U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name: MASTER EXAMINATION	Region: **III**
Date: **November 1, 2000**	Facility/Unit: **Braidwood Units 1 and 2**
License Level: **RO**	Reactor Type: **W**
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____ Applicant's Signature

Results

Examination Value	_____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

Reactor Operator Examination

1. Surveillance 1BwOSR 3.7.5.4-1 "Unit One Train A Auxiliary Feedwater Valve Emergency Actuation Signal Verification Test" is being performed. The personnel performing the surveillance are stationed at the Main Control Room, Aux. Electrical Room and the AF Pump Area.

   In accordance with 1BwAP 390-1 "Operating Department Surveillance Program" how are operator actions directed while performing the surveillance?

   a. US directs operator actions for the surveillance and will inform the NSO of any changes in the status of plant evolutions.
   b. Assigned management person (other than shift operations) will provide direction to the operators and will directly inform the US of the status of plant evolutions.
   c. NSO directs the operator's actions for the surveillance and is directly informed of the status of plant evolutions.
   d. Operator at the AF pump area is in charge of actions being performed and will inform the Unit Supervisor of any changes in the status of plant evolutions.

2. In accordance with OP-AA-101-110, "Reactivity Management Controls," which of the following NON-LICENSED individuals can manipulate the controls of the reactor?

   Under the direct supervision of the Reactor Operator,

   a. an individual that is enrolled in an approved training program.
   b. a System Engineer during surveillance testing.
   c. a Non-Licensed Operator during surveillance testing.
   d. an individual under the direct supervision of the Shift Manager.

3. Per Technical Specification Definitions, a MODE is determined by power level .....

   a. core reactivity, and average RCS temperature.
   b. core reactivity, and auctioneered high RCS temperature.
   c. decay heat, and average RCS temperature.
   d. decay heat, and auctioneered high RCS temperature.

4. Mechanical Maintenance has completed work on the 1B SI pump bearings and the pump is ready to be tested. The OOS is in the process of being cleared when it is discovered that the Personnel Protection Card has not been removed. All work is complete, but the lead worker has left the site and cannot be reached.

   Who can authorize the removal of the Personnel Protection Card?

   a. Shift Manager (SM).
   b. Unit Supervisor (US).
   c. Work Control Supervisor.
   d. Holder releasing the OOS.

5. Which of the following is a responsibility of the NSO during refueling operations in the main control room?

   a. Checking source range counts while a fuel assembly is being placed in the core.
   b. Verifying proper operation of the Containment Evacuation alarm shiftly.
   c. Maintaining a 1/M plot while reloading fuel during a core shuffle.
   d. Updating the Control Room tag board per the Nuclear Component Transfer List shiftly.

6. Concerning 1BwGP 100-2, "Plant Startup," Limitations and Actions, the overlap of the Rod Control Banks shall be ....
   (Assume current fuel cycle)

   a. 113 steps.
   b. 115 steps.
   c. 116 steps.
   d. 118 steps.

7. An operator received radiation exposures at BOTH Braidwood and LaSalle Stations during the
year.

The exposure record to date this year is:

	Braidwood	LaSalle
- Deep Dose Equivalent (DDE)	180 mrem	40 mrem
- Lens Dose Equivalent (LDE)	10 mrem	5 mrem
- Committed Effective Dose Equivalent (CEDE)	105 mrem	0 mrem
- Shallow Dose Equivalent (SDE)	10 mrem	10 mrem
-Committed Dose Equivalent (CDE)	20 mrem	0 mrem

The operator at Braidwood Station has been requested to work in an area where the known radiation rate is 160 mR/hr. The source of the radiation is a nearby HOT SPOT inside a pipe trap where crud has collected and has been determined to be totally gamma radiation.

If the work task takes 30 minutes to complete, what is the individual's Total Effective Dose Equivalent (TEDE) for the year?

a. 365 mrem

b. 405 mrem

c. 460 mrem

d. 485 mrem

8. What are the MINIMUM requirements for unconditional release of a wrench that has been used in a Radiological Posted Area (RPA)?

A survey indicates the wrench is...

a. free of both smearable and fixed contamination.

b. free of smearable contamination but is allowed up to 1000 dpm/100cm² fixed contamination.

c. allowed up to 20 dpm/100cm² smearable contamination and is allowed up to 5000 dpm/100cm² fixed contamination.

d. allowed up to 100 dpm/100cm² of either smearable or fixed contamination.

9. Given the following plant conditions:

- Unit 1 is at 100% power.
- Unit 2 is at 100% power.
- 0PR09J "CC HX Outlet Unit 0 Radiation Monitor" is in HIGH Alarm.
- A confirmed High Alarm has been determined by chemistry.
- The 0 CC HX has been subsequently isolated.

The crew should verify...

a. Only 1CC017 is closed and enter the LCOAR for Unit 1.

b. Only 2CC017 is closed and enter the LCOAR for Unit 2.

c. Both 1CC017 and 2CC017 are closed and enter the LCOAR for both units.

d. Both 1CC017 and 2CC017 are closed and do not enter a LCOAR.

10. An automatic reactor trip has occurred requiring entry to BwEP-0, REACTOR TRIP OR SAFETY INJECTION. During performance of Step 4, the operator has determined that SI has NOT actuated.

What is the NEXT action required of the operator?

a. Manually actuate SI.

b. Transition to 1BwEP ES-0.1, "REACTOR TRIP RESPONSE."

c. Procede with Step 5 of BwEP 0.

d. Check if SI is required.

11. As discussed in BwAP 340-1,"Use of Procedures for Operating Department," the required operator action while implementing a Critical Safety Function would be to suspend...

a. a lower priority RED BwFR to address a higher priority ORANGE condition.

b. a higher priority ORANGE BwFR to address a lower priority RED condition.

c. the Status Tree pass prior to completion to address an ORANGE condition.

d. BwCA-0.0, "Loss of All AC Power."

12. The following plant conditions exist:

- Unit 2 is in the process of starting up from a refueling outage.
- Reactor power is at 3% and has been stabilized to perform a power history surveillance.
- Indicated intermediate range start up rate is 0 dpm.

A loss of the Unit 2 station auxiliary transformer occurs.
The Unit Supervisor directs a reactor trip.
The reactor operator attempts to trip the reactor at 2PM05J and 2PM06J with no results.
The Unit Supervisor has entered 2BwEP-0 and is at Step 1 RNO.

The next procedure action will be to...

a. continue with 2BwEP-0, Step 2.

b. transition to 2BwCA-0.0, "Loss of All AC Power."

c. transition to 2BwFR-S.1, "Response to Nuclear Power Generation/ATWS."

d. transition to 2BwOA ELEC-3, "Loss of 4KV ESF Bus."

13. The following alarms have actuated:
- Unit Two Area Fire
- CO2 Storage Tank Trouble
- On ~~1~~2PM09J, the Zone Light for the 2B DG Room is illuminated

The fire brigade has been dispatched.

The fire brigade can expect CO2 actuation in the...

a. 2B DG Room ONLY.

b. 2B DG Day Tank Room ONLY.

c. 2B DG Room and 2B DG Day Tank Room.

d. NO actuation due to low CO2 Storage Tank Pressure.

14. The following plant conditions exist:

- Rod D-4 rod bottom light LIT
- PWR RANGE FLUX RATE RX TRIP ALERT annunciator LIT
- Reactor Power 95%
- ROD CONTROL URGENT FAILURE annunciator NOT LIT
- 1BwOA ROD-3 "Dropped or Misaligned Rod" has been entered.

While the crew is taking data for the dropped rod per step 7 of 1BwOA ROD-3, the following indications occur:

- Rod D-8 rod bottom light LIT

Which of the following describes the action required?

a. Reset rate trip and perform dropped rod recovery per 1BwOA ROD-3.

b. Trip the reactor and enter 1BwEP-0.

c. Restore Tave/Tref, then calculate QPTR.

d. Perform SDM surveillance and reduce reactor power to less than 70%

15. Given the following plant conditions on Unit 1:

- 80% reactor power.
- CBD is 175 steps.
- Core Age is 5200 EFPH.
- RCS Tave is 575°F.
- RCS Boron Concentration is 600 ppm.

What will RCS Tave be following a withdrawal of CBD to 200 steps? Assume new stable plant conditions exist.

a. 576.5°F

b. 578.5°F

c. 580.5°F

d. 581.5°F

16. Given the following plant conditions on Unit 1:

- The plant is operating at 75% power with normal lineup for performing a calorimetric.
- During the calorimetric, the NSO is in the process of adjusting N-44 when a turbine runback occurs.
- 1PT-505, turbine first stage impulse chamber pressure, fails high when the turbine runsback.
- Tavg is 584°F and increasing.

Based on these conditions, the NSO should ...

a. Drive rods in manual until rod speed drops below 48 steps/min, then switch to AUTO until temperature is restored.

b. Drive rods in manual and continously insert rods until temperature is restored.

c. Allow automatic insertion until rod speed drops below 48 steps/min, then insert rods in manual until temperature is restored.

d. Allow automatic insertion until rod speed drops below 64 steps/min, then insert rods in manual until temperature is restored.

17. The following plant conditions exist during a small-break LOCA:

- Core exit TC's read approximately 532°F
- RCS pressure is 885 psig
- S/G levels are 25% narrow range
- Steam pressure is 1092 psig
- RCS wide range cold leg temperatures are all 525°F

Based on the above conditions, the RCS is ...

a. saturated. Decreasing RCS pressure will aid in establishing subcooling.

b. subcooled. Increasing S/G pressure will aid in increasing subcooling.

c. subcooled. Decreasing RCS pressure will aid in increasing subcooling.

d. saturated. Decreasing S/G pressure will aid in establishing subcooling.

18. Given the following plant conditions on Unit 2:

- Mode 1
- 2A and Unit 0 CC pumps are OOS
- A fault occurs de-energizing ESF Bus 242

Which of the following actions must occur for the above plant conditions?

a. Trip the reactor when CC heat exchanger outlet temperature is 105°F.

b. Trip the reactor when RCP lower radial bearing temperature is 205°F.

c. Trip the reactor when RCP upper motor bearing temperature is 195°F.

d. No reactor trip is required, CC temperatures should remain constant.

19. The following conditions exist on Unit 1:

- Reactor power	36%
- Pzr pressure	2235 psig
- Pzr level	35%

RCP 1A breaker trips due to sensed undervoltage from bus 157. What is expected as a result of the trip of the RCP?

a. The reactor will automatically trip due to the open RCP breaker.

b. The reactor will automatically trip due to RCS loop low flow condition.

c. The reactor must be manually tripped by the operator.

d. A normal plant shutdown will be initiated.

20. The following plant conditions exist:

- Reactor Tripped
- All RCPs Running
- PZR level 48% increasing
- RCS pressure 1700 psig decreasing

Which of the following leak locations is consistent with the plant conditions above?

a. Failure of charging header connection to the RCS.

b. Weld failure on pressurizer liquid space sample line.

c. Failure of pressurizer PORV in an intermediate position.

d. Weld failure on RCP B discharge piping.

21. The following plant conditions exist on Unit 1:

- 100% power
- RCS Tave is 582°F
- PZR Pressure is 2235 psig

All systems were operating normally in Automatic when the 1A CV pump trips. Which of the following actions are required per BwAR 1-9-A3, "CHG PUMP TRIP?"

a. Place 1CV121, "Cent Chg Pumps Flow Cntrl Vlv", in manual and close, then start 1B CV pump.

b. Verify suction source, then start 1B CV pump.

c. Isolate letdown, then start 1B CV pump.

d. Close 1HCV182, "Chg Hdr Back Press Cntrl Vlv", then start 1B CV pump.

22. The following plant conditions exist on Units 1 and 2:

- Unit 1 is in Mode 5
- 1A RH pump is running supplying S/D Cooling
- 1B DG is OOS for maintenance
- Unit 2 is in Mode 6 for a Refueling Outage
- Unit 2 SATs are OOS for repairs
- 2A RH pump is running supplying S/D Cooling
- Unit 2 ESF Busses are being supplied by Unit 1

Annunciator 1-20-C3, "SAT 142-1 SUDDEN PRESS", actuates concurrent with an overcurrent condition on Bkr 1412.

Concerning the RH systems, what method would the control room operators use to remove decay heat?

	Unit 1	Unit 2
a.	Steam SGs	Steam SGs
b.	Bleed and Feed	Steam SGs
c.	Start an RH pump	Bleed and Feed
d.	Steam SGs	Start an RH pump

23. What are the parameters and values used by the operator to ensure the temperature difference between the PZR and the spray fluid are within the specified limit(s) in the PRESSURE AND TEMPERATURE LIMIT REPORT when initiating PZR spray?

For normal spray, the difference between ...

a. RCS hot leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

b. RCS cold leg loop temperature and PZR vapor space temperature limit is 50°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

c. RCS hot leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging inlet temperature and PZR vapor space limit is 320°F.

d. RCS cold leg loop temperature and PZR vapor space temperature limit is 320°F, and for aux spray, the difference between Regenerative Hx charging outlet temperature and PZR vapor space limit is 320°F.

24. The unit is at 100% power, steady state, NOP/NOT. The Pressurizer Pressure Master Controller setpoint fails to 2185 psig. Assume a step change in the setpoint and assume that pressurizer pressure control remains in automatic.

Which of the following is the immediate automatic response of the system?

a. Spray valves open, Variable Heaters deenergize
b. PORV 455A opens, Spray valves open, Variable Heaters energize.
c. Spray valves open, Variable Heaters energize.
d. Spray valves close, Variable Heaters deenergize.

25. Which of the following Reactor Protection System Trips protects against DNB accidents?

a. IR High Flux
b. High Pressurizer Pressure
c. High Pressurizer Level
d. Power Range High Negative Rate

26. The Status light for 1SI8801B is DARK following a SI actuation. 1SI8801B is...

a. FULL OPEN and is NOT in its required safeguards position.
b. CLOSED and is NOT in its required safeguards position.
c. FULL OPEN and is in its required safeguards position.
d. CLOSED and is in its required safeguards position.

27. A normal Unit 1 heatup is in progress per 1BwGP 100-1 with the following plant conditions:

-RCS pressure	1850 psig
-RCS pressurization rate	15 psig/min
-RCS temperature	485°F
-RCS heat up rate	10°F/hr
-S/G pressure	575 psig

If the current trend continues, which of the following occurs FIRST?

a. MSIVs close.

b. PZR PORV opens.

c. Lowest setpoint S/G safety valve opens.

d. First group of steam dumps throttle open.

28. Rods are being withdrawn in manual during a reactor startup, with all systems operable.

For the Control Banks, which of the following describes the status of the DRPI rod bottom lights at the moment the ROD AT BOTTOM annunciator alarm clears?

a. Banks A, B, C, & D -- OFF.

b. Banks A, B, C, & D -- ON.

c. Banks A, B, C -- OFF; Bank D -- ON.

d. Bank A -- OFF; Banks B, C, & D -- ON.

29. Which of the following components is being DIRECTLY adjusted by the gain adjust at the NI panel potentiameter following a calorimetric calibration?

a. Summing and level amplifier

b. Detector output current

c. Upper and Lower Detector Averaging Circuit

d. Detector high voltage power supply

30. A plant start-up is in progress. The P-10 permissive light has just ~~come "ON"~~ gone "OFF."

No operator actions have been taken.

Which of the following will result in an automatic reactor trip?

a. Trip of one RCP.

b. Power range channel N41 fails HIGH.

c. Intermediate Range channel N35 fails HIGH.

d. The NSO places the Block/Reset Switch for SR channel 31 to the "Reset" position.

31. Which of the following is correct for an OPEN in a RVLIS or CETC thermocouple after steady state conditions are reached?

a. RVLIS will indicate core uncovery.

b. Subcoolin Margin Monitor will indicate increased subcooling.

c. Control Board indication for the affected thermocouple will indicate less than 35°F.

d. Control Board indication for the affected thermocouple will indicate greater than 2300°F.

32. Given the following plant conditions on Unit 1:

-100% power.
-Train A CETC power supply (MCC 131x1 ckt15) has been deenergized for breaker replacement.
-Train B CETC has only 10 thermocouples operable which are currently indicating:

1-610°F	6-613°F
2-610°F	7-612°F
3-613°F	8-612°F
4-640°F	9-611°F
5-613°F	10-613°F

-MCB display for train B CETC indicates 615°F

CETC #4 fails high.

MCB temperature would indicate ....

a. 612°F
b. 615°F
c. 731°F
d. 781°F

33. Given the following Unit 2 conditions:

-2A and 2C Reactor Containment Fan Coolers (RCFC) are operating in HIGH speed.
-2B and 2D RCFCs are stopped and in standby.
-Normal cooling water lineup for the RCFCs exists.

