or holding power, an exception to the action level requirements may be applied for. To obtain an exception from the action level requirements, technical justification must be provided which indicates that circumstances exist which were unforeseen or unaccounted for in the guidelines referenced in Section 6.1.1. Exceptions from the action level requirements, which are technically justified, must receive the prior approval of the Station or Unit or Station Services Superintendent, and the Manager of Nuclear Materials and Chemistry. When the Station and Unit and Station Services Superintendents are unavailable, responsibility for site approval of exceptions to power reductions rests with the Unit Duty Officer. When the Manager, Nuclear Materials and Chemistry,

is unavailable, responsibility for corporate approval of exceptions to power reductions rests with the NUSCO Chemistry Duty Officer.

6.1.5.5 Exceptions from the action level requirements which do not have a technical justification or for which the requirements of Section 6.1.5.4 are in any way not met must receive the prior approval of the Senior Vice President, Nuclear Engineering and Operations. Alternates are presented in Attachment 8.B (Reference 5.1.2 of this procedure).

6.1.6 Revisions to Chemistry Specifications and Corrective Actions

Revisions to station chemistry procedures which relate to secondary chemistry specifications, action level requirements, and corrective actions must be reviewed by Nuclear Materials and Chemistry, in addition to the normal PORC review and approval.

6.2 Frequency of Analysis

- 6.2.1 Station procedures shall identify sampling frequencies and sample points for each secondary water chemistry parameter which has an assigned chemistry specification. For simplicity, sampling frequencies should be on a daily, weekly, or monthly basis, if practical. Sampling frequencies should be increased as needed during chemistry transients. All sampling frequencies shall meet or exceed the SGOG secondary water chemistry guidelines. Sampling frequencies for secondary water chemistry parameters which do not fall into the above categories shall be based upon NSSS vendor recommendations.
- 6.2.2 Sufficient supplies of chemical reagents and spare parts for analytical equipment shall be maintained to insure, with reasonable confidence, that specified analysis frequencies can be maintained. Alternate means of chemical analysis can be used as a backup if it is impractical to maintain a spare parts inventory, however, the alternate analysis must be of sufficient accuracy to determine if chemistry specifications are being met.
- 6.2.3 Exceptions to the guidelines specified in Sections 6.2.1 and 6.2.2 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.



### 6.3 Analytical Techniques

- 6.3.1 Station procedures shall exist which identify specific analytical procedures for determining the values of all parameters with secondary water chemistry specifications. The procedures shall identify the applicability of the technique, the accuracy, and the minimum sensitivity of the technique. These procedures shall be modified as new analytical techniques become required.
- 6.3.2 Analytical techniques shall follow the procedures set forth by the American Society for the Testing of Materials (ASTM), Reference 3.5, or the procedures set forth in "Standard Methods for the Examination of Water and Waste Water," Reference 3.6, where applicable. Otherwise, techniques shall follow vendor's and manufacturer's recommendations. The accuracy of all techniques shall be confirmed and documented by testing known standards prior to instituting analytical procedures.
- 6.3.3 Exceptions to the guidelines specified in Sections 6.3.1 and 6.3.2 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

### 6.4 Instrumentation and Sampling

- 6.4.1 Sufficient in-line secondary water chemistry instrumentation and sampling points shall be available to meet the guidelines set forth by the SGOG. Secondary water chemistry parameters which are not covered by the SGOG guidelines shall be based upon the NSSS recommendations.
- 6.4.2 All in-line secondary water chemistry instrumentation shall be interfaced to a means of recording data, either a chart recorder or a computer data logging system.
- 6.4.3 Instrument calibration and preventive maintenance shall be performed as recommended by the instrument manufacturer, or as needed to avoid instrument failure or inaccuracy. Plant procedures shall exist which delineate the procedures for calibration and maintenance, and shall state the minimum frequency of calibration and maintenance.
- 6.4.4 Exceptions to the guidelines specified in Sections 6.4.1 through 6.4.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

## 6.5 Data Management and Trending

- 6.5.1 A computerized data management system shall be created by Nuclear Materials and Chemistry which will provide trending and analysis capabilities for all major primary and secondary water chemistry parameters. This system, called the Chemistry Data Management System (CDMS), shall be used to record data on a daily basis at all nuclear stations in addition to the normal log sheets.
- 6.5.2 Data analysis, recording, review, and trending shall follow the flowpath described in Figure 7.1. Data log sheets shall be submitted to the Nuclear Plant Records System for permanent storage as required by NEO 2.13, "Management of Nuclear Power Plant Records."
- 6.5.3 A trend report summarizing recent chemistry trends and recommending corrective actions, where needed, shall be prepared by Nuclear Materials and Chemistry on a regular basis, normally every two months, for each plant, except during refueling outages for that plant.
- 6.5.4 Exceptions to the guidelines specified in Sections 6.5.1 through 6.5.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

