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CHEMISTRY SAMPLING PROCEDURE

CH-632A

EMERGENCY PLAN IMPLEMENTING PROCEDURE

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

POST ACCIDENT SAMPLING AND ANALYSIS OF THE REACTOR COOLANT SYSTEM

APPROVED BY: Procedure Owner

(SIGNATURE ON FILE)

DATE: 5/11/00

PROCEDURE OWNER: Nuclear Chemistry

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1.0 PURPOSE

This procedure provides instructions for sampling the Reactor Coolant System at pressure under accident conditions for Gamma Isotopic, Boron, Dissolved Hydrogen, Chloride, and pH analyses using the Post Accident Sampling System.

2.0 REFERENCES

2.1 DEVELOPMENTAL REFERENCES

2.1.1 APEX Technologies Post Accident Sample System Modules Manual, FPC Manual #2034

2.1.2 EOP-14, Enclosure 2, PPO Post Event Actions

2.1.3 FD-302-700, Post Accident Sampling System

2.1.4 Nuclear Regulatory Commission RTM-96, Response Technical Manual

2.1.5 NUREG 0737, Post-TMI Requirements

2.1.6 PASS Users Manual Volumes A through C, Crystal River Installation

2.1.7 Radiological Emergency Response Plan

2.1.8 Regulatory Guide 1.97, Instrumentation For Light-Water Cooled Nuclear Power Plants To Assess Plant And Environs Conditions During And Following An Accident

2.1.9 RSP-600, ALARA Program

2.1.10 6059-S-002, APEX Technologies PASS Process Flow Diagrams

2.1.11 NUREG 1465, Accident Source Terms for Light-Water Nuclear Power Plants, Feb. 1995

2.2 CMIS REFERENCES

DPDP-5A BREAKER 27, DPDP-5B BREAKER 8, CACP-1, CAV-126, CAV-1, CAV-3, CAV-431, CAV-432, CAV-429, CAV-430, CAV-626, CAV-627, CAV-633, CAV-484, CAV-439, CAV-636, CAV-519, CAV-447, CAV-437, CAV-448, CAV-623, CAV-625, CAP-10, CAP-13, CAP-14, CAV-436, CAV-434, CAV-624, CA-74-FI, WDT-4, CA-58-CI, CASB-5, CAV-492, CAV-493, CAV-445, CAV-446, CAV-471, DWV-337, CAP-8, CAV-470, CAV-628, CAV-629, CAV-630, CAV-631, CAV-632, CAV-634, CAV-635, CAV-525, CAV-433, CAV-435, CAT-8, AHF-55

3.0 PERSONNEL INDOCTRINATION

3.1 DESCRIPTION

NOTE: The PASS is powered by the B ES Bus through ACDP-59.

The Post Accident Sampling System (PASS) is an on-line system designed to sample and evaluate various liquid and gaseous sample streams during an accident, including the Reactor Coolant System at pressure. The liquid PASS Automated Isotopic And Chemical Measurement System (AIMS) consists of the subassembly used to perform Gamma Isotopic, Boron, Dissolved Hydrogen, Chloride, and pH analyses of the Reactor Coolant System at pressure.

3.2 LIMITS & PRECAUTIONS

3.2.1 Performance of all or part of this procedure will be done by direction of the Emergency Coordinator or designee.

3.2.2 Entries into the controlled access areas must have Radiation Monitoring Team preplanning, concurrence, and coverage as outlined in EM-104, Operation of the Operational Support Center. Controlled access areas will be defined by the Radiation Monitoring Team personnel.

3.2.3 During post-accident sampling, extremely high radiation exposure levels could be experienced. The ability to perform this procedure and stay within exposure limits will require ALARA pre-planning.

3.2.4 Return to the Lab if the dose rate at places requiring work is determined by the Health Physics Technician to be in excess of the limits specified in the pre-job briefing.

3.2.5 All sampling actions are performed on the Main Control Board by Operations, or in the Count Room either on the VAX Computer or from PASS CACP-1 and Nuclear Data Mimic Panels unless otherwise noted.

3.2.6 Section 4.1 must be completed prior to any sample team re-entry.

3.2.7 Sections 4.3, 4.4, or 4. 5 may be performed concurrently, or in any order.

4.0 INSTRUCTIONS

NOTE: Section 4.1 must be completed prior to any sample team re-entries.

4.1 SAMPLE TEAM CHECKLIST

	ACTIONS	DETAILS
4.1.1	ASSEMBLE Sample Team and REVIEW applicable procedures.	1. REVIEW the following procedures. ____ CH-632A, Post Accident Sampling and Analysis of the Reactor Coolant System ____ EM-104, Operation Of The Operational Support Center. 2. LIST personnel performing entry and their dose margins: Name / Dose Margin 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ / _____ Initial/Date
4.1.2	DETERMINE Reactor Coolant System sample point and analyses to be performed.	1. SELECT sample point ___ Reactor Coolant Letdown ___ RCP-1A Discharge ___ RCP-1C Suction 2. LIST analyses to perform _____ _____ _____ _____ _____ / _____ Initial/Date

ACTIONS	DETAILS
NOTE: The following breakers are normally in the locked open (Off) position by Operations due to not having automatic ES closure functions	
4.1.3 ALIGN electrical power supplies	___ VERIFY operations has performed EOP-14, Enclosure 2, PPO post event actions. YES ___ No ___ IF EOP-14, Enclosure 2 was not performed, THEN NOTIFY Operations ENSURE CLOSED the following breakers: ___ DPDP-5A Brk. No. 27 (CAV-433, CAV-434, CAV-429, CAV-430). ___ DPDP-5B Brk. No. 8 (CAV-432, CAV-435, CAV-436). _____/_____ Initial/Date

4.2 SAMPLE LINE-UP

ACTIONS	DETAILS
4.2.1 PERFORM valve lineup to sample Reactor Coolant System at pressure.	ENSURE CLOSED the following: 1.___ CAV-126 2.___ CAV-3 3.___ CAV-1 4.___ CAV-429 5.___ CAV-430 6.___ CAV-431 7.___ CAV-432 8.___ CAV-439 9.___ CAV-484 10.___ CAV-627 11.___ CAV-626 12.___ CAV-633 13.___ CAV-636 ENSURE OPEN the following: 14.___ CAV-519 15.___ CAV-447 16.___ CAV-437 17.___ CAV-448 ENSURE the following: 18.___ CAV-623 to SAMPLE 19.___ CAV-625 to SAMPLE 20.___ CAV-626 to DRAIN TANK 21.___ CAP-10 to AUTO 22.___ CAP-10 Flow Control Switch to FULL CLOCKWISE 23.___ CAP-14 to ON _____/_____ Initial/Date