What will be the status of the RCFCs 15 seconds after an SI signal occurs concurrent with a loss of offsite power?

a. Only 2A and 2B RCFCs running in HIGH speed.
b. Only 2B and 2D RCFCs running in LOW speed.
c. ALL RCFCs running in LOW speed.
d. NO RCFCs are running.

34. The plant has just tripped from 100% power. Which of the following will result in the RCFCs automatically shifting to low speed?

    a. Two channels of containment pressure reading 3.5 psig.
    b. Two channels of pressurizer pressure reading 1880 psig.
    c. Two channels of containment temperature reading 125°F.
    d. Two undervoltage conditions sensed on the 6.9 KV buses.

35. During initial actuation of the Containment Spray System during a LOCA, radiation levels in the RWST are expected to....

    a. increase due to spray add tank recirculation to the RWST.
    b. increase due to containment recirc. sump recirculation to the RWST.
    c. stay the same due to NO recirculation aligned to the RWST.
    d. stay the same due to spray add tank recirculation to the RWST.

36. A fire has occurred in the 2B Containment Charcoal Filter Unit. Deluge is actuated at ...

    a. 0PM02J in the Main Control Room.
    b. 1PM09J, Fire Panel in the Main Control Room.
    c. 2B Containment Charcoal Filter Unit.
    d. 2VP01J on 426' Electrical Penetration Area.

37. The following plant conditions exist:

- A LOCA has occurred on Unit 1
- E-0 has been completed and the crew has transitioned to E-1
- From E-1 the crew transitioned to FR-C.1
- The Post-LOCA Purge Exhaust Fan is de-energized due to an electrical fault on Bus 134V4.

Which of the following containment hydrogen concentrations is the MAXIMUM concentration which the Hydrogen Recombiners may be placed in service WITHOUT CONSULTATION WITH THE TSC?

a. 0.5%

b. 4.0%

c. 6.0%

d. 8.0%

38. The following conditions exist:

-Unit 1 is at 100% power
-Unit 2 is currently off loading fuel to the Spent Fuel Pool
-Current Spent Fuel Pool temperature is 105°F
-1FC01P "SFP Cooling Pump" is OOS for maintenance
-2FC01P "SFP Cooling Pump" was running and tripped for unknown reasons

Per 0BwOA REFUEL-3, which of the following actions should take place:

a. Start one FHB Charcoal Booster Fan and two Aux Building Charcoal Booster Fans.

b. Align a RWST to the SFP and start one Aux Building Charcoal Booster Fan.

c. Align Recycle Hold Up Tank to the SFP.

d. Place the Skimmer Loop in Service.

39. The plant is operating at 100% power when the Controlling S/G Level Channel on 'A' S/G fails to 100%.

If no operator action is taken, what is the expected plant response?

a. Feedwater flow to 'A' S/G will INITIALLY INCREASE, then DECREASE causing S/G level to STABILIZE at a level HIGHER THAN PROGRAM.

b. Feedwater flow to 'A' S/G will INITIALLY DECREASE, then INCREASE causing S/G level to STABILIZE at a level LOWER THAN PROGRAM.

c. Reactor trip will occur on Lo-Lo S/G level.

d. Reactor trip will occur due to turbine trip.

40. Which of the following will close the MSIVs?

a. 3.4 psig Cnmt pressure on 2/3 channels.

b. 640 psig steam line pressure > P-11 on 1/3 channels on 1/4 lines.

c. -100 psi/50sec < P-11 with SI blocked on 1/3 channels on 1/4 lines.

d. 8.2 psig Cnmt pressure on 2/3 channels.

41. All steam generator pressures increase following a transient event. Steam generator pressures are being maintained by all twenty steam generator safety valves. The LOWEST approximate discharge pressure of the MFW pumps necessary to provide flow to the steam generators would be...

a. 1115 psig.

b. 1175 psig.

c. 1205 psig.

d. 1235 psig.

42. The following conditions exist on Unit 2:
    -Reactor Power is at 50%, steady state.
    -The Steam Dumps are in the Tave MODE and in Automatic
    -The Reactor Operator adjusts the steam dump controller potentiometer from 7.28 to 8.00

    Which of the following is a correct plant effect of the potentiometer change?

    Fuel Cladding Temperature...

    a. increases due to increased steam demand.
    b. decreases due to a decrease in steam demand.
    c. remains constant due to the potentiometer only in circuit during Manual Mode.
    d. remains constant due to the potentiometer only in the circuit during STEAM PRESSURE Mode.

43. Unit 2 is operating at 50% power ramping up to full power. Main Condenser pressure is slowly rising. Pressure is currently at 5"HgA and rising at 0.5"/min.

    In 6 minutes the crew should ...

    a. Initiate a Turbine Runback.
    b. Increase turbine power to 620 MW.
    c. Manually trip the reactor and go to 2BwEP-0.
    d. Select MW OUT and ramp down @ 0.5 MW/min.

44. What is the SEQUENCE that occurs when a Main Feed pump LOW NPSH signal is actuated?

    a. The CD 152 valve (CD pump recirc) opens, the CD/CB aux oil pump starts, the CD/CB pump starts.
    b. The CD/CB pump starts then the CD 152 valve (CD pump recirc) opens.
    c. The CD 152 valve (CD pump recirc) closes, the CD/CB aux oil pump starts, the CD/CB pump starts.
    d. The CD/CB pump starts then the CD 152 valve (CD pump recirc) closes.

45. Per Tech Specs, which of the following is a correct listing of Technical Specification Feedwater Isolation Valves associated with the Unit 2 Main Feed Water System?

2FW009, "FW Isolation Valve",
2FW035, "SG Feedwater Tempering Isolation Valve"
2FW510, "FW Regulating Valve",
2FW510A, "FW Regulating Bypass Valve",

AND...

a. 2FW006A, "S/G FW Shutoff VLV" and 2FW043, "SG FWIV Bypass Isolation Valve."
b. 2FW006A, "S/G FW Shutoff VLV" and 2FW046, "S/G FWIV Byp Flow Cont."
c. 2FW034, "SG Tempering Flow Control Valve" and 2FW046, "S/G FWIV Byp Flow Cont."
d. 2FW034, "SG Tempering Flow Control Valve" and 2FW043, "SG FWIV Bypass Isolation Valve."

46. The following conditions exist on Unit 1:

-Reactor power is 100%
-All systems are normal
-1FT-512 is selected for steam flow input into SGWLC for S/G 1A

With NO OPERATOR ACTION, what is the effect of the pressure transmitter associated with FT-512 failing low?

1A S/G level will decrease, feed pump speed ...

a. will decrease, and S/G level will decrease below the LO-2 setpoint.
b. is unaffected, and S/G level will return to normal.
c. will increase, and S/G level will return to normal.
d. is unaffected, and S/G level will decrease below LO-2 setpoint.

47. A Unit 1 RCS cooldown is in progress with the A auxiliary feedwater pump maintaining level in all steam generators. Instrument bus 111 is deenergized.

Auxiliary feedwater system flow control valves (1AF005a-d) ....

a. Fail as is.
b. Fail Open.
c. Fail Closed.
d. Are not affected.

48. Which of the following will result in a shift of Unit 1 Auxiliary Feedwater (AF) System suction from the Condensate Storage Tank to the Essential Service Water System while in Mode 3 at NOT/NOP?

AF pump suction pressure of ...

a. 17 psia coincident with a loss of offsite power.
b. 19 psia coincident with Lo-Lo level in ALL steam generators.
c. 17 psia coincident with Pressurizer pressure of 1850 psig.
d. 19 psia coincident with a phase B isolation.

49. A Reactor Trip has just occurred on Unit 1. Following the main generator trip, Automatic Bus Transfer failed to operate for Busses 156 and 157. Which ONE of the following describes the 6.9 KV Bus AND RCP status?

a. All Feed and Load Breakers Open on Busses 156 and 157.
Only the 1A and 1B RCPs trip due to Bus Undervoltage.
b. All Load Breakers Open on Busses 156 and 157.
Only the 1A and 1B RCPs trip due to Bus Underfrequency.
c. All Load Breakers Open on Busses 156 and 157.
All RCPs trip due to Bus Undervoltage.
d. All Feed and Load Breakers Open on Busses 156 and 157.
All RCPs trip due to Bus Underfrequency.

50. During operation at power with the Reactor Trip Breakers closed, a LOSS of 125 VDC control power to one of the Reactor Trip Breakers occurs.

Which of the following describes how that Reactor Trip Breaker will respond?

a. Trips OPEN due to loss of power to the SHUNT coil.
b. Trips OPEN due to loss of power to the UNDERVOLTAGE coil.
c. Is NOT capable of tripping on a SHUNT trip.
d. Is NOT capable of tripping on an UNDERVOLTAGE trip.

51. Given the following conditions:

- Unit 2 is in MODE 3 at 500°F
- The MCB indication for DC Bus 211 indicates 0 volts
- Pressurizer Spray Valve 2RY455B is stuck open
- RCS pressure is lowering

Which of the following will stop the RCS depressurization?

a. Energize all Pressurizer heaters.
b. Trip the 2D RCP locally at its breaker.
c. Isolate Instrument Air to Containment.
d. Secure the 2C RCP from the Main Control Room.

52. The 1A DG is not running.

Which of the following combinations of Diesel Generator Air Receiver pressures is sufficient to maintain the 1A Diesel Generator OPERABLE per BwOP DG-1 "Diesel Generator Alignment to Standby Condition?"

	Receiver A (PSIG)	Receiver B (PSIG)
a.	170	100
b.	0	240
c.	170	170
d.	0	170

53. The 2A Diesel Generator is NOT running. The lead Fuel Oil Transfer pump starts in response to low level in the Fuel Oil Day Tank. This pump fails to develop adequate discharge pressure but continues to run.

The second Fuel Oil Transfer pump will ...

a. NOT start because it is not selected to start on low level.

b. NOT start unless DG engine speed reaches 100 RPM.

c. start if in AUTO.

d. start immediately if the running pump is placed in Pull Out.

54. The following plant conditions exist:
- A high flow liquid radioactive waste discharge is in progress IAW BwOP WX-501T1, "Liquid Radioactive Tank 0WX01T Release Form."
- Circulating water blowdown flow in the release header indicates 6500 gpm.

The operator should...

a. Increase circulating water blowdown flow to greater than 8000 gpm.

b. Verify 0AOV WX-353, Release Tank Outlet, is closed and ensure the release is terminated.

c. Verify the relase tank discharge high radiation header alarm is NOT lit.

d. Check the high flow release rate less than the calculated value.

55. The waste gas discharge control modulating valve (RCV 014)....

a. must be opened by first dialing the controller to 50%, then placing the open control switch to the OPEN position.

b. will close automatically and an alarm will be activated when vent stack activity exceeds the high alarm setpoint on 0PR2J.

c. controls pressure at 1.3 psig from a gas decay tank to the hold up tanks.

d. maintains a constant downstream pressure to ensure a constant discharge flowrate.

56. When aligned for normal operation (BwOP GW-1), what is the response to high pressure sensed at the in-service Gas Decay Tank?

An alarm is generated that...

a. alerts the operator to manually place a standby Gas Decay Tank in service.

b. indicates auto swap of in-service Gas Decay Tank to selected standby Gas Decay Tank, and alerts the operator to align another standby Gas Decay Tank.

c. indicates auto swap of in-service Gas Decay Tank to selected standby Gas Decay Tank and auto swap of standby Gas Decay Tank to new standby Gas Decay Tank.

d. shuts down the Waste Gas Compressors and isolates the in-service Gas Decay Tank.

57. The Fuel Handling Incident FHB Monitors 0AR055/56 use which of the following detector types and detect which types of radiation?

a. Geiger-Mueller (G-M) tube, gamma and beta

b. Geiger-Mueller (G-M) tube, gamma and alpha

c. Compensated Ion Chamber, gamma and beta

d. Uncompensated Ion Chamber, gamma and alpha

58. The Main Control Room Outside Air Intake Radiation Monitors (gaseous) are separated into Train A and Train B (0RE-PR031B and 0RE-PR032B for Train A and 0RE-PR033B and 0RE-PR034B for Train B).

Which of the following is correct regarding the Main Control Room Outside Air Inlet Radiation Monitors (gaseous)?

The MINIMUM conditions to initiate automatic actions are...

a. 0RE-PR031B and 0RE-PR034B are in the OPERATE FAILURE condition.

b. 0RE-PR031B and 0RE-PR033B are in the OPERATE FAILURE condition.

c. 0RE-PR031B in HIGH alarm.

d. 0RE-PR031B and 0RE-PR033B are in HIGH alarm.

59. The unit is presently at 90% and shutting down due to a loss of Instrument Bus 114. All systems are in automatic.

A Loss of Coolant Accident (LOCA) occurs. Which of the following statements best describes response of the 1B SX pump?

a. Will automatically start on low system pressure.
b. Will have to be manually started.
c. Cannot be started from the control room.
d. Will automatically start on a Manual SI actuation.

60. Given the following Unit 1 conditions:

-Reactor power - 100%
-1B D/G surveillance test in progress - full load
-1B SX pump - running
-1A SX pump - available

The 1B SX pump tripped due to electrical problem with Bus 142. The US directs a start of the 1A SX pump.

What is the SEQUENCE for starting the 1A SX pump in these conditions?

The operator will ...

a. take the 1A SX pump switch to START and release. The pump will start after a delay.
b. take the 1A SX pump switch to START and hold until the pump starts.
c. start the auxiliary oil pump, take the 1A SX pump switch to START and release. The pump will immediately start.
d. start the auxiliary oil pump, wait 5 seconds, take the 1A SX pump switch to START and hold until the pump starts.

61. Which of the following would occur on a small tube leak in the Component Cooling Water (CC) Heat Exchanger?

a. Automatic CC System makeup from the Primary Water System only would occur, providing the necessary level for CC pump operation.

b. CC System liquid inventory would increase, thus increasing the CC flowrate to components cooled by the CC System.

c. CC would leak into the Essential Service Water (SX) System, potentially contaminating the SX System.

d. CC surge tank level would increase, which would cause water to overflow through the vent valve.

62. When does the STBY station air compressor start?

a. 85 psig.

b. 90 psig.

c. 95 psig.

d. 105 psig.

63. Unit 1 is currently in Mode 4.
1A RH train is in service providing shutdown cooling.
RCS temp - 340°F
RCS pressure - 350 psig

Unit 2 is in Mode 1 at 100% power.

Equipment OOS for maintenance:

1B CW pump	"OC" WS pump
1A CC pump	U2 SA Compressor

A loss of the Unit 1 SAT occurs due to a sudden pressure actuation.

With NO operator action, Unit 1 will experience an uncontrolled _____ and Unit 2 will _____.

a. cooldown trip on Lo-Lo S/G level.
b. heatup not be affected
c. cooldown not be affected
d. heatup trip on Lo-Lo S/G level.

64. The design of the Containment Equipment Hatch...

a. is sized to allow reactor vessel head "O" ring passage.
b. will allow only 2 personnel to enter/exit containment at one time.
c. has a door at each end; one of which has been tested to ensure containment integrity during a design basis accident.
d. is equipped with pneumatically interlocked inner and outer doors.

65. Unit 1 is at 36% power, when a rapid drop in reactor power occurs and a rod bottom light (DRPI panel) appears for a rod in Control Bank A. The crew enters 1BwOA ROD-3, Dropped or Misaligned Rod, for determining, correcting, and recovering a dropped control rod.

Which of the following actions will actuate the ROD CONT URGENT FAILURE (Annun. 1-10-C6) alarm during the dropped rod recovery?

a. Resetting Group 1A step counter to ZERO.

b. Resetting Control Bank A P/A Converter to ZERO.

c. Withdrawing the dropped rod to its bank position.

d. Opening the Lift Coil Disconnect switches for the unaffected rods in CB "A".

66. Given the following Unit 1 conditions:

Reactor power is at 100% steady state

	_1_	_2_	_3_	_4_
Power range NIS	102%	103%	102%	102%
PZR pressure	1880 psig(455)	1910 psig(456)	2500 psig(457)	1905 psig(458)
PZR level	90%(459)	92%(460)	90%(461)	72%(462)
Tave	584°F	585°F	582°F	586°F
SG levels	43%(1A)	34%(1B)	89%(1C)	40%(1D)

(all S/G instruments for a S/G read the same level)

What is the FIRST required action for these conditions?

a. Verify a turbine runback is initiated.

b. Reduce power to LESS THAN 100% indicated to ensure 8 hour average does NOT exceed 100% power.

c. Trip the reactor and initiate actions of 1BwEP-0.

d. Initiate a MANUAL Safety Injection and initiate actions of 1BwEP-0.

67. A reactor trip has occurred due to a turbine trip from full power. Narrow range steam generator levels are off scale low.