## 6.6 Management Status Report on Water Chemistry

- 6.6.1 A Management Status Report on Water Chemistry shall be prepared by the Supervisor, Nuclear Materials and Chemistry at least once per year. This status report shall provide an update to senior NEO management summarizing the effectiveness of the station secondary water chemistry programs and identifying corrective actions required. These corrective actions may include plant modifications, procedure upgrades, instrumentation upgrades, personnel requirements, and others as needed. The status report may address any aspect of the secondary water chemistry program; however, the following items shall be addressed:
  - 6.6.1.1 The extent to which the station procedures and operating practices meet the chemistry specifications and corrective actions outlined in Section 6.1.1.
  - 6.6.1.2 The extent to which the station procedures and operating practices meet the sampling frequencies outlined in Section 6.2.



- 6.6.1.3 The extent to which the station procedures and operating practices meet the analytical techniques outlined in Section 6.3:
- 6.6.1.4 The extent to which the station procedures, operating practices, instrumentation, and sampling points meet the guidelines outlined in Section 6.4.
- 6.6.1.5 The extent to which the station procedures and operating practices meet the data management flowpath outlined in Section 6.5.
- 6.6.1.6 The need for any additional chemistry changes based on an assessment of steam generator inspection/examination data.
- 6.6.2 As part of the Management Status Report, a summary of corrective actions needed shall be compiled by the Manager, Nuclear Materials and Chemistry, and a recommended WATERCAP for implementing the corrective actions will be established. The action plan shall attempt to take into account the constraints of manpower, time, and budget. An estimated cost shall be determined for items involving significant expenditures.
- 6.6.3 The station chemistry supervisor shall review and comment on the segments of the Management Status Report and WATERCAP which apply to the plants under their responsibility.
- 6.6.4 Any sections of the WATERCAP which involve plant modifications shall be reviewed and commented on by the appropriate Generation Engineering and Construction discipline.
- 6.6.5 The recommended WATERCAP shall be approved by the Manager, Nuclear Materials and Chemistry, the Director, Nuclear Engineering and Operations Services, the Vice President, Nuclear and Environmental Engineering, and the Senior Vice President, Nuclear Engineering and Operations. The WATERCAP can thereafter be referred to with regard to economic and technical justifications for the performance of the work described therein.

7.0 FIGURES

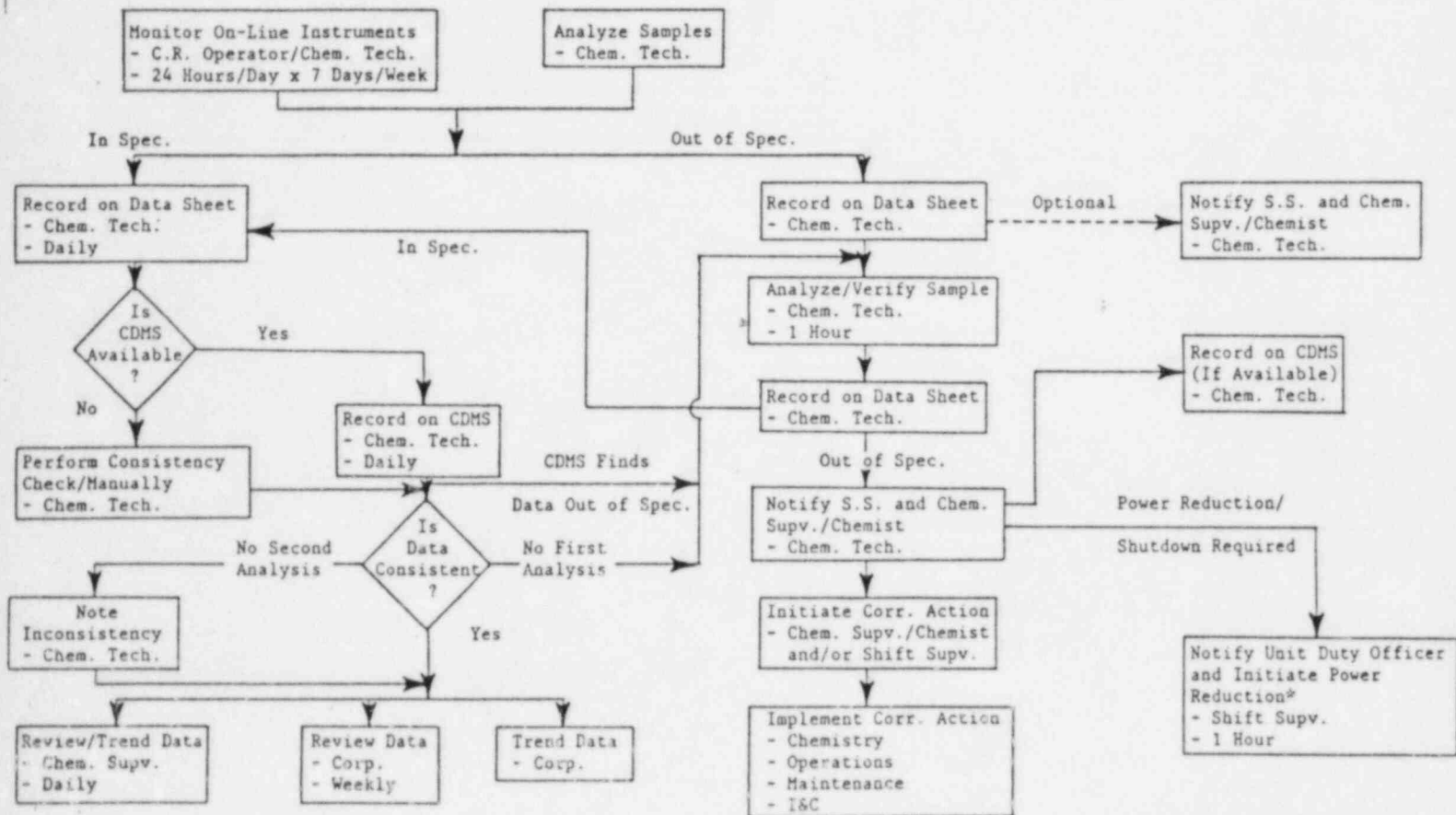
<u>Figure No.</u>	<u>Figure Title</u>
7.1	Data Management and Response.