4.2 SAMPLE LINE-UP (Cont'd)

ACTIONS	DETAILS
4.2.2 NOTIFY Operations to OPEN Containment Isolation Valves	1. NOTIFY Operations OPEN the following: 1.___ CAV-436 2.___ CAV-434 3.___ CAV-431 OR CAV-432 but not both 2. NOTIFY Operations OPEN one of the following: ___ CAV-126 (Reactor Coolant Letdown) OR ___ CAV-429 (RCP-1A Discharge) OR ___ CAV-430 (RCP-1C Suction) _____/_____ Initial/Date

****
CAUTION: Do not exceed 175 psig on CA-89-PI.
****

NOTE: Additional flow adjustments with CAV-484 may be required when flow to other instrumentation is initiated or secured.

NOTE: Refer to section 5.0 if a HI-HI alarm occurs at CAT-8.

4.2.3	ADJUST Sample Flow for Gamma Isotopic, Boron or Grab Sample.	___ THROTTLE CAV-484 to OBTAIN 0.35-0.50 gpm at CA-74-FI. ___ DEPRESS RESET at CA-74-FI _____/_____ Initial/Date

4.2 SAMPLE LINE-UP (Continued)

ACTIONS	DETAILS
4.2.4 CHECK PASS system temperatures	___ LOG ON the VAX computer as Username: PASS ___ SELECT PASS MENU. ___ ENTER NO to DO YOU WANT A SPECTRAL DISPLAY WINDOW? (Default). ___ SELECT DISPLAY ND68DC INPUT VALUES. ___ ND68DC Input Values will be displayed. ___ IF the temperatures are greater than: 120 degrees °F on CA-54-TE1 OR 100 degrees °F on CA-51-TE, THEN consult Chemistry Supervision for instructions. ___ Enter Q to exit. ___ Enter NO for hard copy. ___ DEPRESS PF4 to quit. ___ ENTER LO to log off. _____/_____ Initial/Date

4.3 GAMMA ANALYSIS

ACTIONS		DETAILS
4.3.1	FLUSH sample lines	1.___ ENSURE Section 4.2, SAMPLE LINE-UP performed. **NOTE: While sample is flushing you may continue with step 4.3.2.** 2.___ IF sampling RC Letdown, THEN FLUSH at least the following volumes as indicated as indicated at CA-74-FI: ___ at least 17.5 gallons with RC Letdown flow ___ at least 45 gallons without RC Letdown flow ___ IF sampling RCP-1A OR RCP-1C, THEN FLUSH at least 3 gallons as indicated at CA-74-FI. _____/_____ Initial/Date
4.3.2	PERFORM pre-analysis PASS detector checks.	1.___VERIFY >50 pounds of liquid nitrogen at PASS liquid nitrogen monitor. 2.___ENSURE high voltage applied to PASS detector at value specified in PASS AND RANGE AIMS equipment logbook. ********** **CAUTION: Do not reset liquid nitrogen monitor until high voltage bias has been lowered to zero.** ********** 3.___ENSURE weekly calibration check performed within past 7 days per CH-234 as indicated on weekly Count Room QC logsheet in Count Room Task logbook. _____/_____ Initial/Date

ACTIONS	DETAILS
4.3.3 PERFORM Gamma Isotopic Analysis	1.___ LOG ON VAX computer as Username: PASS 2.___ SELECT PASS MENU. 3.___ ENTER NO to prompt DO YOU WANT A SPECTRAL DISPLAY WINDOW? (Default). 4.___ SELECT LIQUID SAMPLING. 5.___ SELECT the desired sample point: ___ Reactor Coolant Letdown ___ RCP-1A Discharge ___ RCP-1C Suction 6.___ EITHER a.___ ENTER Q to quit MUX display and continue with procedure, OR b.___ RETURN to update MUX values. 7.___ ENTER NO to abort sample (Default value). 8.___ UPDATE sample parameters. 9.___ SELECT ACCEPT. 10.___ SELECT QUIT key to exit. 11.___ ENTER LO to log off VAX computer. 12.___ ATTACH gamma scan to this procedure. 13.___ REPORT results to OSC Chemistry Coordinator or designee Gamma Scan ID number: _____ _____/___/_____ Initial/Date/Time Gamma Scan ID number: _____ _____/___/_____ Initial/Date/Time Gamma Scan ID number: _____ _____/___/_____ Initial/Date/Time

ACTIONS		DETAILS
4.3.3	Continued	14.__ IF additional gamma isotopic analyses are required, THEN REPEAT steps 1 through 13. 15.__ IF all analyses are complete, THEN PERFORM Demineralized Water Flush per section 4.7. _____/_____ Initial/Date
4.3.4	PERFORM Core Damage Assessment	1.____ OSC Chemistry Coordinator or designee PERFORM Core damage assessment per Enclosure 2 _____/_____ Initial/Date

4.4 BORON ANALYSIS

ACTIONS		DETAILS
4.4.1	PERFORM Boron analysis	1.___ ENSURE Section 4.2 SAMPLE LINE-UP performed. 2.___ IF sampling RC Letdown, THEN FLUSH at least the following volumes as indicated as indicated at CA-74-FI: ___ at least 17.5 gallons with RC Letdown flow ___ at least 45 gallons without RC Letdown flow ___ IF sampling RCP-1A OR RCP-1C, THEN FLUSH at least 3 gallons as indicated at CA-74-FI. 3.___ FLUSH sample through the Boronometer for at least one hour. _____ flush start time

ACTIONS	DETAILS
4.4.1 Continued	**NOTE: The Boron concentration of the sample will be displayed at the readout (CA-56-CI) located on PASS Analyzer Panel (CACP-1) in countroom.** Boron _____ PPM 4.___ NOTIFY OSC Chemistry Coordinator or designee of results _____/_____/_____ Initial/Date/Time 5.___ IF all analyses are complete, THEN PERFORM Demineralized Water Flush per section 4.7 _____/_____ Initial/Date