Why does 1BwEP ES-0.1, Reactor Trip Response, instruct the operator to feed the steam generators at greater than 500 GPM?

a. Enhance natural circulation.
b. Provide an adequate heat sink for decay heat removal.
c. Ensure the steam generator U-tubes remain "wet" preventing dry steam generators.
d. Prevent the formation of steam in the steam generator feed ring.

68. The plant is operating at 100% power when a pressurizer safety valve inadvertently lifts. The PRT pressure is 20 psig.

Which of the following most closely approximates the tail pipe temperature of the open safety valve?

a. 235°F
b. 265°F
c. 295°F
d. 325°F

69. Given the following plant conditions on Unit 1:

- 100% power.
- RCP No. 1 SEAL LEAKOFF FLOW HIGH alarm is received.
- No. 2 seal leakoff high flow alarm has been PRINTED.
- RCP No. 1 seal leakoff recorder indication is offscale high on the HIGH range.

Which of the following has occurred and what action is indicated?

a. The No. 1 and No. 2 seals have failed and a controlled reactor shutdown is required.
b. The No. 2 seal has failed and continued monitoring of RCP conditions is required.
c. The No. 1 seal has failed and an immediate reactor trip is required.
d. The No. 2 and No. 3 seals have failed and continued monitoring of RCP conditions is required.

70. The following plant conditions exist:

- Unit 1 40% reactor power steady state conditions
- Rod Control Automatic
- Letdown 75 gpm through 1A L/D Hx

Temperature Control Valve (1CC130A), CC flow control valve, repositions due to a loss of IA to the valve positioner. Which of the following describes the plant response to the event?

a. 1TCV-129 opens bypassing flow around the demineralizers.

b. Control rods step out due to a reduction in RCS temperature.

c. Control rods step in due to rising RCS temperature.

d. RCS temperature falls requiring dilution to restore temperature.

71. Which of the following valve combinations and flows for emergency boration are allowed in accordance with 1BwOA PRI-2, "Emergency Boration?"

a. 1CV112B, VCT Outlet Isolation Valve FULL OPEN and 1CV121, Charging Line Flow Control Valve, FULL OPEN with maximum charging header flow.

b. 1CV112C, VCT Outlet Isolation Valve, CLOSED, and 1CV8104, Emergency Boration Valve, FULL OPEN with maximum charging header flow.

c. 1CV112D, RWST to Cent Chg Pump Suction Valve, FULL OPEN, and 1CV8485A, CV Pump Disch Valve THROTTLED to balance high head SI flow and Letdown flow.

d. 1CV8104, Emergency Boration Valve, FULL OPEN, and 1CV8485A, CV Pump Disch Valve THROTTLED to balance high head SI flow and Letdown flow.

72. Given the following plant conditions on Unit 1:

- Reactor power 75%
- PZR pressure control selected to 455/456
- Pressure channel 1PT-457 fails LOW

1BwOA INST-2 "Operation With A Failed Instrument Channel" is entered and the required actions for the failed channel are performed.

How is the PZR PORV operation affected with the failed channel Out of Service?

a. ONLY PORV PCV-456 will NOT CLOSE, if OPEN in AUTO, when PZR pressure decreases to the PORV blocking signal.

b. Neither PORV will CLOSE, if OPEN in AUTO, when PZR pressure decreases to the PORV blocking signal.

c. ONLY PORV PCV-456 will NOT OPEN when PZR pressure increases to its OPEN setpoint.

d. Neither PORV will OPEN when PZR pressure increases to their OPEN setpoint.

73. While performing the immediate actions of BwFR-S.1," Response to Nuclear Power Generation/ATWS", the operator was directed to verify a turbine trip. Subsequently, in Step 8, the operator is again directed to verify a turbine trip. If the main turbine has not tripped at this point, the crew is directed to trip the main turbine locally.

Why wasn't the operator directed to trip the main turbine locally during the immediate actions of the procedure?

a. Local operators are busy isolating the steam dumps.

b. The main turbine can still be used to draw steam for RCS temperature control.

c. The main turbine can still be used to maintain S/G water level due to no MFW pump trip.

d. Local operator actions are more time consuming to initiate and complete.

74. Refueling is in progress on Unit 2. RCS boron concentration has been verified to be 1990 ppm (two samples analyzed).

The crew is required to ...

a. suspend core alterations and establish containment integrity.

b. suspend core alterations and positive reactivity changes, and initiate boration.

c. suspend core alterations and remove all personnel from the containment building.

d. remove all personnel from the containment building, establish containment integrity, and initiate boration.

75. The following plant conditions exist:

- A fuel assembly has just been removed from the core.
- Immediately after initiating transit to the upender, the refueling cavity level is reported to be a foot below normal and dropping at a visible rate.

Which of the following is the preferred course of action?

a. Stop the refuel movement at the current location in transit to the upender.

b. Place the fuel assembly back into the reactor vessel.

c. Place the fuel assembly in the upender and lower it to the horizontal position.

d. Position the mast over the deepest part of the cavity and lower the assembly to the bottom.

76. A SGTR has occurred on Unit 1. Current conditions are:

- RCS pressure 1350 psig
- RCS temperature (CETCs) 545° F
- SG pressures 930 psig (A) 1145 psig (B) 940 psig (C) 940 psig (D)
- SG 1B has been confirmed as the SG with the rupture.

While performing the steps of 1BwEP-3, "Steam Generator Tube Rupture", the Unit Supervisor found ALL available copies of the procedure had an illegible page. This page contained the required temperatures for determining RCS cooldown temperatures.

The US directs you to use the steam tables to determine the required RCS (core exit) temperature with an allowance of 50° F for subcooling.

The required core exit temperature after the RCS cooldown is ...

a. 513°F

b. 518°F

c. 534°F

d. 538°F

77. The following plant conditions exist:

- An initial plant startup is in progress, per 1BwGP 100-3, from a refueling outage.
- The reactor is initially at 13% power.
- The Main Turbine is at 600 rpm.
- Trips associated with Permissive P-10 have been blocked.
- Fouling of the circ water traveling screens has caused a reduction in condenser CW flow.
- Condenser vacuum decreases to indicate 7.0 inches Hg absolute.

Assuming no operator action, choose the statement below which describes the effect on the plant.

a. The reactor will trip due to a turbine trip.

b. The reactor will trip on NIS IR FLUX HI Setpoint.

c. RCS temperature will increase until steam dumps actuate.

d. RCS temperature will increase until Steam Generator PORVs actuate.

78. While at 35% power, a main feed water regulating valve fails open causing the affected SG level to exceed the hi-hi level setpoint. The reactor trips; however, NO SG level drops below the LO-LO level setpoint. Assuming NO operator action is taken, how many AF pump Lube Oil Pumps will be running 1 minute after the trip?

a. None.

b. One.

c. Two.

d. Three.

79. Given the following plant conditions on Unit 1:

- Reactor power is 90%.
- RCS Tave is stable at 579°F on all 4 loops.
- RCS pressure is stable at 2235 psig.
- Containment Pressure is INCREASING.
- 1C SG Feed Flow is pegged HIGH.
- 1C SG Main FW Reg Valve is full OPEN.
- 1C SG pressure is STABLE.
- 1C SG level is DECREASING.

Which of the following events is in progress?

a. Main FW Reg Valve failed OPEN.

b. Feed Flow Indicator failed HIGH.

c. Feed Line Break INSIDE Containment.

d. Main Feed Pump trip.

80. Which of the following signals will cause the Radwaste Release Tank Pump (0WX53P) to trip?

a. High radiation condition on OPR01J "Liquid Radwaste."

b. Low flow from the Circ Water system.

c. Low level of 16% in the Radwaste Release Tank.

d. High level of 90% in the Regeneration Waste Drain Tank.

81. A waste gas decay tank release is in progress. Which of the following malfunctions occurring during the release could result in a release outside of permitted limits assuming no operator action?

a. Loss of instrument air to OGWRCV014 "Gas DecayTank Vent Stack Effluent Isolation Valve."

b. Gas Decay Tank Cover Gas Pressure reaches .7 psig.

c. OPR02J "Waste Gas Processing Rad Monitor" fails low.

d. In service Gas Decay Tank pressure reaches 95 psig.

82. The following plant conditions exist:

0B Gas Decay Tank is now in service.
0E Gas Decay Tank is in Standby.
0A Gas Decay Tank was in service and is currently isolated.

Previously while the 0A Gas Decay Tank was in service, Chemistry reported that the curie content was 7x10E4 curies with a pressure of 88 psig. 0BwOA RAD-3 was entered and the 0A Gas Decay Tank was taken off-line and isolated.

Transferring the 0A Gas Decay Tank to another Gas Decay Tank is required until 0A Gas Decay Tank pressure is ...

a. 47 psig.

b. 58 psig.

c. 62 psig.

d. 73 psig.

83. Per Tech Spec Basis regarding high containment pressure, which of the following events could lead to the highest pressure/leakage out of containment?

a. Design Basis LOCA.

b. Design Basis Steam Line Break inside Containment.

c. Inadvertant Containment Spray Initiation.

d. Pressurizer vapor space LOCA.

84. Which of the following is NOT a high level action of 1BwFR-Z.1, "Response to Containment High Pressure?"

a. Verify containment isolation.

b. Verify containment heat removal.

c. Reduce heat input to containment.

d. Check for and isolate faulted steam generator.

85. 2BwFR-C.1, "Inadequate Core Cooling" must be entered if CETCs are greater than or equal to...

a. 700°F ONLY.

b. 1200°F ONLY.

c. 700°F AND RCS Subcooling Unacceptable.

d. 1200°F AND RCS Subcooling Unacceptable.

86. The following plant conditions exist:

A reactor trip and loss of offsite power occurred.
Reactor power was initially at 100%.
Tavg is 531°F.
Tcold is at 527°F.
Thot is at 534°F.
Average of the ten (10) hottest CETC's is 538°F.
Pressurizer pressure is at 2185 psig.

Which of the following is the subcooling that currently exists?

a. 92°F

b. 102°F

c. 111°F

d. 121°F

87. A Small Break LOCA occurred on Unit 2 resulting in a reactor trip/SI.
While performing the Immediate Actions of 2BwEP-0, the Main Turbine did not trip and the crew successfully performed ALL actions of the RNO for verifying a Turbine Trip.
From 2BwEP-0 the crew transitioned to 2BwEP-1.
At step 6 of 2BwEP-1, "Check if ECCS flow should be reduced" RCS pressure starts decreasing rapidly.
The crew notes steam flows on ALL 4 Steam Generators.
The crew transitions to 2BwEP ES-0.0 "Rediagnosis"

From 2BwEP ES-0.0, the crew should transition to...

a. 2BwEP-2, "Faulted Steam Generator Isolation."
b. 2BwCA-2.1, "Uncontrolled Depressurization of All SGs."
c. 2BwEP ES-1.1, "SI Termination."
d. 2BwEP-0, "Reactor Trip or Safety Injection."

88. Which of the following describes the methods in order of preference used in 1BwEP ES-1.2, "Post LOCA Cooldown and Depressurization" during the performance of step 10, Depressurize RCS to Refill PZR?

a. One Pzr PORV, Normal Spray. Aux. Spray.
b. One Pzr PORV, Aux. Spray, Normal Spray.
c. Normal Spray, Aux. Spray, One Pzr PORV.
d. Normal Spray, One Pzr PORV, Aux. Spray.

89. A Large Break LOCA has occurred on Unit 1 and a transition to 1BwEP-1, "Loss of Reactor or Secondary Coolant," has been made. Subsequently, 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," was implemented. Currently, the operators are aligning the SI and CV pumps for Cold Leg Recirculation per Step 5. The STA reports a RED path in Heat Sink.

The proper course of action for the operator is to...

a. immediately suspend 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," and implement 1BwFR H.1, "Loss of Secondary Heat Sink."

b. only complete aligning ECCS for Cold Leg Recirculation steps of 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," and then implement 1BwFR H.1, "Loss of Secondary Heat Sink."

c. complete all steps of1Bw EP ES-1.3, "Transfer to Cold Leg Recirculation," and then implement 1BwFR H.1, "Loss of Secondary Heat Sink."

d. immediately implement 1BwFR H.1, "Loss of Secondary Heat Sink," while concurrently aligning ECCS for Cold Leg Recirculation per 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation."

90. Unit 1 is in MODE 4 on RH cooldown with the following plant conditions:

RCS Temperature	340°F slowly lowering			
RCS pressure	300 psig lowering			
PZR level	42% lowering			
CNMT pressure	0.2 psig			
Alarm received for ECCS cubicle radiation (GRID 2)				
SG levels	42% (A)	40% (B)	43% (C)	40% (D)
SG pressures	115 psig (A)	115 psig (B)	115 psig (C)	115 psig (D)

What event is taking place?

a. A steam leak has occurred inside CNMT.

b. The Cold Overpressure system has actuated.

c. Letdown line pressure control valve, 1PCV-131, has failed open.

d. A LOCA has occurred on the suction of the RH pump.

91. An SI Signal has been initiated due to a LOCA outside Containment.

Which of the following describes the lineup of the Control Room Ventilation System?

a. Makeup Air Fan autostarts and Recirc Charcoal Absorber unisolates.

b. Makeup Air Fan autostarts and Supply Fan trips.

c. Makeup Air Fan trips and Normal intake from outside isolates.

d. Makeup Air Fan trips and Purge Exhaust Damper opens.

92. The following conditions exist on Unit 2:

- Reactor power was 8% prior to the event below.
- A failure in the feedwater control system caused ONE S/G level to rise to 83%.
- The main turbine tripped.
- S/G levels have returned to their normal level range
- The Startup FW Pump is running

What are the minimum set of conditions that would have to be met to feed the S/Gs using the 2FW034s Feedwater Tempering Flow Control valves?

a. The FW Isolation Aux Relays would have to be reset and 2FW035 Feedwater Tempering Isol valves opened.

b. The reactor trip breakers would have to be cycled, the FW Isolation Aux Relays would have to be reset and 2FW035 Feedwater Tempering Isol valves opened.

c. The FW Isolation Main Relays and Aux Relays would have to be reset and 2 FW035 Feedwater Tempering Isol valves opened.

d. The reactor trip breakers would have to be cycled and FW Isolation Main Relays and Aux Relays reset and 2FW035 Feedwater Tempering Isol valves opened.

93. All reactor core heat removal systems have failed and the RCS temperature is increasing.

When core exit thermocouple temperatures are greater than 700°F...

a. the DNBR decreases to less than 1.3.

b. the core is superheated.

c. RCP damage is prevalent.

d. fuel cladding failure is prevalent.

94. The following conditions exist on Unit 1:

- A natural circulation cooldown is in progress per 1BwEP ES-0.2 "Natural Circulation Cooldown."
- Pressurizer pressure is being controlled using Aux. Spray and Pzr heaters.
- As pressure is being lowered through 1300 psig, a rapid increase is noted in Pzr level.
- Charging and letdown are in manual and are balanced.

What action is required to be taken by the operators?

a. Repressurize the RCS.

b. Isolate the SI Accumulators.

c. Increase the RCS cooldown rate.

d. Place excess letdown in service.

95. Which of the following describes why it is important to run CRDM fans when performing a natural circulation cooldown?

a. Provides the heat removal mechanism for the vessel head area.

b. Aids in natural circulation flow through the RCS vessel head region.

c. Prevents erratic indication of SR instrumentation.

d. Aids in natural circulation flow through the RCS.

96. What are the MAXIMUM cooldown rates that apply for a cooldown from normal operating temperature for the RCS to 500°F in the following indicated procedures? (NOTE: all choices are applicable in any ONE hour period.)

1BwEP ES-0.3 "Natural Circulation Cooldown With Void In Vessel (With RVLIS)"
1BwEP ES-0.4 "Natural Circulation Cooldown With Void In Vessel (Without RVLIS)"

	1BwEP ES-0.3 value	1BwEP ES-0.4 value
a.	50°F	50°F
b.	50°F	100°F
c.	100°F	50°F
d.	100°F	100°F

97. Unit 1 reactor tripped approximately 1 hour ago due to a large steam break inside containment. The crew is currently in 1BwEP ES-0.3, "Natural Circulation Cooldown with Steam Voids in Vessel (with RVLIS)". Pressurizer level is currently at 95%.

Per 1BwEP ES-0.3, PZR Level should be reduced to less than 90% by ...

a. cycling PZR heaters and securing the RCS cooldown.
b. controlling charging and letdown.
c. closing PZR sprays and energizing PZR heaters.
d. ONLY establish maximum letdown.

98. Why are the S/Gs depressurized to less than 670 psig according to 1BwCA-1.1, "Loss of Emergency Coolant Recirculation"?

a. To allow maximum AF flow to the S/Gs.
b. To ensure adequate subcooling for restart of the RCPs.
c. To set up conditions for controlled injection to the RCS from the accumulators.
d. To decrease RCS temperature and pressure which reduces break flow in a LOCA condition.

