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June 19, 1980

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. B. J. Youngblood, Chief
Licensing Projects Branch No. 1

dockets 369 370

Subject: McGuire Nuclear Station
Secondary Water Chemistry Monitoring
and Control

Dear Mr. Denton:

Please find attached supplemental information on the McGuire N clear Station program to monitor and control secondary water chemistry. This information supplements my letters of October 25, 1979 and May 23, 1980 on this subject. Specifically, the information provides updated pages on Table 1 and Table 2 of my October 25, 1979 letter. In addition, Table 8 thru Table 12 is provided to describe other procedures and administrative controls involved in the secondary water chemistry program.

As stated in my October 25, 1979 letter, due to the continuing evolution of chemistry control technology the procedures and administrative control described in this program are subject to modification. Any modifications will be designed in accordance with the operating experience of McGuire Nuclear Station as well as new developements of technology. It should be emphasized that certain administrative limits specified in the secondary water chemistry program are goals we will be striving to attain. A better understanding of system capability will be obtained during the first year of operation.

Very truly yours,

William O. Parker, Jr.

William O. Parker, Jr. By [illegible]

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Attachment

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POOR QUALITY PAGES

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TABLE 1

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SECONDARY CHEMISTRY SAMPLING SCHEDULE
NORMAL OPERATION

Duke Power Company
McGuire Nuclear Station

SAMPLE	pH	COND µmhos	C COND µmhos	O_2 ppb	Na ppb	N_2H_4 ppb	Cl^- ppb	F^- ppb	MILL SUS SOLIDS ppb	SiO_2 ppb	Fe ppb	Cu ppb	NH_3 ppb	Pb ppb	GROSS β µCi/ml	SPEC ACT µCi/ml	I^{131} µCi/ml	TRITIUM µµCi/ml
Steam Generator B.D. (A – D)	C		C		C		D	D	D	C	2/W	5/W	W	W	D			
Main Steam (A – D)	D	D	C		C													
Hotwell Pump Discharge	C	C	C*	C	C				D	C	2/W	5/W		W				W
Polish Demin Effluent					C		D	D	D	D	2/W	5/W					W**	
Feedwater	C		C	C	D	C	D	D	D	C	2/W	5/W	3/W	W		D(T)	D(T)	
C Heater Drains	3/W		W	W	W							W						
G Heater Drains	3/W		W	W	W							W						
Condensate Storage Tank	W	W								W								
Moisture Separators (1A1 – 1C2)	D			W	W							D						
Condenser Hotwell (1A1 – 1C2)					W		W			W								
Aux Boiler Feedwater (A or B)	D					D			D									
Aux Boiler Blowdown (A or B)		D							D									
Polish Demin Cell Effluent			C							D								
Main Steam Crossover	D	D	D		D													

KEY:
- C – Continuous Monitor
- D – Daily
- 3/W – 3 Times per Week
- W – Weekly
- (T) – Technical Specifications
- * – Continuously Sampled as Polish Demin Influent
- ** – Conducted on Resins removed from Spent Cells

TABLE 2

Duke Power Company
McGuire Nuclear Station

SECONDARY CHEMISTRY SPECIFICATIONS
NORMAL OPERATION

SAMPLE	pH	COND µmhos	C COND µmhos	O_2 ppb	Na ppb	N_2H_4 ppb	Cl ppb	F ppb	DISS SUS SOLIDS ppb	SiO_2 ppb	Fe ppb	Cu ppb	NH_3 ppb	Pb ppb	GROSS β µCi/ml	SPEC ACT µCi/ml	I^{131} µCi/ml	TRITIUM µCi/ml
Steam Generator B.D. (A - D)	8.5-9.0		<2.0		<100		<50(c) <150	<50(c) <150	< 1000	<1000	<1000	<100	<250	<10	<MDA			
Main Steam (A - D)	8.8-9.2	5-12	<0.5		< 3													
Hotwell Pump Discharge	8.8-9.2	1-12	<2.0	<5	< 5				< 10	< 20	< 10	< 5		<1				<MDA
Polish Demin Effluent			<0.5		< 5		<150	<150	< 10	< 20	< 10	< 5					<MDA*	
Feedwater	8.8-9.2		<0.5	<5	< 5	5-25	<150	<150	< 10	< 20	< 10	< 5	100-1000	<1		(T) <MDA	(T) <0.1	
C Heater Drains	8.8-9.2		<0.5	<5	< 5							< 5						
G Heater Drains	8.8-9.2		<0.5	<5	< 5							< 5						
Condensate Storage Tank	6.0-9.2	5-12								< 20								
Moisture Separators (1A1 - 1C2)	8.8-9.2			<5	< 30							< 5						
Condenser Hotwell (1A1 - 1C2)					< 5		<150			< 20								
Polishing Demineralizer Cell Effluent			<0.5							< 20								
Main Steam Crossover	8.8-9.2	5-12	<0.5		< 1													
Aux Boiler Feedwater (A or B)	8.8-9.2					(a)			<100 (b)									
Aux Boiler Blowdown (A or B)		N/S							<2000									

(a) N_2H_4 - to Hotwell if feeding from hotwell
- 1 - 5 ppm if feeding from an Upper Surge Tank

(b) < 250 ppb not to exceed 1 hour, Transient Condition

(c) Administrative Limit for Chloride or Fluoride is <50 ppb. If exceeded, take corrective action immediately; do not wait for conc. to reach 150 ppb.