4.5 DISSOLVED HYDROGEN, pH, AND/OR CHLORIDE ANALYSES

ACTIONS	DETAILS
4.5.1 ALIGN valves for Hydrogen and pH Analyses	1.___ ENSURE Section 4.2, SAMPLE LINE-UP performed. 2.___ IF sampling RC Letdown, THEN FLUSH at least the following volumes as indicated as indicated at CA-74-FI: ___ at least 17.5 gallons with RC Letdown flow ___ at least 45 gallons without RC Letdown flow ___ IF sampling RCP-1A OR RCP-1C, THEN FLUSH at least 3 gallons as indicated at CA-74-FI. 3. ALIGN the following to SAMPLE: 1.___ CAV-627 2.___ CAV-628 3.___ CAV-629 4.___ CAV-630 5.___ CAV-634 4. ALIGN the following: ___ CAV-633 to pH/IC ANAL. ___ CAP-13 to ON _____/_____ Initial/Date

4.5 DISSOLVED HYDROGEN, pH, AND/OR CHLORIDE ANALYSES (Cont'd)

ACTIONS		DETAILS

****
CAUTION: Do not exceed 100 psig on CA-77-PI.
****

NOTE: Additional flow adjustments with CAV-631 may be required when flow to other instrumentation is initiated or secured.

NOTE: Refer to section 5.0 if a HI-HI alarm occurs at CAT-8.

4.5.2	ADJUST Sample Flow for Hydrogen and pH Analyses.	___ THROTTLE CAV-631 to OBTAIN approximately 0.067 gpm at CA-78-FI. _____/_____ Initial/Date

4.5.3 DISSOLVED HYDROGEN ANALYSIS

4.5.3.1	PERFORM Hydrogen Analysis	1.___ FLUSH sample through Dissolved Hydrogen sensors at least 15 minutes before taking first readings. **NOTE: Dissolved Hydrogen concentration will be displayed on CA-55-CI readout.** Hydrogen ________ cc/kg 2.___ REPORT results to OSC Chemistry Coordinator or designee. _____/_____/_____ Initial/Date/Time

4.5.4 pH ANALYSIS

ACTIONS	DETAILS
4.5.4.1 PERFORM pH Analysis	1.___ FLUSH sample through pH sensors at least 15 minutes before taking first readings. **NOTE: Sample pH will be displayed on CA-73-CI readout.** pH _____ 2.___ REPORT results to OSC Chemistry Coordinator or designee. _____/___/_____ Initial/Date/Time

4.5.5 CHLORIDE ANALYSIS

4.5.5.1 STAGE the 2010IC	1.___ RETRIEVE the 2010IC from its storage location. 2.___ STAGE the 2010IC in the primary lab's southwest corner. _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.2 SETUP 2010IC	ENSURE the following: ___ IC plugged in 120 VAC outlet labeled PASS CHROMATOGRAPH ONLY. ___ Eluent tubing secured to analytical pump outlet. ___ Eluent delivery tubing secured to the analytical pump inlet bulkhead. ___ Demin water delivery tubing secured to analytical pump inlet bulkhead. ___ Reference ENCLOSURE 4 if reagent/chemical prep is required. ___ Adequate volumes of eluent, regenerate, demin water, and calibration solution are in each respective reservoir. ___ Regenerant container pressurized to ~5 psi . ___ Eluent container pressurized to ~5 psi with nitrogen. ___ Integrator is connected to the "Chart Recorder" output on back side of Conductivity Detector Module. _____/_____ Initial/Date
4.5.5.3 CONNECT the 2010IC to PASS	___ CONNECT the following: ___ Cell drive ___ Cell return ___ Cell thermistor ___ Solenoid power supply on Chromatography Module _____/_____ Initial/Date