99. The NSO reports that the Spray Additive Tank low-2 level light has just been received as a result of a Containment spray system actuation during a steam line break. Containment Pressure is currently 24 psig. Which of the following is correct concerning this situation? (Assume CS Actuation signal has been RESET)

a. Allow the Containment spray system to operate AS-IS until containment pressure is < 15 psig.
b. Manually shift the Containment spray system lineup to the post accident recirculation lineup.
c. Manually close the motor operated isolation valve between the eductor and the spray additive tank (1CS019A/B).
d. Stop all containment spray pumps until the spray additive tank is filled and vented per BwOP CS-3.

100. Per 1BwFR-Z.2, "Respond to Containment Flooding," the MAXIMUM level of water in containment following a major accident is based upon the entire contents of the RCS, RWST, ...

a. CST and SI accumulators.

b. SX and CC water.

c. SX and FP.

d. CC water and PW.

Reactor Operator Answer Key

1. c
2. a
3. a
4. d
5. a
6. a
7. b
8. a
9. c
10. d
11. b
12. c
13. c
14. b
15. b
16. b
17. d
18. c
19. b
20. c
21. b
22. d
23. d
24. a
25. d
26. b
27. a
28. d
29. a
30. c
31. d
32. a
33. d
34. a
35. c
36. d
37. b
38. a
39. c
40. d
41. d
42. d
43. c
44. c
45. d
46. a
47. c
48. a
49. a
50. c

Reactor Operator Answer Key

51. b
52. b
53. a
54. b
55. b
56. b
57. a
58. c
59. b
60. b
61. c
62. d
63. d
64. a
65. c
66. c
67. b
68. b
69. c
70. c
71. c
72. c
73. d
74. b
75. b
76. a
77. d
78. a
79. c
80. c
81. c
82. b
83. a
84. c
85. b
86. c
87. b
88. d
89. b
90. d
91. a
92. a
93. b
94. a
95. a
96. c
97. b
98. c
99. c
100. a

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT A (PG 1 OF 1)
ACCEPTABLE PRESSURE CALCULATION

1 Calculate absolute pressure for affected gas decay tank:

P_A = (indicated pressure) + 15 psi

2 Calculate pressure of affected gas decay tank at which activity will be within limits:

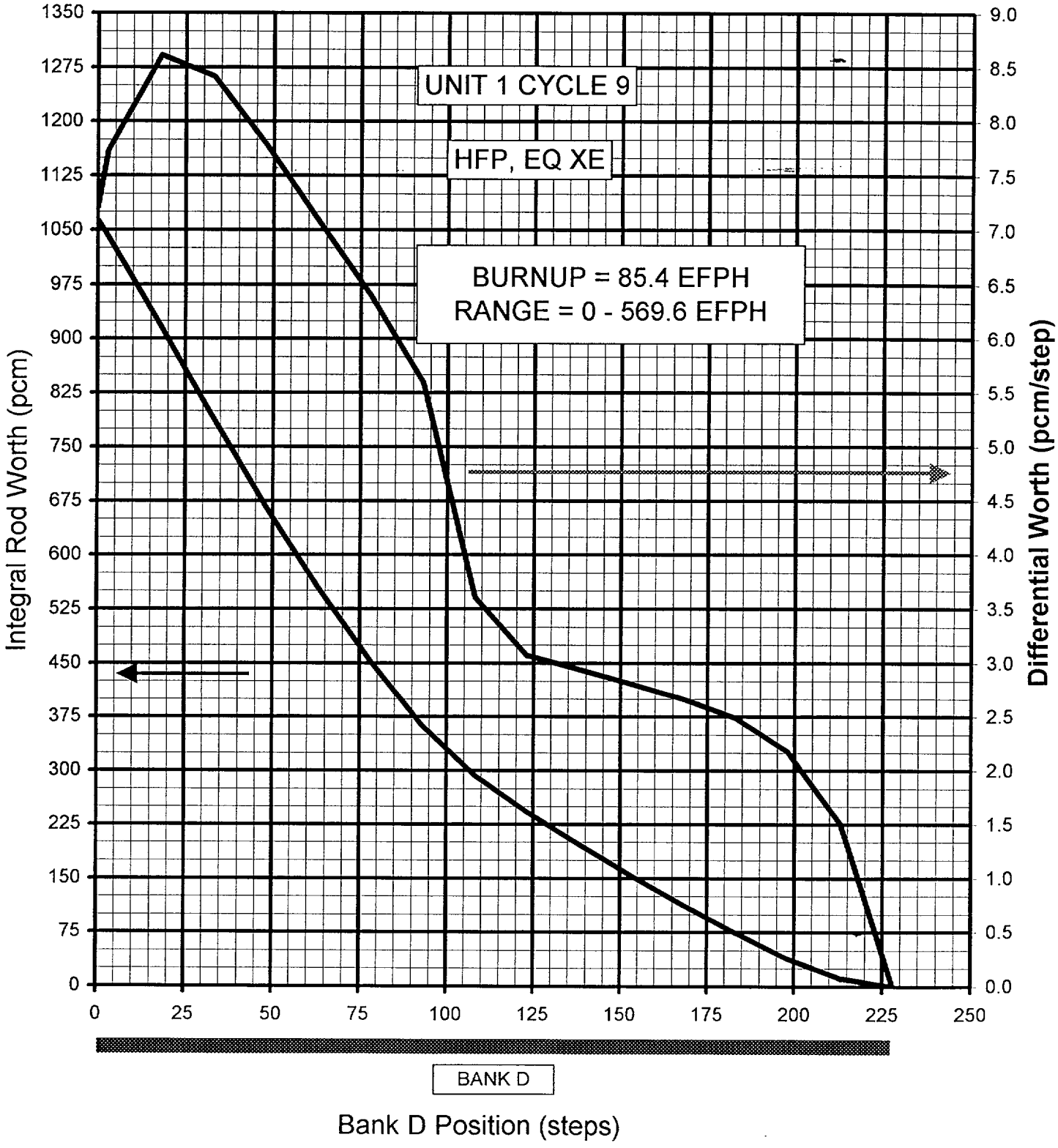
$$P_{Lim} = \frac{P_A \times 5 \times 10^4 \text{ curies}}{\text{(present tank activity in curies)}}$$

3 Calculate indicated pressure equivalent to P_{Lim}:

Indicated pressure = P_{Lim} - 15 psi

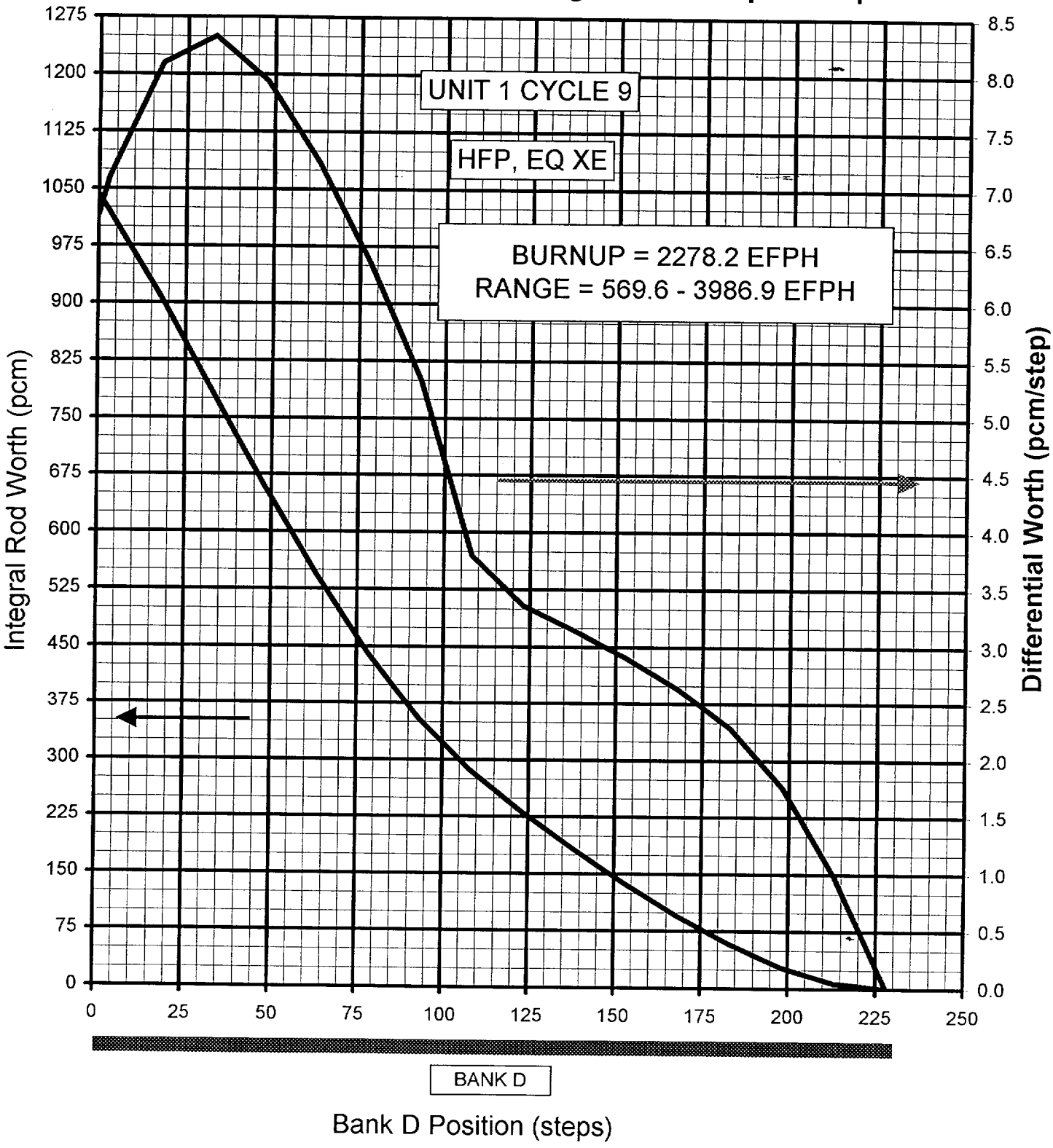
-END-

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



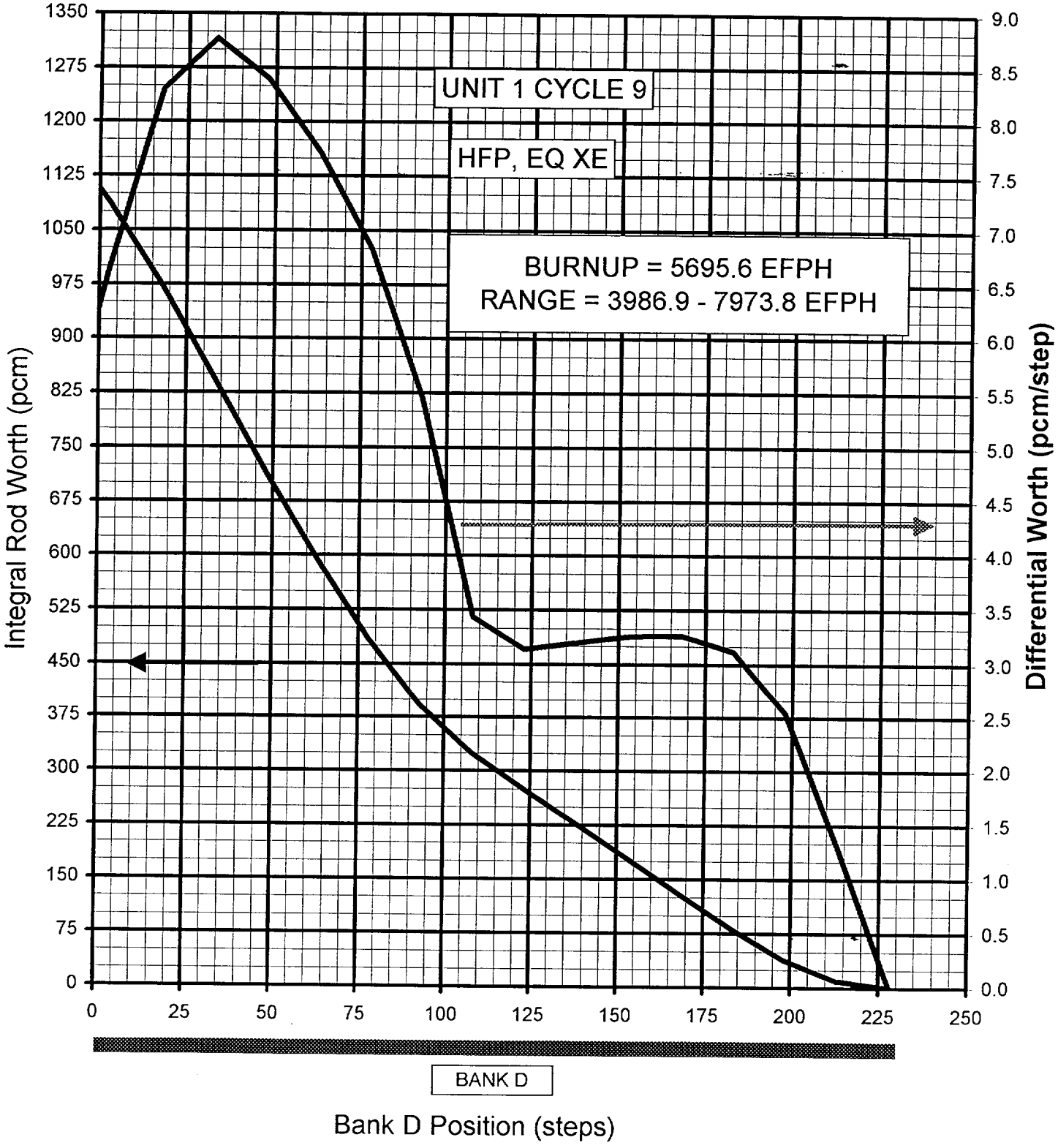
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



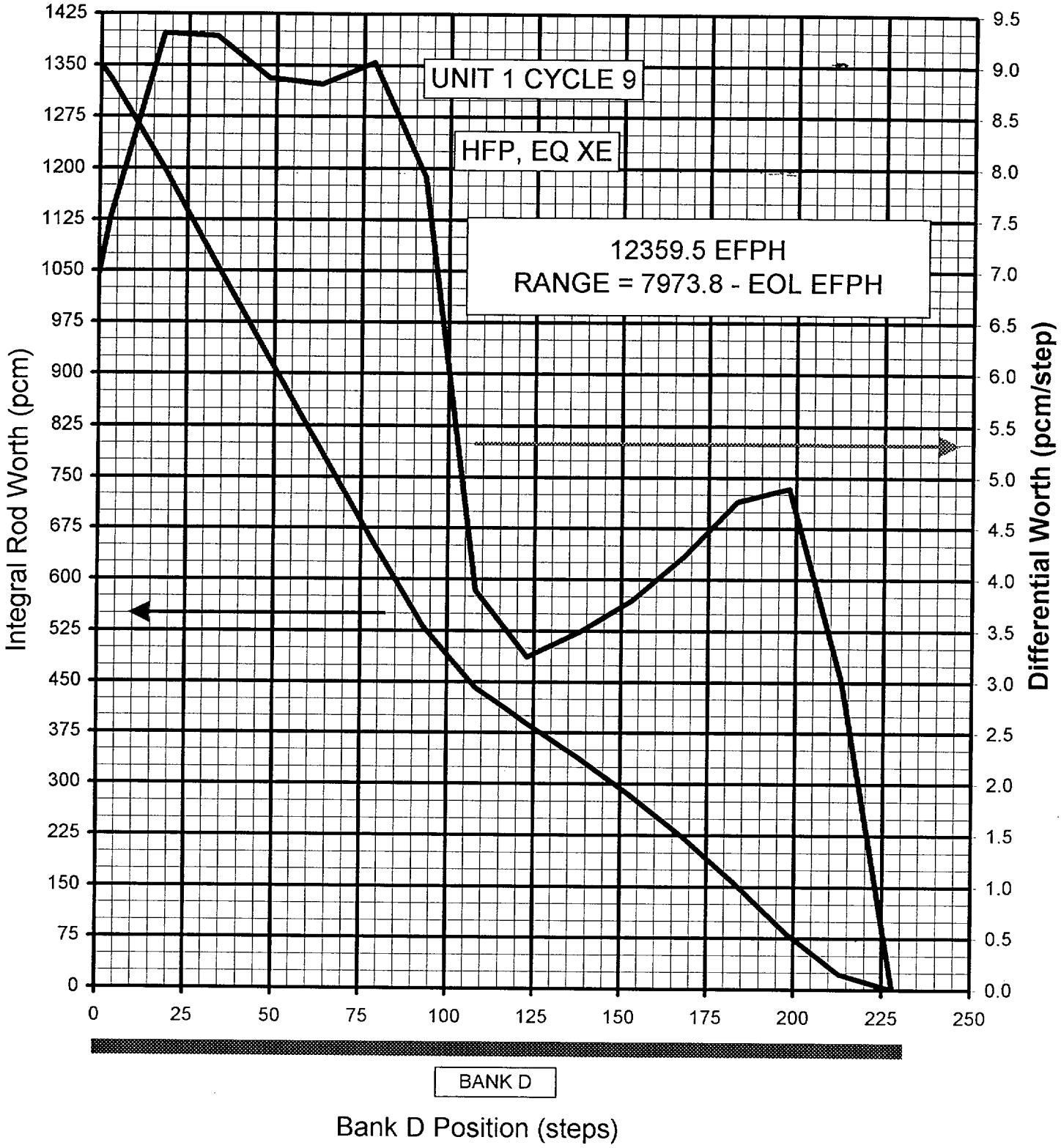
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