* - Conducted on Resins removed from Spent Cells.

Note: It should be emphasized that these are goals we will be striving to attain. A better understanding of actual specific system capabilities will be obtained during the first year of operation.

TABLE 8

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ADMINISTRATIVE GUIDELINES FOR LIMITING OPERATION
FEEDWATER SYSTEM

CHEMICAL PARAMETER	PREOPERATIONAL CLEANUP NC SYSTEM < 100°F	PREOPERATIONAL CLEANUP NC SYSTEM > 100°F (Note 1)	NORMAL OPERATION (Note 2)	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 100 hrs	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 24 hrs	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 2 hrs
pH	8.8-9.6	8.8-9.2	8.8-9.2	8.7-8.8 9.2-9.3	8.6-8.7 9.3-9.4	8.5-8.6 9.4-9.5
Cat Cond	< 0.5 μmho	< 0.5 μmho	< 0.2 μmho	0.2-0.5 μmho	0.5-1.0 μmho	> 1.0 μmho
Dissolved O_2 (Note 4)	< 100 ppb	< 5 ppb	< 5 ppb	5-25 ppb	25-100 ppb	> 100 ppb
SiO_2	< 20 ppb	< 20 ppb	< 10 ppb	20-40 ppb	40-60 ppb	> 60 ppb
Na^+	< 5 ppb	< 5 ppb	< 1.5 ppb (2.5 Note 3)	2.5-3.5 ppb	3.5-6.0 ppb	> 6.0 ppb
N_2H_4	1-2 ppm	75-150 ppb	3 x DO	3 x DO	3 x DO	
SS	< 10 ppb	< 10 ppb	< 10 ppb	10-25 ppb	25-50 ppb	> 50 ppb
Fe	< 10 ppb	< 10 ppb	< 10 ppb	10-25 ppb	25-50 ppb	> 50 ppb
Cu	< 5 ppb	< 5 ppb	< 3 ppb	3-5 ppb	5-10 ppb	> 10 ppb
Pb	< 1 ppb	< 1 ppb	< 1 ppb	1-2 ppb	2-3 ppb	> 3 ppb

Note 1: These parameters apply as long as the ratio of Na^+ concentration in the S/G Blowdowns is < 2 times the feed concentration.

Note 2: These parameters apply any time the Na^+ concentration in the S/G Blowdowns exceeds 2 times the feedwater concentration.

Note 3: If Na^+ concentration exceeds 1.5 ppb, all available corrective actions should be used to prevent exceeding 2.5 ppb, and restore Na^+ to < 1.5 ppb.

Note 4: These limits apply to the Hotwell. If Dissolved Oxygen > 5 ppb, increase N_2H_2 concentration to 3 times the DO concentration.

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Note: It should be emphasized that these are goals we will be striving to attain. A better understanding of actual specific system capabilities will be obtained during the first year of operation.

TABLE 9

DRAFT

ADMINISTRATIVE GUIDELINES FOR LIMITING OPERATION
STEAM GENERATOR BLOWDOWN

CHEMICAL PARAMETER	PREOPERATIONAL CLEANUP NC SYSTEM < 100°F	PREOPERATIONAL CLEANUP NC SYSTEM > 100°F (Note 1)	NORMAL OPERATION (Note 2)	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 100 hrs	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 24 hrs	TRANSIENT CONDITIONS LIMITING OPERATION TO: < 2 hrs
pH	8.5-9.4	8.5-9.2	8.8-9.2	9.2-9.4 8.8-8.6	9.4-9.5 8.6-8.4	< 8.3 or > 9.5
Cat Cond	< 2 μmhos	< 2 μmhos	< 2 μmhos	2-4 μmhos	4-8 μmhos	> 8.0 μmhos
Na^+	< 40 ppb	< 40 ppb	< 100 ppb	100-150 ppb	150-250 ppb	> 250 ppb
Cl^-	< 50 ppb	< 50 ppb	< 50 ppb	50-200 ppb	200-250 ppb	> 250 ppb
F^-	< 50 ppb	< 50 ppb	< 50 ppb	50-200 ppb	200-250 ppb	> 250 ppb
SS	< 250 ppb	< 250 ppb	< 1000 ppb	1000-1500 ppb	1500-25[illegible] ppb	> 2500 ppb
SiO_2	< 250 ppb	< 250 ppb	< [illegible] ppb	1000-1500 ppb	1500-2000 ppb	> 2000 ppb
Fe	< 250 ppb	< 250 ppb	< 1000 ppb	1000-1500 ppb	1500-2000 ppb	> 2500 ppb
Cu	< 10 ppb	< 10 ppb	< 100 [illegible]	100-500 ppb	500-1000 ppb	> 1000 ppb

Note 1: These parameters apply as long as the ratio of Na^+ concentration in the S/G Blowdowns is < 2 times the feed concentration.