8.0 ATTACHMENTS

<u>Attachment No.</u>	<u>Attachment Title</u>
8.A	Critical Secondary Water Chemistry Specifications for Power Operation (> 30 percent).
8.B	Alternates Identified for Senior Vice President, Nuclear Engineering and Operations.

Figure 7.1

Data Management and Response



\*For exceptions to power reductions or shutdowns, see Sections 6.1.5.4 and 6.1.5.5 of this procedure. The specified time limit of one hour should not be exceeded while pursuing approvals of exceptions.

# ATTACHMENT 8.A

## Critical Secondary Water Chemistry Specifications for Power Operations ( > 30 Percent)

<u>Unit</u>	<u>System</u>	<u>Parameter</u>	<u>Normal</u>	<u>Action Level 1</u>	<u>Action Level 2</u>	<u>Action Level 3</u>
CY	Steam Generator Blowdown	Sodium (ppb)	≤ 20	> 20	> 100	> 500
		Chloride (ppb)	≤ 20	> 20	> 100	
		Cat. Cond. (umhos/cm)	≤ 0.8	> 0.8	> 2.0	> 7.0
	Condensate	Oxygen (ppb)	≤ 5	> 5	> 30	
MP2	Steam Generator Blowdown	Sodium (ppb)	≤ 20 <sup>(1)</sup>	> 20 <sup>(1)</sup>	> 100	> 500
		Chloride (ppb)	≤ 20 <sup>(1)</sup>	> 20 <sup>(1)</sup>	> 100	
		Cat. Cond. (umhos/cm)	≤ 0.8 <sup>(2)</sup>	> 0.8 <sup>(2)</sup>	> 2.0 <sup>(2)</sup>	> 7.0
	Condensate	Oxygen (ppb)	≤ 10	> 10	> 30	
		Sodium (ppb)	≤ 0.4	> 0.8	> 1.3 <sup>(3)</sup>	> 12.0 <sup>(3)</sup>

### Action Level 1:

Correct problem within one week or go to Action Level 2.

### Action Level 2:

Reduce power to 30 percent or less. Correct within 100 hours or go to Action Level 3 (Sodium and Cation Conductivity only).

### Action Level 3:

Shutdown within 12 hours and correct the problem.

- (1) These limits increase to 30 ppb when operating with condensate polishers.
- (2) Greater than a pre-established baseline.
- (3) Action Levels 2 and 3 for condensate sodium apply only when plant is at full power and condensate polishers are not in service.

ATTACHMENT 8.B

Alternates Identified for Senior Vice President,  
Nuclear Engineering and Operations

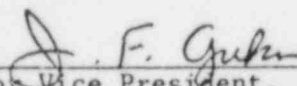
- 1) Vice President, Nuclear and Environmental Engineering.
- 2) Vice President, Nuclear Operations.
- 3) Vice President, Generation Engineering and Construction.

NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

NEO 2.17

SECONDARY WATER CHEMISTRY PROGRAM

APPROVED

  
Senior Vice President,  
Nuclear Engineering and Operations

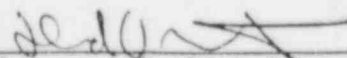
REVISION

0

DATE

May 30, 1985

CONCURRENCE

  
Manager, Quality Assurance

# NUCLEAR ENGINEERING AND OPERATIONS PROCEDURE

## NEO 2.17

### SECONDARY WATER CHEMISTRY PROGRAM

#### 1.0 PURPOSE

The purpose of this procedure is to establish a secondary water chemistry program for all Northeast Utilities operating Pressurized Water Reactor (PWR) nuclear plants in accordance with Nuclear Engineering and Operations (NEO) Policy Statement No. 7, "Plant Water Chemistry Program." This program minimizes or eliminates corrosion/phenomena that are threatening to the long-term lifetime of significant plant equipment. Lower-tier implementing procedures are required.

#### 2.0 APPLICABILITY

This procedure applies to the NEO Group including the Northeast Nuclear Energy Company (NNECO) and the Connecticut Yankee Atomic Power Company (CYAPCO).

#### 3.0 REFERENCES

- 3.1 NEO Policy Statement No. 7 - Plant Water Chemistry Program, March 10, 1982.
- 3.2 Steam Generator Owners Group Secondary Water Chemistry Guidelines, Revision 1, June 1984.
- 3.3 Westinghouse Steam Side Water Chemistry Control Specifications, Update, August 1981.
- 3.4 Nuclear Steam Supply System Chemistry Manual, Combustion Engineering, Revision 3, September 1982.
- 3.5 American Society for the Testing of Materials (ASTM), 1984 Annual Book of Standards, Part 31, Water.
- 3.6 Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 15th Edition, 1980.
- 3.7 NEO Procedure 2.13, "Management of Nuclear Power Plant Records."

#### 4.0 DEFINITIONS

##### 4.1 Management Status Report on Water Chemistry

A report issued to NEO management, chemistry-related staff, and operations staff which evaluates the effectiveness of the



station water chemistry programs, and identifies any changes needed. This evaluation shall include an assessment of steam generator inspection/examination data with regard to any additional chemistry changes needed.

#### 4.2 Water Chemistry Action Plan (WATERCAP)

A brief summary of the efforts needed to implement the changes identified in the Management Status Report on Water Chemistry. The WATERCAP will be management approved and will serve as a tool for management support of the Water Chemistry Program.

#### 4.3 Chemistry Data Management System (CDMS)

A computerized system capable of managing and trending all major primary and secondary water chemistry parameters at all of the nuclear stations.

#### 4.4 NUSCO Chemistry Duty Officer

Designated by the Manager, Nuclear Materials and Chemistry, to provide the technical decision authority in the event that an exception to a power reduction/hold mandated by the station chemistry procedures is requested per Section 6.1.5.4.

### 5.0 RESPONSIBILITIES

#### 5.1 Senior Vice President, Nuclear Engineering and Operations

5.1.1 Responsible for providing the authority and resources for development, implementation, and maintenance of the Secondary Water Chemistry Program.

5.1.2 Responsible for approving any exceptions to power reductions/holds mandated by the station chemistry procedures which do not have a technical justification or as required by Section 6.1.5.5. Alternates are presented in Attachment 8.B.

5.1.3 Responsible for approving the WATERCAP.

#### 5.2 Vice President, Nuclear and Environmental Engineering

5.2.1 Responsible for ensuring that the Secondary Water Chemistry Program is developed, maintained, and implemented on the corporate level.

5.2.2 Responsible for approving the WATERCAP.

5.3 Vice President, Nuclear Operations

Responsible for ensuring implementation of the Secondary Water Chemistry Program at the stations.

5.4 Director, Nuclear Engineering and Operations Services

Responsible for approving the WATERCAP.

5.5 Station/Unit/Station Services Superintendents

5.5.1 Responsible for developing station procedures for implementing the Secondary Water Chemistry Program at the stations.

5.5.2 Responsible for ensuring implementation of corrective actions as required by Section 6.1.5.1.

5.5.3 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the Unit Duty Officer when the Unit and Station and Station Services Superintendents are unavailable.

5.6 Unit Duty Officer and NUSCO Chemistry Duty Officer

5.6.1 Responsible for ensuring initiation of corrective actions, as required by Section 6.1.5.1.

5.6.2 Responsible for approving and documenting exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. This responsibility is assumed by the Unit Duty Officer when the Station and Unit and Station Services Superintendents are not available, and by the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.