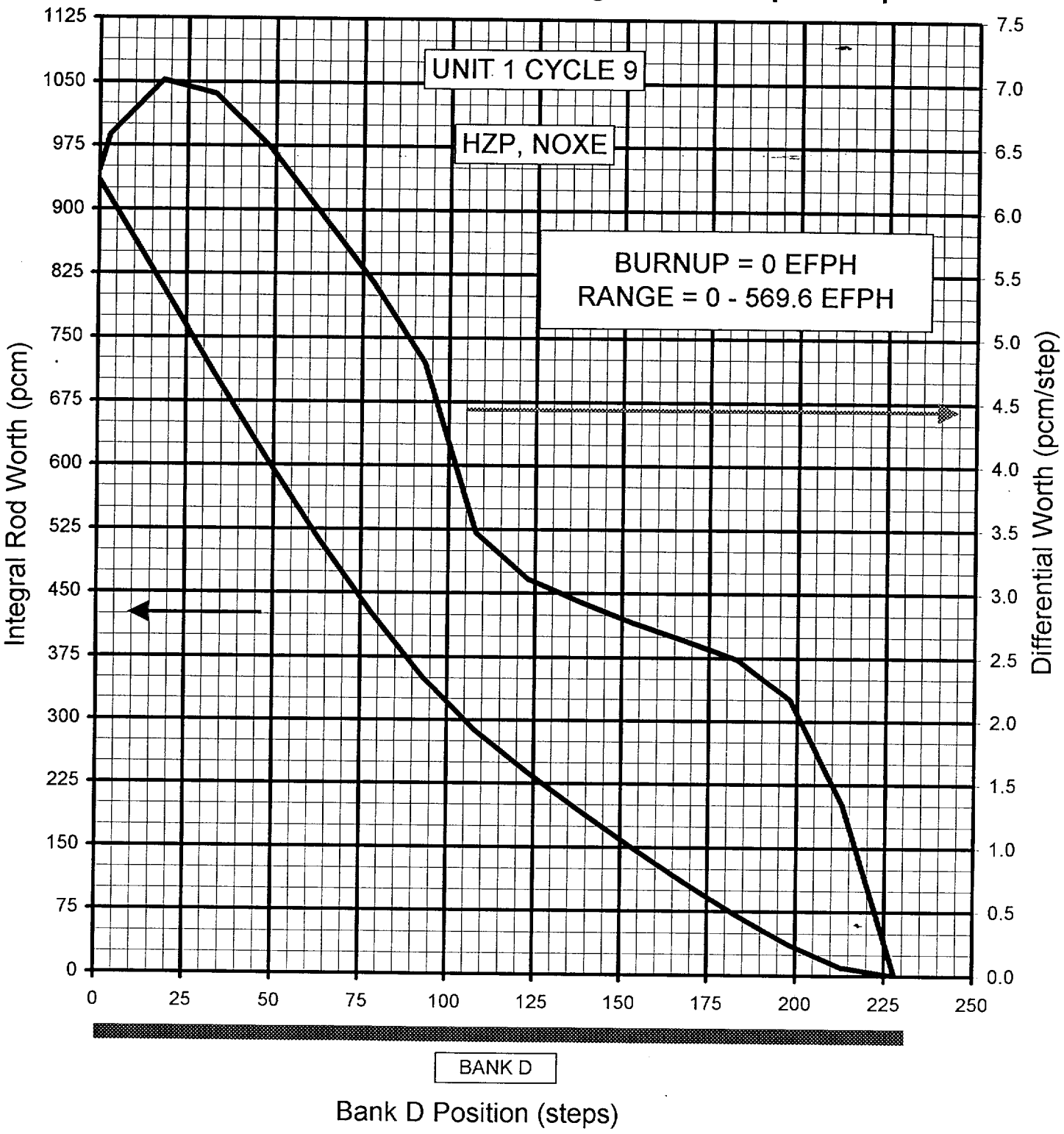
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



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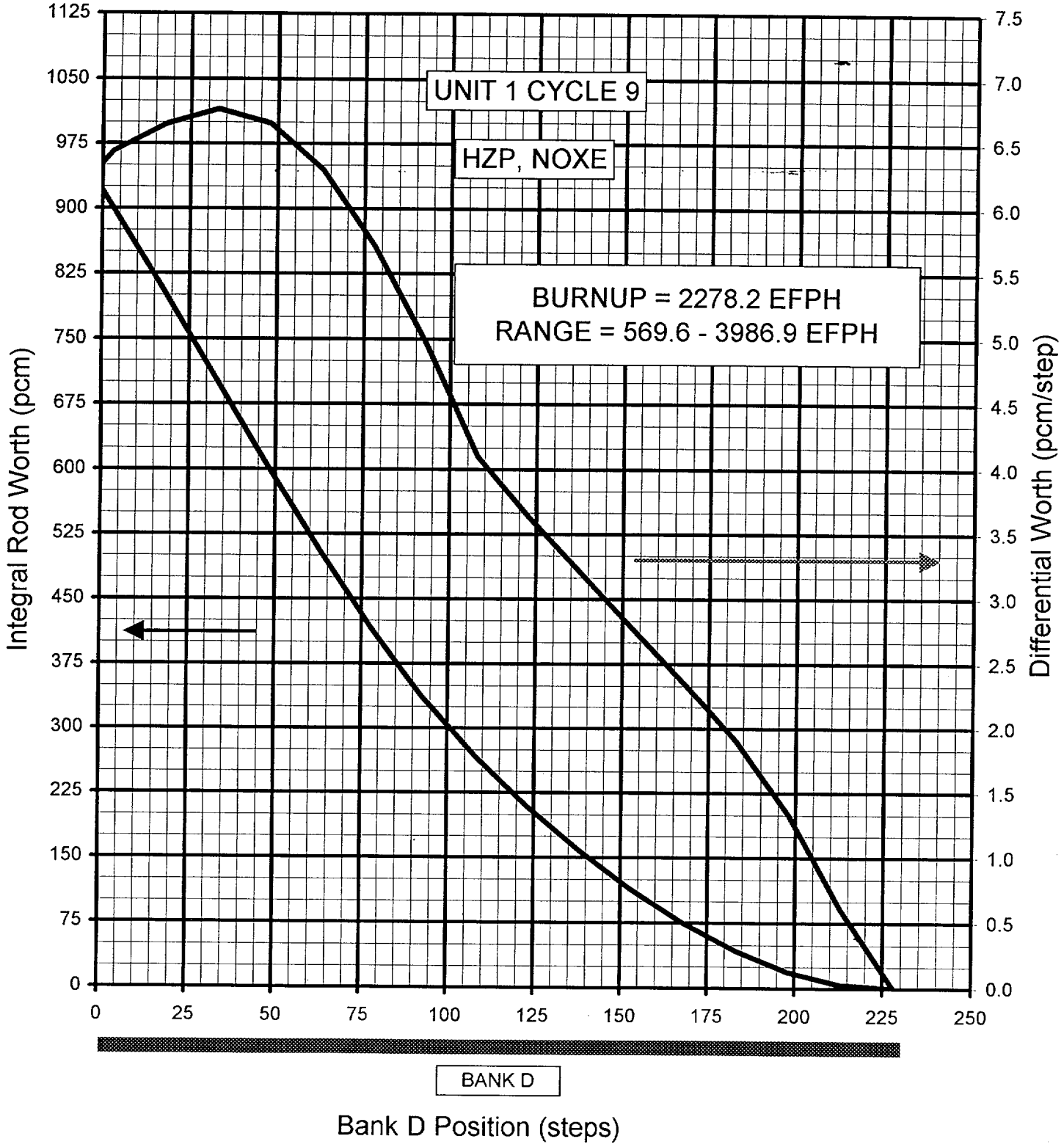
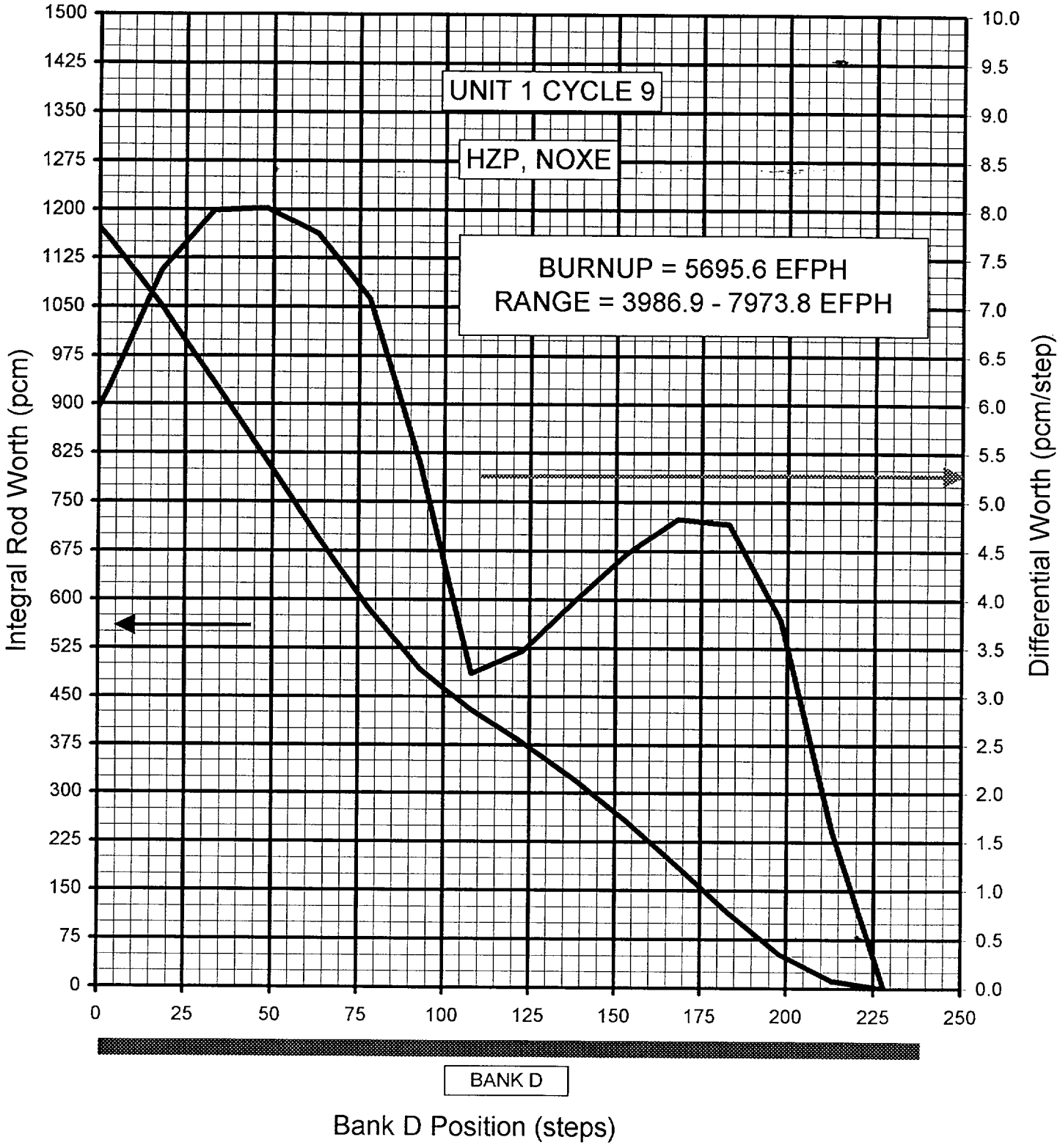
Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



** EXPANDED SCALE **

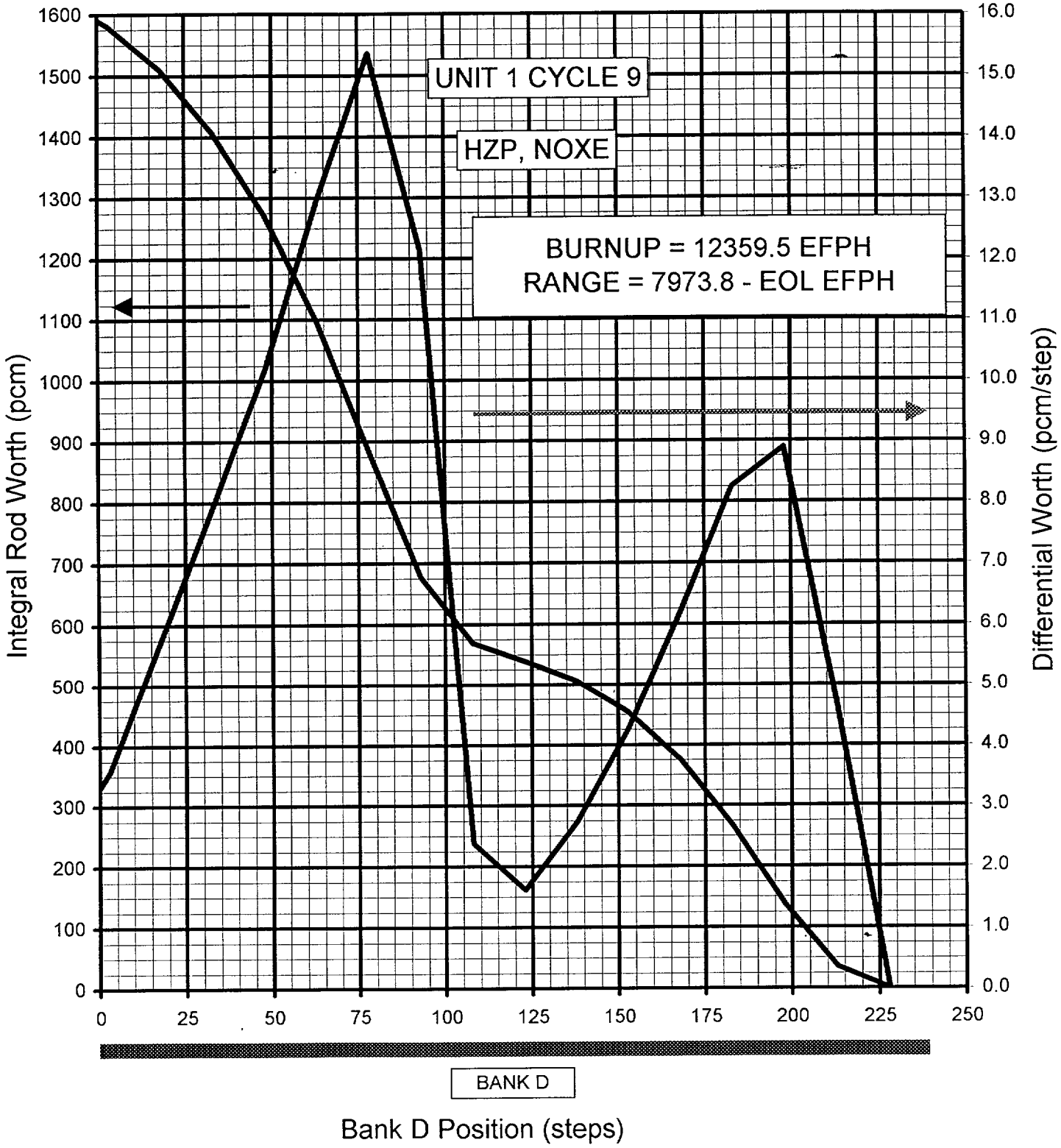
Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



Bank D Position (steps)