Note 2: These parameters apply any time the Na^+ concentration in the S/G Blowdowns exceeds 2 times the feedwater concentration.

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TABLE 10

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SECONDARY SYSTEM
WET LAYUP SPECIFICATIONS

Duke Power Company
McGuire Nuclear Station

SAMPLE	TECH	TIME	pH	SPEC. COND. µmhos	VERIFY N_2 OVERPRESSURE	O_2 ppb	Na ppb	N_2H_4 ppm	Cl^- ppb	F^- ppb	SUS SOLIDS ppb/Fe	SiO_2 ppb	OTHER
STEAM GENERATOR B.D. A			9.8 - 10.2	N/S	YES or NO	< 100	< 100	50 - 75	< 200	< 150	N/S	N/S	
STEAM GENERATOR B.D. B			9.8 - 10.2	N/S	YES or NO	< 100	< 100	50 - 75	< 200	< 150	N/S	N/S	
STEAM GENERATOR B.D. C			9.8 - 10.2	N/S	YES or NO	< 100	< 100	50 - 75	< 200	< 150	N/S	N/S	
STEAM GENERATOR B.D. D			9.8 - 10.2	N/S	YES or NO	< 100	< 100	50 - 75	< 200	< 150	N/S	N/S	
HOTWELL			9.8 - 10.2					10 - 20	< 200	< 150	N/S	N/S	
FEEDWATER HEATERS A - E TUBE SIDE			9.8 - 10.2					10 - 20			N/S		

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TABLE 11

SECONDARY SYSTEM
WET LAYUP SAMPLING SCHEDULE

Duke Power Company
McGuire Nuclear Station

SAMPLE	TECH	TIME	pH	SPEC. COND. µmhos	VERIFY N_2 OVERPRESSURE	O_2 ppb	Na ppb	N_2H_4 ppm	Cl^- ppb	F^- ppb	SUS SOLIDS ppb/Fe	SiO_2 ppb	OTHER
STEAM GENERATOR B.D. A			W	W	W	W	W	W	W	W	W	W	
STEAM GENERATOR B.D. B			W	W	W	W	W	W	W	W	W	W	
STEAM GENERATOR B.D. C			W	W	W	W	W	W	W	W	W	W	
STEAM GENERATOR B.D. D			W	W	W	W	W	W	W	W	W	W	
HOTWELL			W					W	W	W	W	W	
FEEDWATER HEATERS A - E TUBE SIDE			2/M					2/M			2/M		

TABLE 12

CALIBRATION OF MCGUIRE NUCLEAR STATION'S
PROCESS ANALYTICAL INSTRUMENTATION
SECONDARY CHEMISTRY

pH Meters:	Calibrated daily using a minimum of two different purchased buffers, ACS Reagent Grade. Normally pH's of 7 and 9, 10, or 11 are checked.
Conductivity Meters:	Calibrated monthly by cross verifying the reading to a Balabaugh meter. The Balaburgh meter is checked using selected potassium chloride solutions to verify probe response, and checked electronically by our instrument group.
Dissolved Oxygen Analyzers:	Calibrated fully weekly (membrane changed, electrolyte changed, and air calibration), checked for accuracy daily using the indigo carmine method (in addition, chemets are sometimes used).
Hydrazine Analyzers:	Currently calibrated daily by cross verifying the reading using a manual determination. This may be relaxed to weekly in the future if results indicate this is feasible. Also see Note 1.
Silica Analyzer:	Standardized daily using prepared standards of known composition. ACS Reagent Grade chemicals are used.
Sodium Analyzers:	Standardized daily using standards prepared and verified using a flameless Atomic Absorption technique. See Note 1.

If, in the future, the current calibration frequencies of these instruments are found to be excessive, the frequency may be changed. However, it is highly doubtful of the frequency would be less than weekly (except conductivity as these units are extremely stable). No instrument will hold calibration indefinitely and we feel that accurate data is an absolute necessity, regardless of how many hours are required to calibrate these instruments.

NOTE 1: The Q Sum technique is used to insure accuracy of these manual determinations. This technique requires that at least 20 duplicate sets of samples be analyzed under optimum conditions. This data is then used to determine the standard deviation for both accuracy and precision of the method with a 95% confidence level. Graphs are then prepared and each day the method is used, the deviation of both accuracy and precision are plotted. If a positive slope change occurs outside of the 95% confidence limits, sample data is rejected and all samples are reanalyzed. In addition, at least one standard must be analyzed with each subsequent sample that day and that one standard must fall within the standard deviation of the method. This insures that not only all reagents used react as required, but also verifies instrumentation operation and the analytical technique of the technician.