ACTIONS		DETAILS
4.5.5.4	STARTUP 2010IC	1.___ DEPRESS Main POWER button. 2.___ OPEN eluent supply valve on selected eluent. 3.___ DEPRESS appropriate eluent button on analytical pump inlet manifold. 4.___ ENSURE that the only pump inlet manifold light ON is for the selected eluent. _____/_____ Initial/Date
4.5.5.5	SETUP Conductivity Detector Module	ENSURE Conductivity Detector Module status: 1.___ LOCAL/REMOTE is LOCAL. 2.___ CELL is ON. 3.___ AUTO OFFSET is OFF. 4.___ TEMPERATURE COMPENSATOR set at 1.7. 5.___ OUTPUT RANGE is set to desired range as indicated by last calibration found in 2010i Equipment Logbook. _____/_____ Initial/Date
4.5.5.6	SETUP Analytical Pump Module	ENSURE Analytical Pump Module status: 1.___ LOCAL/REMOTE is LOCAL. 2.___ Low Pressure Pump trip at 20#. 3.___ High Pressure Pump trip set at 200 psi above operating pressure. 4.___ Eluent flow rate set to desired rate as indicated by last calibration found in 2010i Equipment Logbook. _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.7 START analytical pump	1.___ DEPRESS Analytical Pump STOP/START Switch. 2.___ ALLOW pressure to stabilize and pump "Ready" LED to light. 3.___ IF system pressure is less than 20#, THEN LOWER low pressure trip point to 0# until after pump starts and system pressure is at least 30#. 4.___ IF pump will not sustain a stable pressure, THEN Refer to section 5.3 to prime pump cylinders. _____/_____ Initial/Date
4.5.5.8 SETUP Advanced Chromatography Module	ENSURE SYS 2 SELECTED to the following settings: ___ LOCAL/REMOTE is LOCAL. ___ LOAD/INJECT valve in LOAD. ___ A valve OFF. **NOTE: WHEN B valve is OFF, THEN RCS is lined up to sample loading loop.** ___ B valve ON. _____/_____ Initial/Date
4.5.5.9 ALLOW conductivity to stabilize	1.___ ALLOW conductivity reading to stabilize before continuing. Reading is considered stable when unchanged (plus or minus 0.02 units) for 1 minute. 2.___ RECORD operational parameters: _____ Pressure _____ Background conductivity _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.10 SETUP Chromjet Integrator	___ IF a "PASS Calibration" file is known to be present in the integrator's memory, THEN select the file by ENTERING FI=n, where "n" is the number corresponding to the current PASS file located in the 2010i Equipment Logbook. ____ REVIEW the contents of the file: 1.___ DEPRESS PRINT FILE. 2.___ COMPARE printout to current PASS file in the 2010i Equipment Logbook. 3.___ Changes may be made following examples in Enclosure 3. ___ IF a "PASS Calibration" file does not exist in the integrator's memory, THEN file may be initially entered using the integrator's "DIALOG" function AND entering the integrator parameters file using the current PASS file located in the 2010I Equipment Logbook. _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.11 LOAD standard	Using the calibration pump at the PASS Chemical Analysis Panel: 1.___ PLACE selector switch in CALIB SAMPLE position. 2.___ PULL out the CALIB PUMP switch to start the calibration pump. 3.___ After at least one minute, PUSH in CALIB PUMP switch to stop the calibration pump. _____/_____ Initial/Date
4.5.5.12 ANALYZE Standard	At the 2010IC: 1.___ CYCLE the AUTO OFFSET. 2.___ PLACE the AUTO OFFSET to ON. 3.___ ENSURE conductivity is stable. Reading is considered stable when unchanged (plus or minus 0.02 units) for 1 minute. 4.___ Record operational parameters _____ Pressure _____ Conductivity 5.___ PERFORM the following actions simultaneously: ___ PLACE SYS 2 LOAD/INJECT valve in INJECT. ___ DEPRESS the INJ-A button on Integrator. 6.___ WHEN analysis is complete, THEN PLACE SYS 2 LOAD/INJECT valve in LOAD. 7.___ ENSURE CALIB PUMP switch is PUSHED in. 8.___ PLACE selector switch in OFF position. 9.___ RECORD Results. _____ Standard Concentration (ppb) _____ Integrated peak area _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.13 UPDATE calibration table for chloride with Retention Time (RT) and Calculated Response Factor (RF).	1.__ DIVIDE peak area by chloride standard concentration to obtain the RF value. Calculated RF _____ 2.__ UPDATE the chloride RF value into integrator file using Enclosure 3. 3.__ UPDATE the chloride RT value by inputting the chloride retention time into integrator file using Enclosure 3. _____/_____ Initial/Date
4.5.5.14 CHECK 2010 calibration	___ PREPARE a chloride calibration check standard. Standard _____ppb _____/_____ Initial/Date
4.5.5.15 LOAD check standard	IF using the calibration pump, THEN at the PASS Chemical Analysis Panel: 1.___ ENSURE calibration sample inlet line is connected to the Load/Inject valve. 2.___ RINSE the calibration pump suction line with reagent grade water. 3.___ PLACE the calibration pump suction line in the check standard. 4.___ PLACE selector switch in CALIB SAMPLE position. 5.___ PULL out the CALIB PUMP switch to start the calibration pump. 6.___ After at least one minute, PUSH in CALIB PUMP switch to stop the calibration pump. continued next page...

ACTIONS	DETAILS
4.5.5.16 INJECT check standard	At the 2010IC: 1.___ Place AUTO OFFSET to ON. 2.___ WHEN conductivity is stable, THEN PERFORM the following actions simultaneously: ___ PLACE SYS 2 LOAD/INJECT valve in INJECT. ___ DEPRESS the INJ-A button on Integrator. 3.___ WHEN analysis is complete, THEN PLACE SYS 2 LOAD/INJECT valve in LOAD. 4.___ RECORD the check standard result. _____ 5.___ IF the check standard is within 25% of expected value, THEN: ___ ENSURE CALIB PUMP switch is PUSHED in. ___ PLACE selector switch in OFF position. 6.___ IF satisfactory results are not obtained, THEN CONTACT OSC Chemistry Coordinator or designee. _____/_____ Initial/Date

ACTIONS	DETAILS
4.5.5.17 ANALYZE sample	1.___ OPEN CAV-525. **NOTE: WHEN B valve is OFF, THEN RCS is lined up to sample loading loop.** 2.___ ENSURE SYS 2 LOAD/INJECT valve in LOAD. 3.___ PLACE B valve in OFF. 4.___ WHEN conductivity is stable, THEN REZERO conductivity with AUTO RESET button. 5.___ LOAD sample onto loop for at least 5 minutes. 6.___ SIMULTANEOUSLY PERFORM the following actions: ___ PLACE SYS 2 LOAD/INJECT VALVE in INJECT. ___ DEPRESS the INJ-A button on the Integrator. 7.___ RECORD chloride results _____ppb 8.___ Report results to OSC Chemistry Coordinator or designee. _____/_____ Initial/Date
4.5.5.18 SHUT DOWN 2010IC	1.___ ENSURE all analysis are complete. 2.___ PLACE B valve in ON. 3.___ PLACE SYS 2 LOAD/INJECT VALVE in LOAD. 4.___ PLACE 2010 on demineralized water for 30 minutes. 5.___ ENSURE A valve in OFF. 6.___ STOP analytical pump. 7.___ TURN Main Power OFF. 8.___ IF desired, THEN DISCONNECT the following: ___ Cell drive ___ Cell return ___ Cell thermistor ___ Analytical pump head delivery tubing ___ Solenoid power supply ___ Remove Nitrogen pressure from the reagent and regenerent bottles. 9.___ GO TO Section 4.5.6 _____/_____ Initial/Date

4.5.6 ISOLATE FLOW TO HYDROGEN, pH, AND CHLORIDE ANALYZERS

ACTIONS	DETAILS
4.5.6.1 ISOLATE flow to the Hydrogen, pH and Chloride Analyzers	___ Close CAV-627. ___ Close CAV-628. ___ Close CAV-629. ___ Close CAV-630. ___ Close CAV-633. ___ Close CAV-634. ___ CAP-13 to OFF ___ IF all analyses are complete, THEN PERFORM Demineralized Water Flush per Section 4.7. _____/_____ Initial/Date

4.6 GRAB SAMPLE COLLECTION AT CASB-5

NOTE: Spare grab sample bombs are stored in the oil tank warehouse FIMIS # 1400513.