** EXPANDED SCALE **

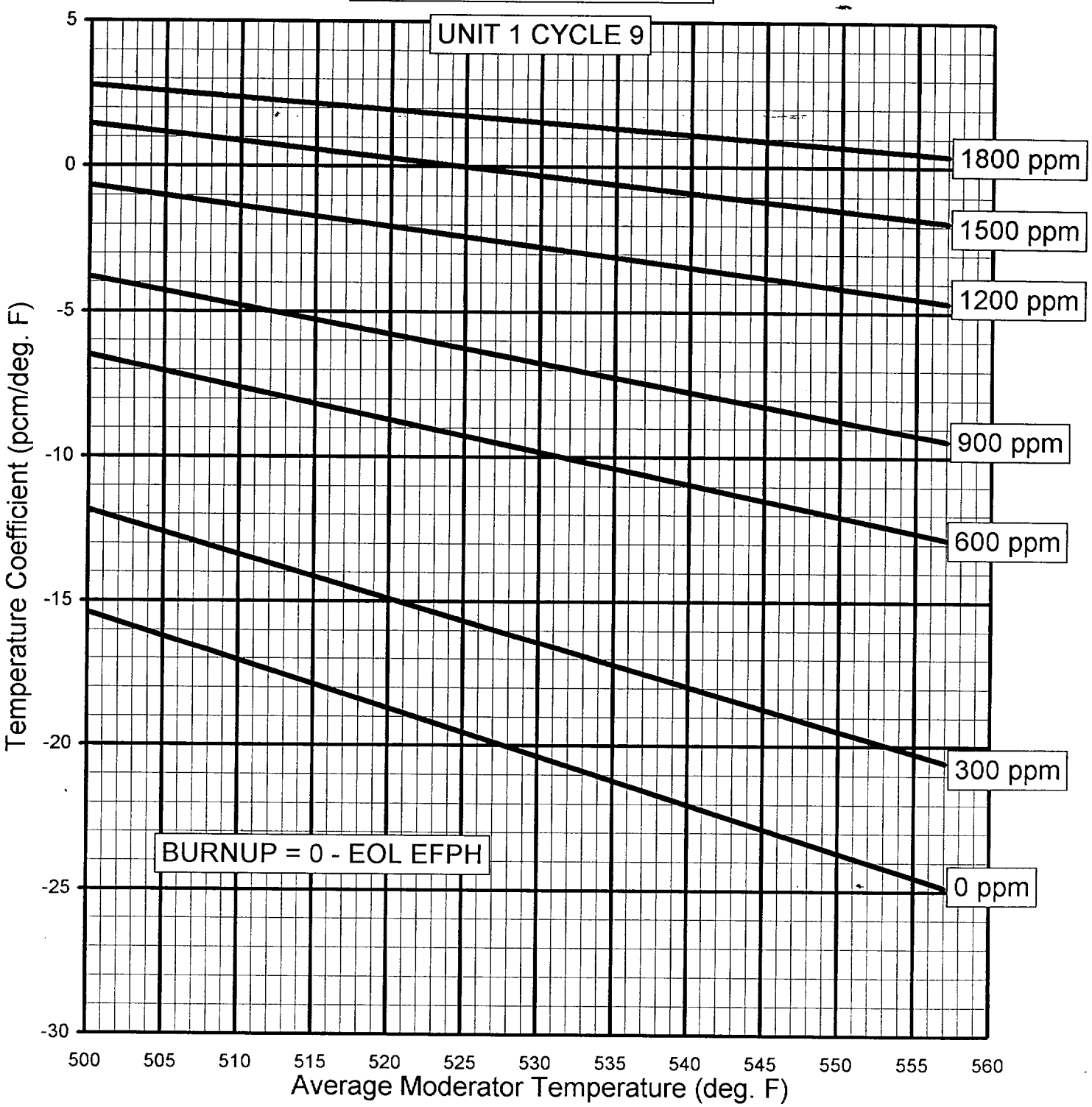
Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



** EXPANDED SCALE **

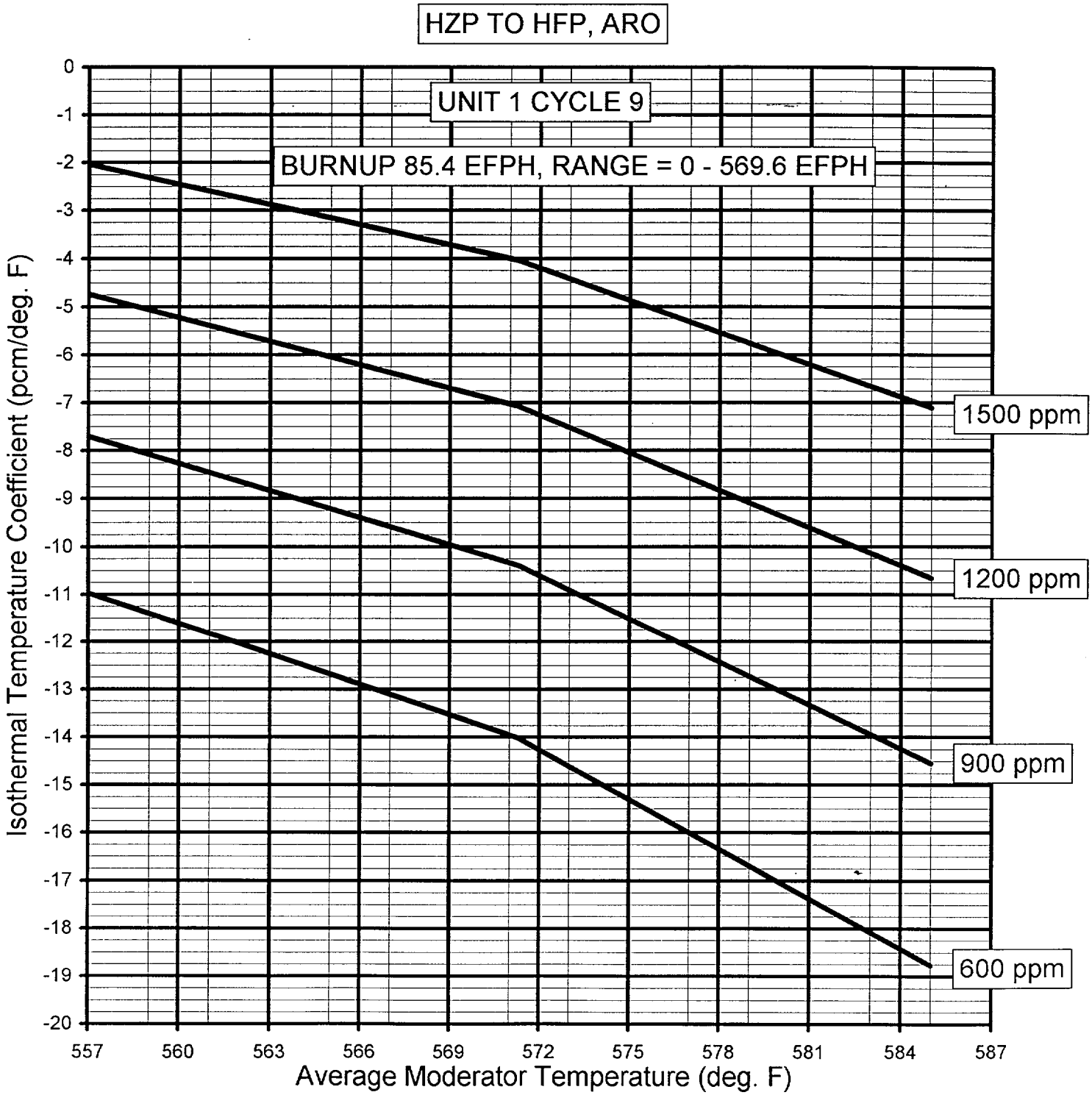
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE

CZP TO HZP, ARO, NO Xe

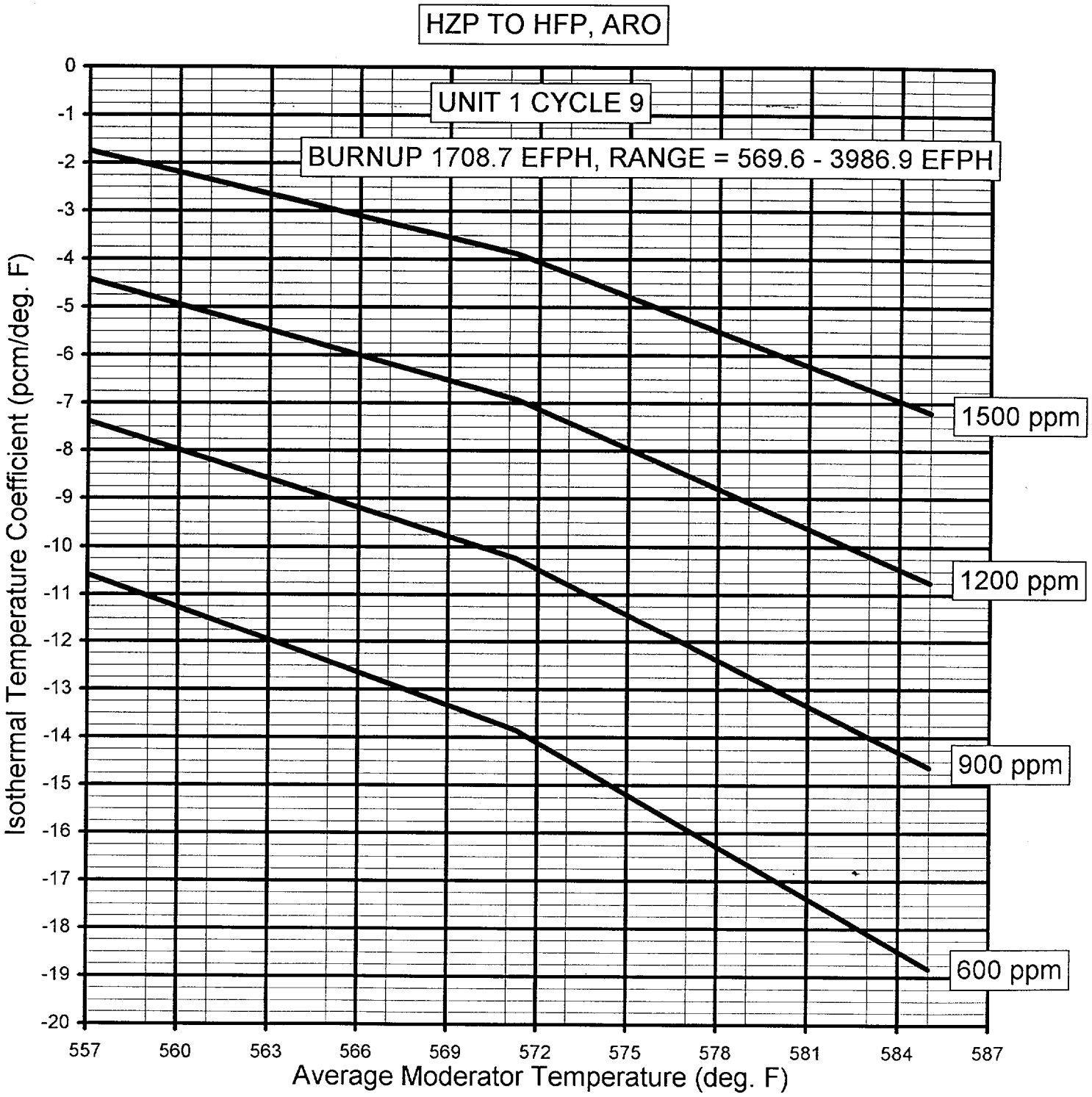


See following pages for Hot Full Power Curves.

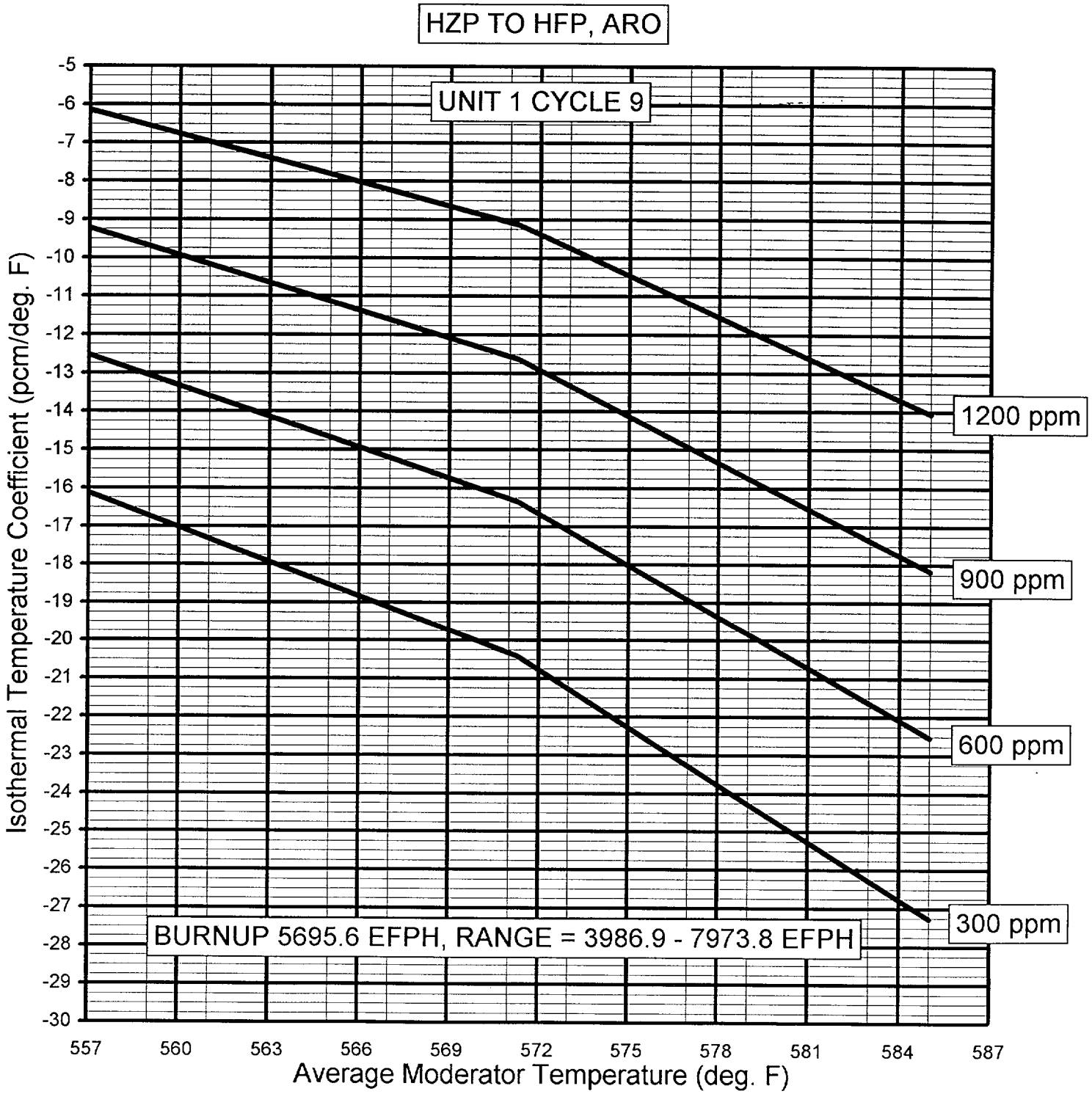
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