5.7 Station Chemistry Supervisors

5.7.1 Responsible for implementation of station chemistry procedures at the stations.

5.7.2 Responsible for initiating revisions to chemistry procedures as necessary to comply with the Secondary Water Chemistry Program and the WATERCAP.

5.7.3 Responsible for implementing the chemistry data management and trending as specified in Section 6.5.

- 5.7.4 Responsible for reviewing and commenting on the segments of the Management Status Report and the WATERCAP which apply to the plants under their responsibility.
- 5.7.5 Responsible for reviewing/interpreting chemistry data and initiating corrective actions as specified in Section 6.1.

5.8 Manager, Nuclear Materials and Chemistry

- 5.8.1 Responsible for designating the NUSCO Chemistry Duty Officer.
- 5.8.2 Responsible for approving and documenting any exceptions to power reductions/holds mandated by the station chemistry procedures which are technically justified. Responsibility passes to the NUSCO Chemistry Duty Officer when the Manager, Nuclear Materials and Chemistry, is not available.
- 5.8.3 Responsible for compiling and approving the Management Status Report on Water Chemistry.
- 5.8.4 Responsible for compiling and approving the WATERCAP.
- 5.8.5 Responsible for assessing in-service inspection results to determine the effectiveness of the secondary water chemistry controls in minimizing or eliminating corrosion phenomena.
- 5.8.6 Responsible for ensuring that the secondary water chemistry controls defined in this procedure are adequate to minimize or eliminate corrosion phenomena.
- 5.8.7 Responsible for maintaining this procedure current.

5.9 Supervisors, Nuclear Materials and Chemistry

- 5.9.1 Responsible for performing technical reviews of revisions to the station secondary water chemistry procedures as specified in Section 6.1.6.
- 5.9.2 Responsible for developing and maintaining the Chemistry Data Management System (CDMS) computer programs.
- 5.9.3 Responsible for preparing the Management Status Reports on Water Chemistry.
- 5.9.4 Responsible for preparing the WATERCAP.

- 5.9.5 Responsible for preparing trend reports summarizing recent chemistry trends and recommending corrective actions on a regular basis, normally every two months, as specified in Section 6.5.3.

5.10 Manager/Supervisors

Responsible for ensuring that activities under their control are performed in accordance with the Water Chemistry Program, any related implementing procedures, and the WATERCAP.

6.0 INSTRUCTIONS

6.1 Station Chemistry Specifications and Corrective Actions

- 6.1.1 Station procedures shall identify station chemistry specifications which shall meet or exceed the Steam Generator Owners Group (SGOG) Secondary Water Chemistry Guidelines. Chemistry specifications which are not included in the SGOG guidelines shall meet or exceed the Nuclear Steam System Supplier (NSSS) vendor recommendations (References 3.3 and 3.4). Specific chemistry specifications for critical chemistry control parameters under full power operating conditions are listed in Attachment 8.A.
- 6.1.2 Station procedures shall identify specific corrective actions and/or power reductions/holds to be initiated upon exceeding station secondary water chemistry specifications including the sequence and timing of such corrective actions. These actions shall be based on the corrective actions recommended in the SGOG Secondary Water Chemistry Guidelines and NSSS vendor recommendations, as applicable. Corrective actions specified in the procedures shall include power reductions as specified in Attachment 8.A.
- 6.1.3 Chemistry specifications and/or corrective actions in addition to or more stringent than the guidelines referenced in Section 6.1.1 shall be instituted on a plant-specific basis. These specifications and corrective actions may be instituted directly by station chemistry or as recommended by Nuclear Materials and Chemistry. These specifications and corrective actions shall be based on specific concerns related to known corrosion phenomena and/or recent industry experience. Specifically, steam generator inspection/examination results shall be evaluated to determine if any additional secondary water chemistry controls are needed. The specifications shall also be based on a

proven capability to maintain a parameter at significantly lower levels than those specified in the referenced guidelines.

6.1.4 Exceptions to the guidelines specified in Sections 6.1.1 through 6.1.3 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

6.1.5 Exceeding Chemistry Specifications

6.1.5.1 Upon exceeding a chemistry specification, the correct personnel shall be notified and corrective actions taken, including power reductions/holds, as described in Figure 7.1.

6.1.5.2 Station and corporate personnel shall identify alternates to carry the responsibility and authority identified in Figure 7.1 in their absence.

6.1.5.3 When not on site, key station and corporate personnel identified in Figure 7.1 shall be available for contact. This availability may be achieved by being at an established telephone number or by carrying a paging device. When these choices are not feasible, an alternate must be identified per Section 6.1.5.2.