4.6.1	PREPARE CASB-5 (Grab Sampler) for sample collection.	**NOTE: CASB-5 exhaust fan (AHF-55) switch is located to the right of Intermediate Building door (across from RM-A7)** ___ START AHF-55. _____/_____ Initial/Date

4.6 GRAB SAMPLE COLLECTION AT CASB-5 (Cont'd)

	ACTIONS	DETAILS
4.6.2	PERFORM valve alignment	1.___ ENSURE Section 4.2 SAMPLE LINE-UP performed. 2.___ IF sampling RC Letdown, THEN FLUSH at least the following volumes as indicated as indicated at CA-74-FI. ___ at least 17.5 gallons with RC Letdown flow ___ at least 45 gallons without RC Letdown flow ___ IF sampling RCP-1A OR RCP-1C, THEN FLUSH at least 3 gallons as indicated at CA-74-FI. 3.___ OPEN CAV-445. 4.___ OPEN CAV-446. 5.___ CLOSE CAV-447. 6.___ FLUSH for at least 15 minutes. _____/_____ Initial/Date
4.6.3	ISOLATE Grab Sample	**NOTE: The T-handle operator for CAV-492 and CAV-493 is attached to CASB-5.** 1.___ CLOSE CAV-492 using T-handle. 2.___ CLOSE CAV-493 using T-handle. _____/_____ Initial/Date
4.6.4	ISOLATE CASB-5	1.___ OPEN CAV-447 2.___ CLOSE CAV-445 3.___ CLOSE CAV-446 _____/_____ Initial/Date

4.6 GRAB SAMPLE COLLECTION AT CASB-5 (Cont'd)

	ACTIONS	DETAILS
4.6.5	NOTIFY Operations to CLOSE Containment Isolation Valves	NOTIFY Operations ENSURE CLOSED the following: 1.____ CAV-431 2.____ CAV-432 3.____ CAV-126 4.____ CAV-429 5.____ CAV-430 _____/_____ Initial/Date
4.6.6	ESTABLISH demineralized water flush.	1.___ CLOSE-CAV-484 2.___ OPEN DWV-337 3.___ OPEN CAV-470 4.___ THROTTLE CAV-484 to obtain a flow rate between 0.35-0.50 gpm on CA-74-FI. **NOTE: While sample is flushing you may continue with steps 4.6.7 and 4.6.8.** 5.___ FLUSH for at least 10 minutes _____/_____ Initial/Date

ACTIONS		DETAILS
4.6.7	A.I.M.S. Flushing Pre-Requisites	1.___ VERIFY >50 pounds of liquid nitrogen at PASS liquid nitrogen monitor. 2.___ ENSURE high voltage applied to PASS detector at value specified in PASS AND RANGE AIMS equipment logbook. ********** **CAUTION: Do not reset liquid nitrogen monitor until high voltage bias has been lowered to zero.** ********** 3.___ ENSURE weekly calibration check performed within past 7 days per CH-234 as indicated on weekly Count Room QC logsheet in Count Room Task logbook. _____/_____ Initial/Date
4.6.8	PERFORM A.I.M.S. Flush	1.___ LOG ON VAX computer as Username: PASS 2.___ SELECT PASS Menu. 3.___ ENTER NO to DO YOU WANT A SPECTRAL DISPLAY WINDOW? (Default) 4.___ SELECT Flush Sample Lines. 5.___ SELECT Sump Demin Flush. 6.___ MAXIMIZE MCA Display 1 and toggle through ADC's until RCS CONFIGURATION shown. 7.___ SELECT the Erase function on MCA Display as needed to re-acquire spectrum. 8.___ When a low stable countrate is indicated MINIMIZE MCA Display 1. 9.___ SELECT Return. 10.___ DEPRESS PF4 to quit. 11.___ ENTER LO to log off. _____/_____ Initial/Date

4.6 GRAB SAMPLE COLLECTION AT CASB-5 (Cont'd)

	ACTIONS	DETAILS
4.6.9	FLUSHING CASB-5	1.___ OPEN CAV-445. 2.___ OPEN CAV-446. 3.___ CLOSE CAV-447. 4.___ FLUSH for at least 5 minutes. _____/_____ Initial/Date
4.6.10	ISOLATE CASB-5	1.___ OPEN CAV-447 2.___ CLOSE CAV-445. 3.___ CLOSE CAV-446. _____/_____ Initial/Date
4.6.11	SECURE Demineralized water flush after grab sampling.	ENSURE CLOSED the following: 1.___ DWV-337 2.___ CAV-470 3.___ CAV-484 4.___ CAV-519 5.___ CAV-447 6.___ CAV-623 7.___ CAV-625 8.___ CAV-626 _____/_____ Initial/Date

ACTIONS		DETAILS
4.6.12	REMOVE CASB-5	1. ___ OBTAIN 3/4" wrench from Primary Chemistry lab key locker 2. ___ PROCEED to CASB-5 location, 95' elevation Auxiliary building 3. ___ REMOVE the Grab Sampler ramp from storage location 4. ___ INSTALL the Grab Sampler ramp in front of sample station 5. ___ DISCONNECT CASB-5 from the sample station: a. ___ SQUEEZE disengagement lever b. ___ PUSH the engagement handle to its rearmost position c. ___ PULL UP on cart handle locking mechanism to release the cart d. ___ REMOVE CASB-5 cart from sample station 6. ___ INSTALL the transit cover over the quick-connects 7. ___ REMOVE the cart and move to the Turbine Building crane well 8. ___ UNBOLT CASB-5 from the cart using 3/4" wrench 9. ___ REMOVE T-handle operator 10. ___ GO TO section 5.0 to prepare CASB-5 for shipment off-site _____/_____ Initial/Date

ACTIONS	DETAILS
4.6.13 INSTALL new grab sampler.	1.___ BOLT new Grab Sampler onto cart. 2.___ REMOVE transit cover. 3.___ ATTACH transit cover to lifting ring on grab sampler. 4.___ ATTACH T handle operator to grab sampler. 5.___ OPEN CAV-492 using T handle. 6.___ OPEN CAV-493 using T handle. 7.___ PROCEED to Sample ********** **CAUTION: When connecting CASB-5, force should NEVER be used. Damage to quick connects will result from forcing connection.** ********** **NOTE: Repeated attempts may be necessary to successfully align CASB-5.** 8. ENGAGE CASB-5 a.___ One person GUIDE CASB-5 b.___ Another person PUSH CASB-5 UP Ramp and onto Platform, c.___ HALT CASB-5 several inches from connection points. **NOTE: WHEN positioned correctly, front of CASB-5 will make metal to metal contact with curved face of sample station.** d.___ SLOWLY PUSH CASB-5 into Sample Station. e.___ ENGAGE Cart to Station Locking Mechanism. f.___ PUSH Locking Mechanism handle completely down, DRIVING lock bolt through hole in cart. g.___ IF CASB-5 does not position correctly, THEN PULL Cart back a short distance AND REALIGN it.