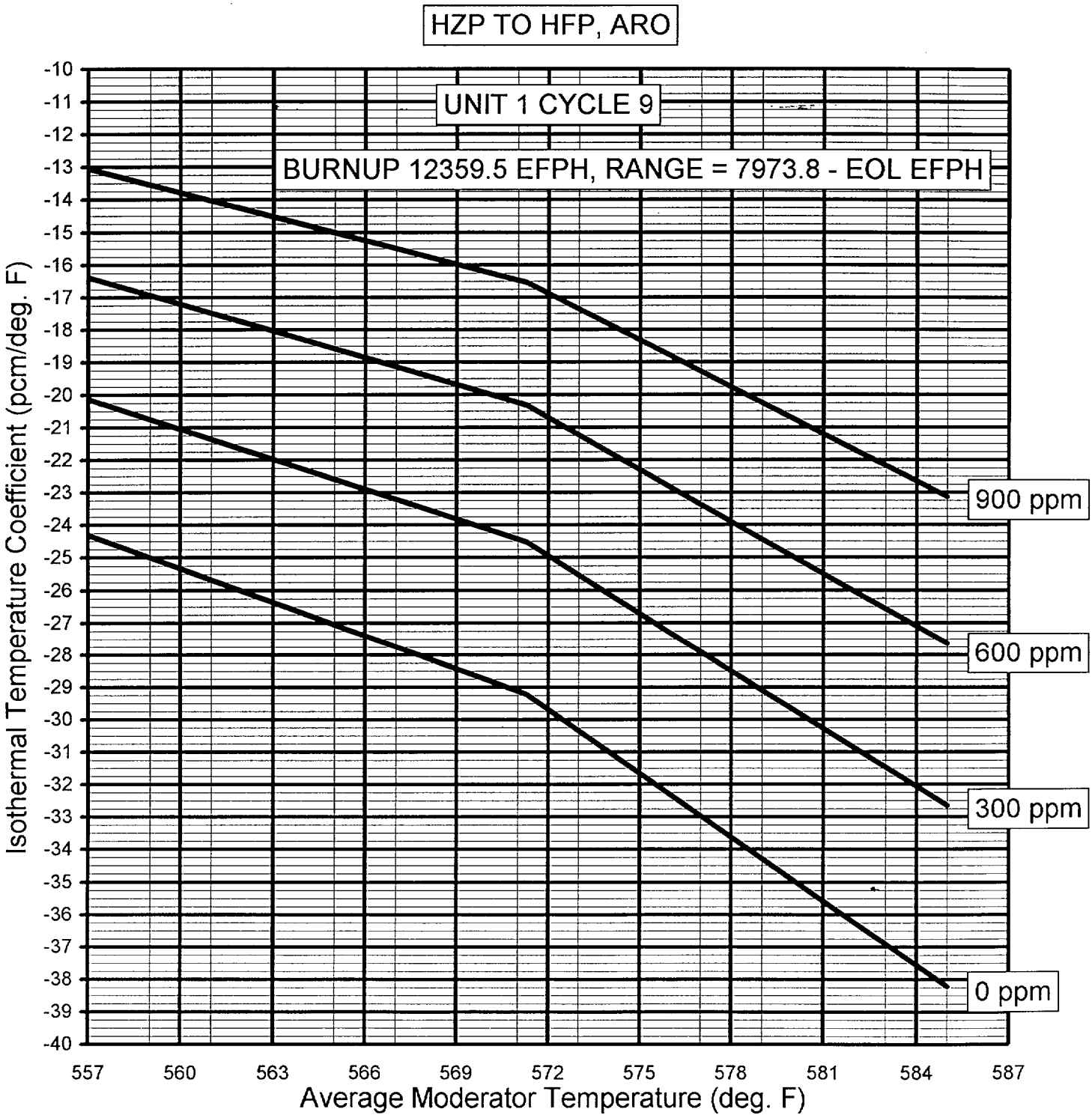
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	**CHECK IF ANY SG SECONDARY PRESSURE BOUNDARY IS INTACT:**	
	a. Check pressure in all SGs - ANY SG PRESSURE STABLE OR INCREASING	a. IF a controlled cooldown is in progress, THEN GO TO Step 2 (Next Page). IF NOT, THEN the following applies: o IF main steamlines are NOT isolated, THEN you should be in 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION. -OR- o IF main steamlines are isolated, THEN you should be in 1BwCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	**CHECK IF ALL SGs SECONDARY PRESSURE BOUNDARIES ARE INTACT:**	
	a. Check pressure in all SGs: · NO SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER · NO SG COMPLETELY DEPRESSURIZED	a. You should be in 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION. IF NOT, THEN GO TO 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
3	**CHECK IF SG TUBES ARE RUPTURED:** o ANY SG LEVEL INCREASING IN AN UNCONTROLLED MANNER -OR- o ANY ABNORMAL SECONDARY RADIATION	You should be in a 1BwEP-1, or 1BwCA-1 series procedure. IF NOT, THEN GO TO 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
4	**YOU SHOULD BE IN A 1BwEP-3, OR A 1BwCA-3 SERIES PROCEDURE**	GO TO 1BwEP-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

-END-

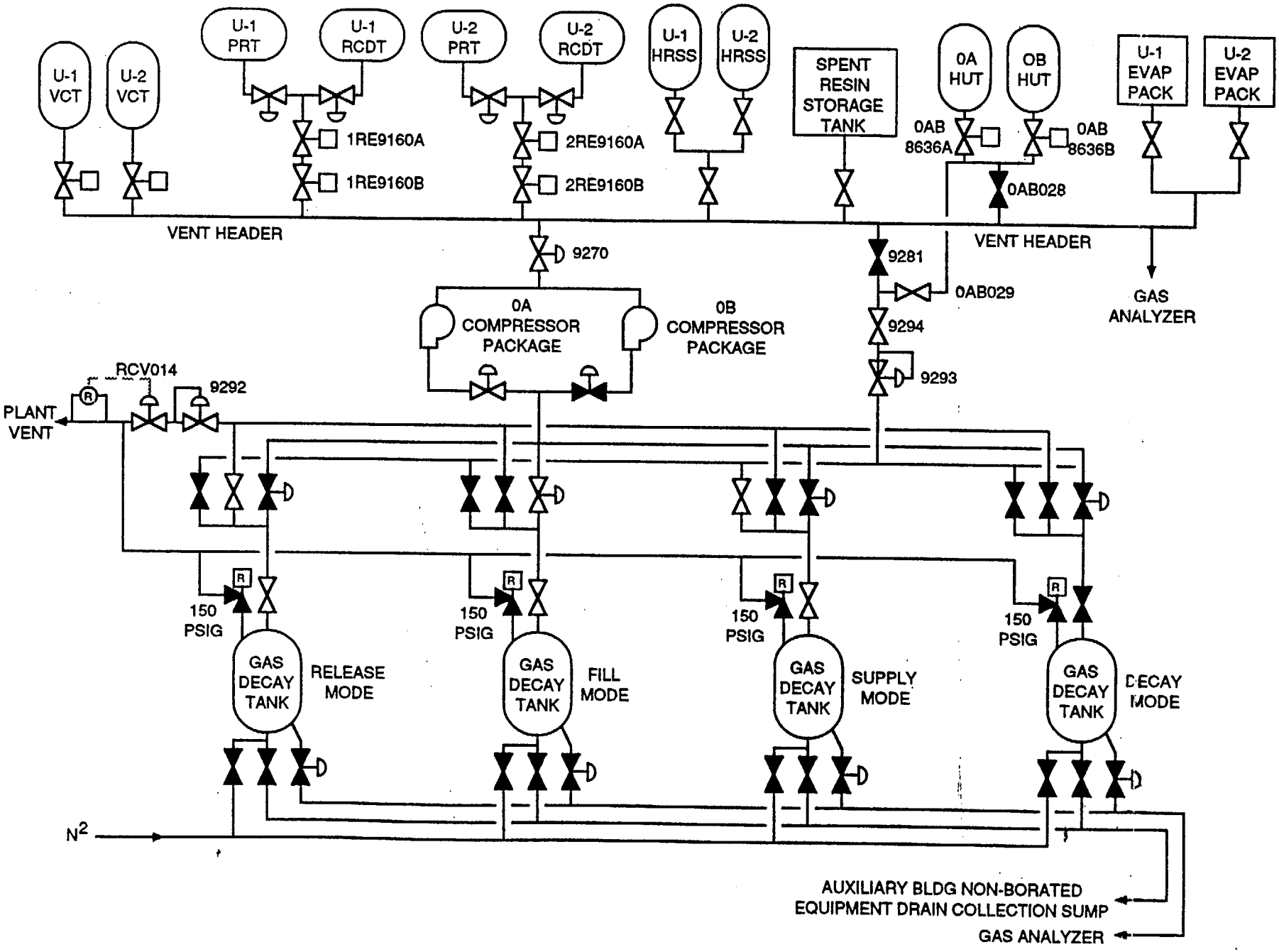


FIGURE 46-1 GASEOUS RADIOACTIVE WASTE SYSTEM (REV. 0)

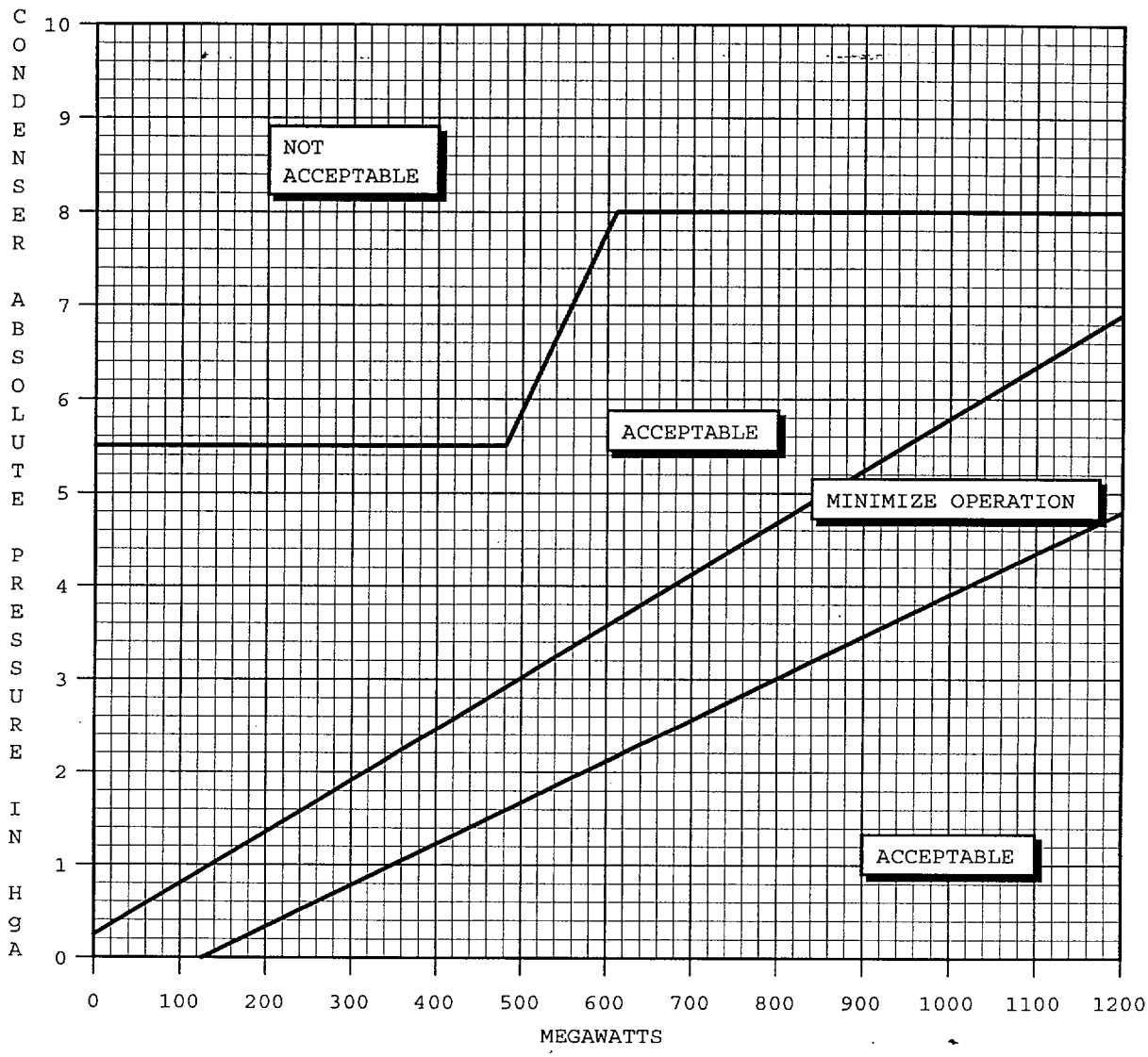


FIGURE 1BwOA SEC-3-1
TURBINE LOAD -vs- CONDENSER PRESSURE

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name: MASTER EXAMINATION	Region: **III**
Date: **November 1, 2000**	Facility/Unit: **Braidwood Units 1 and 2**
License Level: **SRO**	Reactor Type: **W**
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____

Applicant's Signature

Results

Examination Value	_____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

Senior Reactor Operator Examination

1. Surveillance 1BwOSR 3.7.5.4-1 "Unit One Train A Auxiliary Feedwater Valve Emergency Actuation Signal Verification Test" is being performed. The personnel performing the surveillance are stationed at the Main Control Room, Aux. Electrical Room and the AF Pump Area.

   In accordance with 1BwAP 390-1 "Operating Department Surveillance Program" how are operator actions directed while performing the surveillance?

   a. US directs operator actions for the surveillance and will inform the NSO of any changes in the status of plant evolutions.
   b. Assigned management person (other than shift operations) will provide direction to the operators and will directly inform the US of the status of plant evolutions.
   c. NSO directs the operator's actions for the surveillance and is directly informed of the status of plant evolutions.
   d. Operator at the AF pump area is in charge of actions being performed and will inform the Unit Supervisor of any changes in the status of plant evolutions.

2. The following Unit 1 conditions exist:

   - Reactor Power is 85%
   - Containment pressure is 0.6 psig
   - Containment temperature is 115°F

   Electric Operations has requested a load ascension to 95% power.

   A containment entry is required to search for a 0.3 gpm UNIDENTIFIED leak inside containment. Which of the following is applicable for this entry?

   a. Reactor power must be reduced to <60% if entry inside the missile barrier is required.
   b. Containment Integrity must be maintained.
   c. The requested load increase may occur while personnel are inside containment.
   d. A Containment Entry Checklist is NOT required for this entry.

3. Per Technical Specification Definitions, a MODE is determined by power level .....

   a. core reactivity, and average RCS temperature.
   b. core reactivity, and auctioneered high RCS temperature.
   c. decay heat, and average RCS temperature.
   d. decay heat, and auctioneered high RCS temperature.

8. Concerning 1BwGP 100-2, "Plant Startup," Limitations and Actions, the overlap of the Rod Control Banks shall be ....
(Assume current fuel cycle)

a. 113 steps.

b. 115 steps.

c. 116 steps.

d. 118 steps.

9. An operator received radiation exposures at BOTH Braidwood and LaSalle Stations during the year.

The exposure record to date this year is:

	Braidwood	LaSalle
- Deep Dose Equivalent (DDE)	180 mrem	40 mrem
- Lens Dose Equivalent (LDE)	10 mrem	5 mrem
- Committed Effective Dose Equivalent (CEDE)	105 mrem	0 mrem
- Shallow Dose Equivalent (SDE)	10 mrem	10 mrem
-Committed Dose Equivalent (CDE)	20 mrem	0 mrem

The operator at Braidwood Station has been requested to work in an area where the known radiation rate is 160 mR/hr. The source of the radiation is a nearby HOT SPOT inside a pipe trap where crud has collected and has been determined to be totally gamma radiation.

If the work task takes 30 minutes to complete, what is the individual's Total Effective Dose Equivalent (TEDE) for the year?

a. 365 mrem

b. 405 mrem

c. 460 mrem

d. 485 mrem

10. Which of the following activities would NOT require Radiation Protection consultation prior to performing?

    a. Raising radioactive material(s) from the fuel pool above established limits.
    b. Uncovering contaminated process lines.
    c. Cleanup of a boric acid spill coverin 2 levels of the Auxiliary Building.
    d. Adding boric acid to the batch tank.

11. What are the MINIMUM requirements for unconditional release of a wrench that has been used in a Radiological Posted Area (RPA)?

    A survey indicates the wrench is...

    a. free of both smearable and fixed contamination.
    b. free of smearable contamination but is allowed up to 1000 dpm/100cm² fixed contamination.
    c. allowed up to 20 dpm/100cm² smearable contamination and is allowed up to 5000 dpm/100cm² fixed contamination.
    d. allowed up to 100 dpm/100cm² of either smearable or fixed contamination.

12. The following conditions exist on Unit 1:

    - Unit 1 Containment Equipment hatch is removed
    - Refueling operations in progress
    - A HIGH alarm is received on radiation monitors 1RE-AR011/12, Containment Fuel Handling Incident

    The crew should...

    a. Activate the Unit 1 Containment evacuation alarm and start containment charcoal filter fans.
    b. Verify Fuel Handling Building is at a negative pressure and start the Cnmt Mini Purge System.
    c. Start the Containment Purge System and start containment charcoal filter fans.
    d. Activate the Unit 1 Containment evacuation alarm and start the Containment Mini Purge System.

13. Per procedure 1BwCA-0.0, "LOSS OF ALL AC POWER", which of the following is the basis for maintaining SG Narrow Range levels above 10% when the RCS is being cooled to 350°F?

    a. Narrow Range level is the only indication of SG inventory available after a loss of all AC power.

    b. Ensure proper thermal stratification in the SGs in the event of a SGTR.

    c. Ensures the capability to cooldown once AC power is restored.

    d. Ensures heat transfer capability exists to remove heat from the RCS.

14. The following plant conditions exist:

    - Unit 2 is in the process of starting up from a refueling outage.
    - Reactor power is at 3% and has been stabilized to perform a power history surveillance.
    - Indicated intermediate range start up rate is 0 dpm.