6.1.5.4 If an action level condition occurs (or threatens to occur) which requires a power reduction/hold, and extreme or unusual circumstances occur which provide technical justification for not reducing or holding power, an exception to the action level requirements may be applied for. To obtain an exception from the action level requirements, technical justification must be provided which indicates that circumstances exist which were unforeseen or unaccounted for in the guidelines referenced in Section 6.1.1. Exceptions from the action level requirements, which are technically justified, must receive the prior approval of the Station or Unit or Station Services Superintendent, and the Manager of Nuclear Materials and Chemistry. When the Station and Unit and Station Services Superintendents are unavailable, responsibility for site approval of exceptions to power reductions rests with the Unit Duty Officer. When the Manager, Nuclear Materials and Chemistry,



is unavailable, responsibility for corporate approval of exceptions to power reductions rests with the NUSCO Chemistry Duty Officer.

6.1.5.5 Exceptions from the action level requirements which do not have a technical justification or for which the requirements of Section 6.1.5.4 are in any way not met must receive the prior approval of the Senior Vice President, Nuclear Engineering and Operations. Alternates are presented in Attachment 8.B (Reference 5.1.2 of this procedure).

6.1.6 Revisions to Chemistry Specifications and Corrective Actions

Revisions to station chemistry procedures which relate to secondary chemistry specifications, action level requirements, and corrective actions must be reviewed by Nuclear Materials and Chemistry, in addition to the normal PORC review and approval.

6.2 Frequency of Analysis

6.2.1 Station procedures shall identify sampling frequencies and sample points for each secondary water chemistry parameter which has an assigned chemistry specification. For simplicity, sampling frequencies should be on a daily, weekly, or monthly basis, if practical. Sampling frequencies should be increased as needed during chemistry transients. All sampling frequencies shall meet or exceed the SGOG secondary water chemistry guidelines. Sampling frequencies for secondary water chemistry parameters which do not fall into the above categories shall be based upon NSSS vendor recommendations.

6.2.2 Sufficient supplies of chemical reagents and spare parts for analytical equipment shall be maintained to insure, with reasonable confidence, that specified analysis frequencies can be maintained. Alternate means of chemical analysis can be used as a backup if it is impractical to maintain a spare parts inventory, however, the alternate analysis must be of sufficient accuracy to determine if chemistry specifications are being met.

6.2.3 Exceptions to the guidelines specified in Sections 6.2.1 and 6.2.2 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.



### 6.3 Analytical Techniques

- 6.3.1 Station procedures shall exist which identify specific analytical procedures for determining the values of all parameters with secondary water chemistry specifications. The procedures shall identify the applicability of the technique, the accuracy, and the minimum sensitivity of the technique. These procedures shall be modified as new analytical techniques become required.
- 6.3.2 Analytical techniques shall follow the procedures set forth by the American Society for the Testing of Materials (ASTM), Reference 3.5, or the procedures set forth in "Standard Methods for the Examination of Water and Waste Water," Reference 3.6, where applicable. Otherwise, techniques shall follow vendor's and manufacturer's recommendations. The accuracy of all techniques shall be confirmed and documented by testing known standards prior to instituting analytical procedures.
- 6.3.3 Exceptions to the guidelines specified in Sections 6.3.1 and 6.3.2 shall be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

### 6.4 Instrumentation and Sampling

- 6.4.1 Sufficient in-line secondary water chemistry instrumentation and sampling points shall be available to meet the guidelines set forth by the SGOG. Secondary water chemistry parameters which are not covered by the SGOG guidelines shall be based upon the NSSS recommendations.
- 6.4.2 All in-line secondary water chemistry instrumentation shall be interfaced to a means of recording data, either a chart recorder or a computer data logging system.
- 6.4.3 Instrument calibration and preventive maintenance shall be performed as recommended by the instrument manufacturer, or as needed to avoid instrument failure or inaccuracy. Plant procedures shall exist which delineate the procedures for calibration and maintenance, and shall state the minimum frequency of calibration and maintenance.
- 6.4.4 Exceptions to the guidelines specified in Sections 6.4.1 through 6.4.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

## 6.5 Data Management and Trending

- 6.5.1 A computerized data management system shall be created by Nuclear Materials and Chemistry which will provide trending and analysis capabilities for all major primary and secondary water chemistry parameters. This system, called the Chemistry Data Management System (CDMS), shall be used to record data on a daily basis at all nuclear stations in addition to the normal log sheets.
- 6.5.2 Data analysis, recording, review, and trending shall follow the flowpath described in Figure 7.1. Data log sheets shall be submitted to the Nuclear Plant Records System for permanent storage as required by NEO 2.13, "Management of Nuclear Power Plant Records."
- 6.5.3 A trend report summarizing recent chemistry trends and recommending corrective actions, where needed, shall be prepared by Nuclear Materials and Chemistry on a regular basis, normally every two months, for each plant, except during refueling outages for that plant.
- 6.5.4 Exceptions to the guidelines specified in Sections 6.5.1 through 6.5.3 will be noted in the Management Status Report on Water Chemistry, as described in Section 6.6.