ACTIONS	DETAILS
4.6.13 Continued	********** **CAUTION: When engaging handle, force should NEVER be used. Damage to quick connects will result from forcing connection.** ********** **NOTE: Due to environmental conditions, the click may not be heard.** h.___ GENTLY PULL Engagement Handle forward until a distinct "click" is heard. This signifies that quick connect couplings have engaged. i.___ ENSURE engagement: ___ UNLOCK Cart from station. ___ MOVE engagement handle gently back and forth. ___ IF properly connected, Cart will move back and forth. j.___ RE-LOCK Cart to Station by inserting locking pin into Cart base. _____/_____ Initial/Date

4.7 DEMINERALIZED WATER FLUSH

	ACTIONS	DETAILS
4.7.1	NOTIFY Operations to CLOSE Containment Isolation Valves	NOTIFY Operations ENSURE CLOSE the following: 1.____ CAV-431 2.____ CAV-432 3.____ CAV-126 4.____ CAV-429 5.____ CAV-430 _____/_____ Initial/Date
4.7.2	PERFORM Valve Line-up	___ ENSURE CLOSED CAV-484 ___ ENSURE CLOSED CAV-623 ___ ENSURE CAV-626 is SELECTED to DRAIN TANK ___ ENSURE CLOSED CAV-627 ___ ENSURE CLOSED CAV-631 ___ ENSURE CAV-633 is SELECTED to pH/IC ___ ENSURE CAV-634 is SELECTED to SAMPLE ___ ENSURE CLOSED CAV-636 ___ ENSURE CAP-10 is SELECTED to AUTO ___ ENSURE CAP-10 Flow Control Switch is SELECTED to FULL CLOCKWISE ___ ENSURE CAP-14 is SELECTED to ON _____/_____ Initial/Date
4.7.3	ESTABLISH demineralized water supply.	___ OPEN DWV-337 ___ OPEN CAV-470 ___ SELECT CAV-623 to the SAMPLE position ___ SELECT CAV-627 to the SAMPLE position _____/_____ Initial/Date

ACTIONS	DETAILS

****
CAUTION: Do not exceed 175 psig on CA-89-PI
****

NOTE: Additional flow adjustments with CAV-484 may be required when flow to other instrumentation is initiated or secured.

4.7.4 ADJUST demineralized water flowrate.

___ THROTTLE CAV-484 to obtain 0.35-0.50 gpm at CA-74-FI.

___ THROTTLE CAV-631 to obtain approximately 0.067 gpm at CA-78-FI

NOTE: While sample is flushing you may continue with step 4.7.5 and 4.7.6.

___ FLUSH for at least 10 minutes.

_____/_____
Initial/Date

4.7.5 A.I.M.S. Flushing Pre-Requisites

1.___ VERIFY >50 pounds of liquid nitrogen at PASS liquid nitrogen monitor.
2.___ ENSURE high voltage applied to PASS detector at value specified in PASS AND RANGE AIMS equipment logbook.

****
CAUTION: Do not reset liquid nitrogen monitor until high voltage bias has been lowered to zero.
****

3.___ ENSURE weekly calibration check performed within past 7 days per CH-234 as indicated on weekly Count Room QC logsheet in Count Room Task logbook.

_____/_____
Initial/Date

ACTIONS	DETAILS
4.7.6 PERFORM A.I.M.S. Flush	1.___ LOG ON VAX computer as Username: PASS 2.___ SELECT PASS Menu. 3.___ ENTER NO to DO YOU WANT A SPECTRAL DISPLAY WINDOW? (Default) 4.___ SELECT Flush Sample Lines. 5.___ SELECT Sump Demin Flush. 6.___ MAXIMIZE MCA Display 1 and toggle through ADC's until RCS CONFIGURATION is shown. 7.___ SELECT Erase function on MCA Display as needed to re-acquire spectrum. 8.___ WHEN a low stable countrate is indicated THEN MINIMIZE MCA Display 1. 9.___ SELECT Return. 10.___ DEPRESS PF4 to quit. 11.___ ENTER LO to log off. _____/_____ Initial/Date
4.7.7 SECURE demineralized water flush	ENSURE CLOSED the following: 1.___ CAV-470. 2.___ DWV-337. 3.___ CAV-519. 4.___ CAV-437. 5.___ CAV-447. 6.___ CAV-448. 7.___ CAV-484. 8.___ CAV-623. 9.___ CAV-624. 10.___ CAV-625. 11.___ CAV-626. 12.___ CAV-627. 13.___ CAV-628. 14.___ CAV-629. 15.___ CAV-630. 16.___ CAV-631. 17.___ CAV-632. 18.___ CAV-633. 19.___ CAV-634. 20.___ CAV-635. 21.___ CAV-525. _____/_____ Initial/Date

4.7 **DEMINERALIZED WATER FLUSH** (Cont'd)

	ACTIONS	DETAILS
4.7.8	NOTIFY Operations to CLOSE Containment Isolation Valves	NOTIFY Operation ENSURE CLOSE the following: ___ CAV-436 ___ CAV-434 _____/_____ Initial/Date

4.8 **SYSTEM RESTORATION**

4.8.1	SECURE flow	ENSURE CLOSED the following: 1.____ CAV-447 2.____ CAV-448 3.____ CAV-484 4.____ CAV-623 5.____ CAV-624 6.____ CAV-625 7.____ CAV-626 8.____ CAV-627 9.____ CAV-471 10.____ CAV-628 11.____ CAV-629 12.____ CAV-630 13.____ CAV-631 14.____ CAV-632 15.____ CAV-633 16.____ CAV-634 17.____ CAV-635 18.____ CAV-525 19.____ CAP-13 OFF _____/_____ Initial/Date

5.0 CONTINGENCIES

ACTIONS	DETAILS
5.1 CAT-8 HI-HI LEVEL ALARM	
5.1.1 PERFORM lineup	ENSURE the following: 1.___ CAP-10 OFF 2.___ CAV-623 CLOSED 3.___ CAV-627 CLOSED 4.___ CONCURRENTLY PERFORM the following until CAT-8 HI-HI level alarm light clears: o DEPRESS and hold RESET button on Drain Tank level indicator o SELECT CAP-10 to ON 5.___ OPEN CAV-623 6.___ OPEN CAV-627 7.___ SELECT CAP-10 to AUTO 8.___ RETURN to the step in the procedure which was in progress when the CAT-8 HI-HI level alarm occurred _____/_____ Initial/Date

5.2 NOTIFICATIONS AND SHIPMENT

ACTIONS	DETAILS

NOTE: The Emergency 24 hour access phone number is (800) 335-9264.

NOTE: Spare grab sample bombs are located under FIMIS #1400513.

5.2.1 PERFORM notifications

___ NOTIFY the Manager, Nuclear Operations Materials Controls that a grab sample has been taken and to initiate acquisition process for shielded sample cask.

___ NOTIFY the BWX Technologies Emergency Sample Coordinator when a grab sample has been collected that will require offsite analysis.

___ Required information to be made available:

- o Utility and plant name
- o Name and phone of ChemRad Specialist to whom follow-up communication should be addressed.
- o Number and type of samples to be shipped (i.e., liquid, gaseous, or iodine cartridge).
- o Measured radiation levels at the surface and three feet from the shipping container.
- o Estimated shipping time, mode of transportation, carrier, and estimated arrival at BWX Technologies site in Lynchburg, VA.

Shipping Address:
BWX Technologies
Lynchburg Technology Center
Route 726, Mt. Athos Road
Lynchburg, VA. 24506
Attn. Kenneth D. Long
(804)-335-9264.

___ All data accumulated per this procedure is to be summarized on Enclosure 1 and forwarded to the Emergency Coordinator via Chemistry Supervision.

_____/_____
Initial/Date

5.3 PRIMING THE 2010 ANALYTICAL PUMP

ACTIONS	DETAILS
5.3.1 PRIME pump	1.___ STOP analytical pump 2.___ ENSURE correct eluent is selected 3.___ CONNECT a plastic syringe to black block valve on left side of analytical pump 4.___ TURN handle on block valve so it aligns with syringe 5.___ WITHDRAW syringe plunger for half the length of the syringe to remove air from eluent supply line 6.___ REMOVE syringe from block valve 7.___ EXPEL all air from syringe, but retain the liquid 8.___ CONNECT syringe to block valve again 9.___ LOOSEN round black knob on the analytical pump outlet two full turns counterclockwise to open pump drain line 10.___ DEPRESS syringe plunger to flush analytical pump with eluent 11.___ TIGHTEN round black knob on analytical pump outlet two full turns clockwise to close pump drain line 12.___ RETURN handle on block valve to original position, perpendicular to syringe 13.___ REMOVE syringe from block valve 14.___ START analytical pump 15.___ IF pressure will not stabilize, THEN REPEAT steps 1 through 14 until all air is expelled from analytical pump _____/_____ Initial/Date

TECHNICAL SUPPORT CENTER DATA SHEET

REACTOR COOLANT SYSTEM Analysis Results

Boron _____ ppm _____ / _____ / _____
Initial / Date / Time

Boron _____ ppm _____ / _____ / _____
Initial / Date / Time

Boron _____ ppm _____ / _____ / _____
Initial / Date / Time

Boron _____ ppm _____ / _____ / _____
Initial / Date / Time

Total Activity _____ uCi/cc

Major Contributing Isotopes

Isotope	Activity	
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc
_____	_____	uCi/cc

_____ / _____ / _____
Initial / Date / Time

_____ / _____
Signature / Title

TECHNICAL SUPPORT CENTER DATA SHEET

REACTOR COOLANT SYSTEM Analysis Results

Chloride	_____	ppm	_____ / _____ / _____ Initial / Date / Time
Chloride	_____	ppm	_____ / _____ / _____ Initial / Date / Time
Chloride	_____	ppm	_____ / _____ / _____ Initial / Date / Time
Chloride	_____	ppm	_____ / _____ / _____ Initial / Date / Time
Dissolved Hydrogen	_____	cc/Kg	_____ / _____ / _____ Initial / Date / Time
Dissolved Hydrogen	_____	cc/Kg	_____ / _____ / _____ Initial / Date / Time
Dissolved Hydrogen	_____	cc/Kg	_____ / _____ / _____ Initial / Date / Time
Dissolved Hydrogen	_____	cc/Kg	_____ / _____ / _____ Initial / Date / Time
pH	_____	pH	_____ / _____ / _____ Initial / Date / Time
pH	_____	pH	_____ / _____ / _____ Initial / Date / Time
pH	_____	pH	_____ / _____ / _____ Initial / Date / Time
pH	_____	pH	_____ / _____ / _____ Initial / Date / Time

_____ / _____ / _____
Initial / Date / Time

_____ / _____
Signature / Title

ASSESSMENT OF CORE DAMAGE BASED ON REACTOR COOLANT SAMPLE

ASSUMPTIONS/LIMITATIONS:

1. Use of RCS sample results to estimate the extent of core damage is subject to significant uncertainties. Many order of magnitude errors are possible due to factors such as the fraction of an isotope assumed to be released from the fuel matrix, the homogeneity of the activity in the RCS, the representativeness of the sample, and the effects of removal mechanisms.

2. Given the order of magnitude uncertainties noted above, no corrections are made for the following minor factors:
   a. Radioactive decay (longer half-life nuclides chosen to minimize error)
   b. Dilution volume (assumes CFT's have discharged and BWST injection to low alarm setpoint).
   c. RCS temperature/density corrections.
   d. Reactor power history (assumes end of cycle activities for long lived nuclides and assumes shorter lived nuclides at equilibrium).
   e. Release from the RCS. Nuclides chosen should remain in RCS. Noble gases not included.