## 6.6 Management Status Report on Water Chemistry

- 6.6.1 A Management Status Report on Water Chemistry shall be prepared by the Supervisor, Nuclear Materials and Chemistry at least once per year. This status report shall provide an update to senior NEO management summarizing the effectiveness of the station secondary water chemistry programs and identifying corrective actions required. These corrective actions may include plant modifications, procedure upgrades, instrumentation upgrades, personnel requirements, and others as needed. The status report may address any aspect of the secondary water chemistry program; however, the following items shall be addressed:
  - 6.6.1.1 The extent to which the station procedures and operating practices meet the chemistry specifications and corrective actions outlined in Section 6.1.1.
  - 6.6.1.2 The extent to which the station procedures and operating practices meet the sampling frequencies outlined in Section 6.2.

- 6.6.1.3 The extent to which the station procedures and operating practices meet the analytical techniques outlined in Section 6.3.
- 6.6.1.4 The extent to which the station procedures, operating practices, instrumentation, and sampling points meet the guidelines outlined in Section 6.4.
- 6.6.1.5 The extent to which the station procedures and operating practices meet the data management flowpath outlined in Section 6.5.
- 6.6.1.6 The need for any additional chemistry changes based on an assessment of steam generator inspection/examination data.
- 6.6.2 As part of the Management Status Report, a summary of corrective actions needed shall be compiled by the Manager, Nuclear Materials and Chemistry, and a recommended WATERCAP for implementing the corrective actions will be established. The action plan shall attempt to take into account the constraints of manpower, time, and budget. An estimated cost shall be determined for items involving significant expenditures.
- 6.6.3 The station chemistry supervisor shall review and comment on the segments of the Management Status Report and WATERCAP which apply to the plants under their responsibility.
- 6.6.4 Any sections of the WATERCAP which involve plant modifications shall be reviewed and commented on by the appropriate Generation Engineering and Construction discipline.
- 6.6.5 The recommended WATERCAP shall be approved by the Manager, Nuclear Materials and Chemistry, the Director, Nuclear Engineering and Operations Services, the Vice President, Nuclear and Environmental Engineering, and the Senior Vice President, Nuclear Engineering and Operations. The WATERCAP can thereafter be referred to with regard to economic and technical justifications for the performance of the work described therein.

7.0 FIGURES

Figure No.

Figure Title

7.1

Data Management and Response.

8.0 ATTACHMENTS

Attachment No.

Attachment Title

8.A

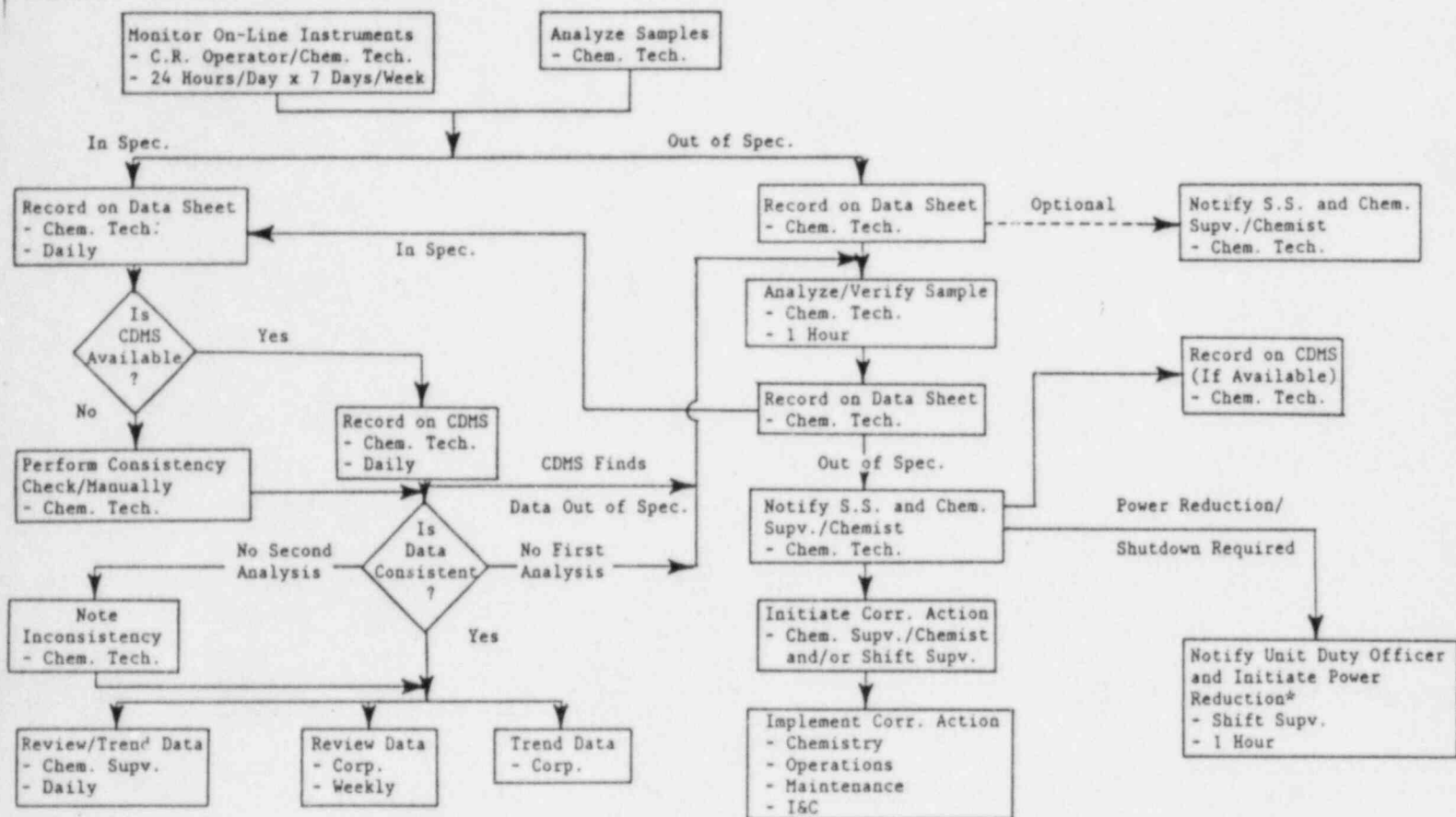
Critical Secondary Water Chemistry Specifications  
for Power Operation (> 30 percent).

8.B

Alternates Identified for Senior Vice President,  
Nuclear Engineering and Operations.

Figure 7.1

Data Management and Response



\*For exceptions to power reductions or shutdowns, see Sections 6.1.5.4 and 6.1.5.5 of this procedure. The specified time limit of one hour should not be exceeded while pursuing approvals of exceptions.

# ATTACHMENT 8.A

## Critical Secondary Water Chemistry Specifications for Power Operations ( > 30 Percent)

Unit	System	Parameter	Normal	Action Level 1	Action Level 2	Action Level 3
CY	Steam Generator Blowdown	Sodium (ppb)	$\leq 20$	$> 20$	$> 100$	$> 500$
		Chloride (ppb)	$\leq 20$	$> 20$	$> 100$	
		Cat. Cond. (umhos/cm)	$\leq 0.8$	$> 0.8$	$> 2.0$	$> 7.0$
	Condensate	Oxygen (ppb)	$\leq 5$	$> 5$	$> 30$	
MP2	Steam Generator Blowdown	Sodium (ppb)	$\leq 20^{(1)}$	$> 20^{(1)}$	$> 100$	$> 500$
		Chloride (ppb)	$\leq 20^{(1)}$	$> 20^{(1)}$	$> 100$	
		Cat. Cond. (umhos/cm)	$\leq 0.8^{(2)}$	$> 0.8^{(2)}$	$> 2.0^{(2)}$	$> 7.0$
	Condensate	Oxygen (ppb)	$\leq 10$	$> 10$	$> 30$	
		Sodium (ppb)	$\leq 0.4$	$> 0.8$	$> 1.3^{(3)}$	$> 12.0^{(3)}$

### Action Level 1:

Correct problem within one week or go to Action Level 2.

### Action Level 2:

Reduce power to 30 percent or less. Correct within 100 hours or go to Action Level 3 (Sodium and Cation Conductivity only).

### Action Level 3:

Shutdown within 12 hours and correct the problem.

- (1) These limits increase to 30 ppb when operating with condensate polishers.
- (2) Greater than a pre-established baseline.
- (3) Action Levels 2 and 3 for condensate sodium apply only when plant is at full power and condensate polishers are not in service.



ATTACHMENT 8.B

Alternates Identified for Senior Vice President,  
Nuclear Engineering and Operations

- 1) Vice President, Nuclear and Environmental Engineering.
- 2) Vice President, Nuclear Operations.
- 3) Vice President, Generation Engineering and Construction.