Appropriate corrections may be applied if desired. For example, if no water has been added from the CFT's or BWST, then results could be reduced by a factor of 5.5 (510,000 lb RCS mass vs. 2,800,000 lb mass RCS, BWST and CFT's)

DATE/TIME OF RCS SAMPLE: _____ DATE/TIME OF RX SHUTDOWN:_____

Nuclide	(A) Sample Result µCi/cc	(B) Factor	(C) Curies in RCS (A) x (B)	(D) Core Inventory Ci	(E) Fractional Release to RCS (C)÷(D)	(F) Expected Gap Fraction	% Clad Failure (Note 1) 100 x (E)÷(F)	(G) Expected Fraction 100% Melt	% Fuel Melt/ Overheat 100 x (E)÷(G)
I-131		1300		6.7E7		0.05		0.4	
Cs-134		1300		8.9E6		0.05		0.3	
Cs-137		1300		5.0E6		0.05		0.3	
Te-132		1300		9.7E7		0	NA	0.05	
Ru-103		1300		9.4E7		0	NA	0.0025	
Ba-140		1300		1.3E8		0	NA	0.02	
Ce-144		1300		7.1E7		0	NA	0.0005	
Np-239		1300		1.3E9		0	NA	0.0005	

(B) Factor = Assumed dilution mass x 1E-6 Ci/µCi = 1.3E9 gm x 1E-6 = 1300
(D) Core inventory is from RADTRAD library for 2619 MWth core
(F) Expected fraction in gap is from NUREG-1465
(G) Expected in-vessel melt release fraction is from NUREG-1465
Note 1 – Enter 100% if greater than 100%

Report results to Dose Assessment Coord. and Accident Assessment Team

Completed by/Date: _____

EDITING A CALIBRATION TABLE IN THE CHROMJET INTEGRATOR

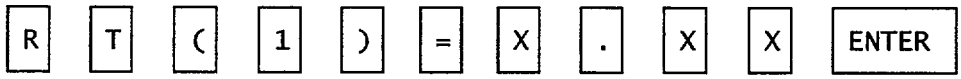
TO EDIT THE RF VALUE:

Divide the AREA of the chloride peak by the concentration of the calibration standard. This is the RF value.

Input the RF value by pressing the following buttons, where X is the RF value:

TO EDIT THE RT VALUE:

Input the numerical value for the chloride retention time by pressing the following buttons, where X is the RT value:



ION CHROMATOGRAPH REAGENTS

1. 0.025 N sulfuric acid (H_2SO_4), molecular weight 98.06g:
   Pipet 2.8 mL of concentrated H_2SO_4, into 500mL reagent grade water and dilute to 4 liters.

2. Eluent #1 [0.005 M sodium tetraborate ($Na_2B_4O_7 \cdot 10\ H_2O$)]: For each liter of eluent to be prepared dissolve 1.91 grams $Na_2B_4O_7 \cdot 10\ H_2O$ in ~ 500 mL reagent grade water and dilute to the mark in a 1 liter volumetric flask.

3. Chloride Calibration Standard: Standard should be prepared from commercially available aqueous stock solutions or from the sodium salt: Chloride: 0.165 g NaCl diluted to 1L is 100 ppm chloride.

NOTE: Chloride standard should be prepared in glassware cleared in nitric acid and rinsed thoroughly in reagent grade water.

NOTE: Calibration Standard concentration will be determined based on accident scenario.

PROCEDURE DEVELOPMENT AND REVISION RECORD

Procedure: CH0632A **New Rev:** 4 **PRR#:** 18497

Title: POST ACCIDENT SAMPLING AND ANALYSIS OF THE REACTOR COOLANT SYSTEM

MINOR CHANGES

If Minor Changes are included, check the applicable box(es) and provide a list of affected steps.
The following corrections are incorporated throughout:

- _ Sentence Structure
- _ Punctuation
- _ Capitalization
- _ Spelling
- _ Organizational Changes: position titles, department names, or telephone numbers
- _ Redundant words or phrases
- _ Abbreviations
- _ Obviously incorrect units of measure
- _ Inadvertently omitted symbols (#, %, etc.)
- X Obvious step numbering discrepancies
- _ Format

The following corrections are incorporated in the step(s) indicated: "Throughout" is used in lieu of Step# if a specific change affects a large number of steps.

	Correcting equipment nomenclature that does not agree with field labels or balance of procedure
	Changing information that is obviously incorrect and referenced correctly elsewhere
	Misplaced decimals that are neither setpoint values nor tolerances
	Reference to a procedure when an approved procedure has taken the place of another procedure
	Fixing branching points when it is clear the branching steps were originally intended but were overlooked or incorrectly stated due to step number changes
	Adding clarifying information such as NOTES and CAUTIONS
	Adding words to clarify steps, NOTES, or CAUTIONS which clearly do not change the methodology or intent of the steps

PROCEDURE DEVELOPMENT AND REVISION RECORD

Procedure: CH0632A **New Rev:** 4 **PRR#:** 18497

Title: POST ACCIDENT SAMPLING AND ANALYSIS OF THE REACTOR COOLANT SYSTEM

NON-INTENT CHANGES

Changes are incorporated for the reasons provided. "Throughout" is used in lieu of Step # if a specific change affects a large number of steps. For new or cancelled procedures the reason is provided.

2.1.11	Added reference used in revised Enclosure 2
4.1.1	Corrected the number and name of the procedure to be reviewed. NUPOST item 59258.
4.7.4	Corrected reference step number from 4.7.8 to 4.7.6. NUPOST item 59261
Enclosure 2	1.Modified table to provide for calculation of percentage of fuel damage. 2. Modified nuclide listing to only include nuclides that decay by gamma emission with a moderate or long half-life 3) Used latest industry info of NUREG 1465 for best estimate of nuclide fractions released from fuel. 4. Expanded discussion of uncertainties. 5. Added Accident Assessment Team for informing of results.
5.2.1	Changed receiving address, contact name and phone number
4.6.8	Added word "countrate" after "low stable". This is obvious omission, as without the word "countrate" the sentence makes no sense. NUPOST item 59266
4.5.1, 4.5.6.1, 4.8.1	Added steps to turn CAP-13 on and then off. This step is part of normal system operation and is required to obtain sample. It was left out of the procedure by error.
2.2	Added CAP-13 to CMIS list.

CHANGE OF INTENT, CANCELLATION, OR NEW PROCEDURE

Changes are incorporated for the reasons provided. "Throughout" is used in lieu of Step # if a specific change affects a large number of steps. For new or cancelled procedures the reason is provided.

None	None