    A loss of the Unit 2 station auxiliary transformer occurs.
    The Unit Supervisor directs a reactor trip.
    The reactor operator attempts to trip the reactor at 2PM05J and 2PM06J with no results.
    The Unit Supervisor has entered 2BwEP-0 and is at Step 1 RNO.

    The next procedure action will be to...

    a. continue with 2BwEP-0, Step 2.

    b. transition to 2BwCA-0.0, "Loss of All AC Power."

    c. transition to 2BwFR-S.1, "Response to Nuclear Power Generation/ATWS."

    d. transition to 2BwOA ELEC-3, "Loss of 4KV ESF Bus."

15. The following conditions exist following a LOCA on unit 2:

- AF flow	420 gpm
- CNMT Pressure	18 psig and increasing
- RCS Pressure	2340 psig
- Core Exit TC's	650°F and increasing
- RCPs	Tripped
- SG pressures	750 psig stable
- Narrow Range SG levels	38% (A) 34%(B) 34%(C) 35%(D)

Based on the above conditions, which of the following satisfies the minimum scanning requirements for the CSF Status Tree's?

a. Continuously scan.

b. Scan at 15 minute intervals.

c. Scan at 30 minute intervals.

d. Scanning may be terminated.

16. The following alarms have actuated:
- Unit Two Area Fire
- CO2 Storage Tank Trouble
- On ~~1~~2PM09J, the Zone Light for the 2B DG Room is illuminated

The fire brigade has been dispatched.

The fire brigade can expect CO2 actuation in the...

a. 2B DG Room ONLY.

b. 2B DG Day Tank Room ONLY.

c. 2B DG Room and 2B DG Day Tank Room.

d. NO actuation due to low CO2 Storage Tank Pressure.

17. Unit 1 has declared an ALERT due to a Steam Generator Tube Rupture. Offsite dose assessment is in progress. The Shift Manager is the acting Station Director. Which of the following responsibilities CAN NOT be delegated by the SM?

a. Notification of the offsite authorities of protective action recommendations.

b. Authorize exceeding 10CFR100 site boundary limits.

c. Decision to issue thyroid blocking agents to onsite personnel.

d. Notify the NRC Operations Center via the ENS Red Phone.

18. The following plant conditions exist:

- Rod D-4 rod bottom light	LIT
- PWR RANGE FLUX RATE RX TRIP ALERT annunciator	LIT
- Reactor Power	95%
- ROD CONTROL URGENT FAILURE annunciator	NOT LIT
- 1BwOA ROD-3 "Dropped or Misaligned Rod" has been entered.	

While the crew is taking data for the dropped rod per step 7 of 1BwOA ROD-3, the following indications occur:

- Rod D-8 rod bottom light	LIT

Which of the following describes the action required?

a. Reset rate trip and perform dropped rod recovery per 1BwOA ROD-3.

b. Trip the reactor and enter 1BwEP-0.

c. Restore Tave/Tref, then calculate QPTR.

d. Perform SDM surveillance and reduce reactor power to less than 70%

19. Given the following plant conditions on Unit 1:

- 80% reactor power.
- CBD is 175 steps.
- Core Age is 5200 EFPH.
- RCS Tave is 575°F.
- RCS Boron Concentration is 600 ppm.

What will RCS Tave be following a withdrawal of CBD to 200 steps? Assume new stable plant conditions exist.

a. 576.5°F

b. 578.5°F

c. 580.5°F

d. 581.5°F

20. Given the following plant conditions on Unit 1:

- The plant is operating at 75% power with normal lineup for performing a calorimetric.
- During the calorimetric, the NSO is in the process of adjusting N-44 when a turbine runback occurs.
- 1PT-505, turbine first stage impulse chamber pressure, fails high when the turbine runsback.
- Tavg is 584°F and increasing.

Based on these conditions, the NSO should ...

a. Drive rods in manual until rod speed drops below 48 steps/min, then switch to AUTO until temperature is restored.

b. Drive rods in manual and continously insert rods until temperature is restored.

c. Allow automatic insertion until rod speed drops below 48 steps/min, then insert rods in manual until temperature is restored.

d. Allow automatic insertion until rod speed drops below 64 steps/min, then insert rods in manual until temperature is restored.

21. The following plant conditions exist during a small-break LOCA:

- Core exit TC's read approximately 532°F
- RCS pressure is 885 psig
- S/G levels are 25% narrow range
- Steam pressure is 1092 psig
- RCS wide range cold leg temperatures are all 525°F

Based on the above conditions, the RCS is ...

a. saturated. Decreasing RCS pressure will aid in establishing subcooling.

b. subcooled. Increasing S/G pressure will aid in increasing subcooling.

c. subcooled. Decreasing RCS pressure will aid in increasing subcooling.

d. saturated. Decreasing S/G pressure will aid in establishing subcooling.

22. The following conditions exist on Unit 1:

- Reactor power	36%
- Pzr pressure	2235 psig
- Pzr level	35%

RCP 1A breaker trips due to sensed undervoltage from bus 157. What is expected as a result of the trip of the RCP?

a. The reactor will automatically trip due to the open RCP breaker.

b. The reactor will automatically trip due to RCS loop low flow condition.

c. The reactor must be manually tripped by the operator.

d. A normal plant shutdown will be initiated.

23. The following plant conditions exist:

- Reactor	Tripped
- All RCPs	Running
- PZR level	48% increasing
- RCS pressure	1700 psig decreasing

Which of the following leak locations is consistent with the plant conditions above?

a. Failure of charging header connection to the RCS.

b. Weld failure on pressurizer liquid space sample line.

c. Failure of pressurizer PORV in an intermediate position.

d. Weld failure on RCP B discharge piping.

24. The following plant conditions exist on Unit 1:

- 100% power
- RCS Tave is 582°F
- PZR Pressure is 2235 psig

All systems were operating normally in Automatic when the 1A CV pump trips. Which of the following actions are required per BwAR 1-9-A3, "CHG PUMP TRIP?"

a. Place 1CV121, "Cent Chg Pumps Flow Cntrl Vlv", in manual and close, then start 1B CV pump.

b. Verify suction source, then start 1B CV pump.

c. Isolate letdown, then start 1B CV pump.

d. Close 1HCV182, "Chg Hdr Back Press Cntrl Vlv", then start 1B CV pump.

25. The following plant conditions exist:

Unit 1 is at 100%	Unit 2 is in MODE 4
1A CC pump is running	2A CC pump is running
1B CC pump is OOS	2B CC pump is in standby
0 CC pump is aligned to Bus 141	0 CC HX is aligned to Unit 1

Which of the following applies?

a. No Tech Spec actions apply.

b. Unit 1 is in a 7 day LCO to restore required CC pump to operable status.

c. Unit 2 is in a 7 day LCO to restore required CC HX to operable status.

d. Unit 1 and unit 2 are in a 7 day LCO to restore required CC pump to operable status.

26. The unit is at 100% power, steady state, NOP/NOT. The Pressurizer Pressure Master Controller setpoint fails to 2185 psig. Assume a step change in the setpoint and assume that pressurizer pressure control remains in automatic.

Which of the following is the immediate automatic response of the system?

a. Spray valves open, Variable Heaters deenergize

b. PORV 455A opens, Spray valves open, Variable Heaters energize.

c. Spray valves open, Variable Heaters energize.

d. Spray valves close, Variable Heaters deenergize.

27. Per Tech Specs, which of the following is NOT a reason for designating 1LT459 and 1LT460 as Post Accident Monitoring Instrumentation?

a. Used to determine whether to terminate SI.

b. Used to determine if SI reinitiation is required.

c. Used to verify unit conditions necessary to establish natural circulation.

d. Used to evaluate RCP trip criteria.

28. Which of the following Reactor Protection System Trips protects against DNB accidents?

a. IR High Flux

b. High Pressurizer Pressure

c. High Pressurizer Level

d. Power Range High Negative Rate

29. The Status light for 1SI8801B is DARK following a SI actuation. 1SI8801B is...

a. FULL OPEN and is NOT in its required safeguards position.

b. CLOSED and is NOT in its required safeguards position.

c. FULL OPEN and is in its required safeguards position.

d. CLOSED and is in its required safeguards position.

30. Rods are being withdrawn in manual during a reactor startup, with all systems operable.

For the Control Banks, which of the following describes the status of the DRPI rod bottom lights at the moment the ROD AT BOTTOM annunciator alarm clears?

a. Banks A, B, C, & D -- OFF.

b. Banks A, B, C, & D -- ON.

c. Banks A, B, C -- OFF; Bank D -- ON.

d. Bank A -- OFF; Banks B, C, & D -- ON.

31. Which of the following components is being DIRECTLY adjusted by the gain adjust at the NI panel potentiameter following a calorimetric calibration?

a. Summing and level amplifier

b. Detector output current

c. Upper and Lower Detector Averaging Circuit

d. Detector high voltage power supply

32. The following plant conditions exist on Unit 2:

-Reactor is operating at 100% rated thermal power
-Annunciator 2-10-A4 "PWR RNG UPPER DET FLUX DEV HIGH" has alarmed
-All control rods are positioned within 12 steps of their group demand counters
-Maximum QPTR based on the plant computer calculation is 1.04

Assuming QPTR is not reduced, within two hours reactor power must be reduced to...

a. 50%

b. 74%

c. 88%

d. 94%

33. Given the following plant conditions on Unit 1:

-100% power.
-Train A CETC power supply (MCC 131x1 ckt15) has been deenergized for breaker replacement.
-Train B CETC has only 10 thermocouples operable which are currently indicating:

1-610°F	6-613°F
2-610°F	7-612°F
3-613°F	8-612°F
4-640°F	9-611°F
5-613°F	10-613°F

-MCB display for train B CETC indicates 615°F

CETC #4 fails high.

MCB temperature would indicate ....

a. 612°F

b. 615°F

c. 731°F

d. 781°F

34. The following conditions exist with Unit 1 in MODE 5:

- Containment temperature - 88°F
- 2C RCP - RUNNING
- 2C RCFC - STOPPED

The adverse consequence of starting the 2C RCFC is that 2C RCP seal number ...

a. 2 may CLOSE causing the number 1 seal leakoff flow indication to INCREASE.

b. 2 may OPEN causing the number 1 seal leakoff flow indication to DECREASE.

c. 1 may OPEN causing the number 1 seal leakoff flow indication to INCREASE.

d. 1 may CLOSE causing the number 1 seal leakoff flow indication to DECREASE.

35. Given the following Unit 2 conditions:

-2A and 2C Reactor Containment Fan Coolers (RCFC) are operating in HIGH speed.
-2B and 2D RCFCs are stopped and in standby.
-Normal cooling water lineup for the RCFCs exists.

What will be the status of the RCFCs 15 seconds after an SI signal occurs concurrent with a loss of offsite power?

a. Only 2A and 2B RCFCs running in HIGH speed.

b. Only 2B and 2D RCFCs running in LOW speed.

c. ALL RCFCs running in LOW speed.

d. NO RCFCs are running.

36. During initial actuation of the Containment Spray System during a LOCA, radiation levels in the RWST are expected to....

a. increase due to spray add tank recirculation to the RWST.

b. increase due to containment recirc. sump recirculation to the RWST.

c. stay the same due to NO recirculation aligned to the RWST.

d. stay the same due to spray add tank recirculation to the RWST.

37. A fire has occurred in the 2B Containment Charcoal Filter Unit. Deluge is actuated at ...

a. 0PM02J in the Main Control Room.

b. 1PM09J, Fire Panel in the Main Control Room.

c. 2B Containment Charcoal Filter Unit.

d. 2VP01J on 426' Electrical Penetration Area.

38. The following plant conditions exist:

- A LOCA has occurred on Unit 1
- E-0 has been completed and the crew has transitioned to E-1
- From E-1 the crew transitioned to FR-C.1
- The Post-LOCA Purge Exhaust Fan is de-energized due to an electrical fault on Bus 134V4.

Which of the following containment hydrogen concentrations is the MAXIMUM concentration which the Hydrogen Recombiners may be placed in service WITHOUT CONSULTATION WITH THE TSC?

a. 0.5%

b. 4.0%

c. 6.0%

d. 8.0%

39. In Modes 1-4, the Containment Normal Purge Valves _____ and the Mini Purge Valves _____.

a. are sealed closed, may be opened as needed.

b. are sealed closed, are sealed closed

c. may be opened as needed, may be opened as needed

d. may be opened as needed, are sealed closed

40. The following conditions exist:

-Unit 1 is at 100% power
-Unit 2 is currently off loading fuel to the Spent Fuel Pool
-Current Spent Fuel Pool temperature is 105°F
-1FC01P "SFP Cooling Pump" is OOS for maintenance
-2FC01P "SFP Cooling Pump" was running and tripped for unknown reasons

Per 0BwOA REFUEL-3, which of the following actions should take place:

a. Start one FHB Charcoal Booster Fan and two Aux Building Charcoal Booster Fans.
b. Align a RWST to the SFP and start one Aux Building Charcoal Booster Fan.
c. Align Recycle Hold Up Tank to the SFP.
d. Place the Skimmer Loop in Service.

41. The plant is operating at 100% power when the Controlling S/G Level Channel on 'A' S/G fails to 100%.

If no operator action is taken, what is the expected plant response?

a. Feedwater flow to 'A' S/G will INITIALLY INCREASE, then DECREASE causing S/G level to STABILIZE at a level HIGHER THAN PROGRAM.
b. Feedwater flow to 'A' S/G will INITIALLY DECREASE, then INCREASE causing S/G level to STABILIZE at a level LOWER THAN PROGRAM.
c. Reactor trip will occur on Lo-Lo S/G level.
d. Reactor trip will occur due to turbine trip.

42. Which of the following will close the MSIVs?

a. 3.4 psig Cnmt pressure on 2/3 channels.
b. 640 psig steam line pressure > P-11 on 1/3 channels on 1/4 lines.
c. -100 psi/50sec < P-11 with SI blocked on 1/3 channels on 1/4 lines.
d. 8.2 psig Cnmt pressure on 2/3 channels.

43. The following conditions exist on Unit 2:
-Reactor Power is at 50%, steady state.
-The Steam Dumps are in the Tave MODE and in Automatic
-The Reactor Operator adjusts the steam dump controller potentiometer from 7.28 to 8.00

Which of the following is a correct plant effect of the potentiometer change?

Fuel Cladding Temperature...

a. increases due to increased steam demand.
b. decreases due to a decrease in steam demand.
c. remains constant due to the potentiometer only in circuit during Manual Mode.
d. remains constant due to the potentiometer only in the circuit during STEAM PRESSURE Mode.

44. What is the SEQUENCE that occurs when a Main Feed pump LOW NPSH signal is actuated?

a. The CD 152 valve (CD pump recirc) opens, the CD/CB aux oil pump starts, the CD/CB pump starts.
b. The CD/CB pump starts then the CD 152 valve (CD pump recirc) opens.
c. The CD 152 valve (CD pump recirc) closes, the CD/CB aux oil pump starts, the CD/CB pump starts.
d. The CD/CB pump starts then the CD 152 valve (CD pump recirc) closes.

45. The following conditions exist on Unit 1:

-Reactor power is 100%
-All systems are normal
-1FT-512 is selected for steam flow input into SGWLC for S/G 1A

With NO OPERATOR ACTION, what is the effect of the pressure transmitter associated with FT-512 failing low?

1A S/G level will decrease, feed pump speed ...

a. will decrease, and S/G level will decrease below the LO-2 setpoint.
b. is unaffected, and S/G level will return to normal.
c. will increase, and S/G level will return to normal.
d. is unaffected, and S/G level will decrease below LO-2 setpoint.

46. A Unit 1 RCS cooldown is in progress with the A auxiliary feedwater pump maintaining level in all steam generators. Instrument bus 111 is deenergized.

Auxiliary feedwater system flow control valves (1AF005a-d) ....

a. Fail as is.
b. Fail Open.
c. Fail Closed.
d. Are not affected.

47. A Reactor Trip has just occurred on Unit 1. Following the main generator trip, Automatic Bus Transfer failed to operate for Busses 156 and 157. Which ONE of the following describes the 6.9 KV Bus AND RCP status?

a. All Feed and Load Breakers Open on Busses 156 and 157.
Only the 1A and 1B RCPs trip due to Bus Undervoltage.
b. All Load Breakers Open on Busses 156 and 157.
Only the 1A and 1B RCPs trip due to Bus Underfrequency.
c. All Load Breakers Open on Busses 156 and 157.
All RCPs trip due to Bus Undervoltage.
d. All Feed and Load Breakers Open on Busses 156 and 157.
All RCPs trip due to Bus Underfrequency.

48. During operation at power with the Reactor Trip Breakers closed, a LOSS of 125 VDC control power to one of the Reactor Trip Breakers occurs.

Which of the following describes how that Reactor Trip Breaker will respond?

a. Trips OPEN due to loss of power to the SHUNT coil.
b. Trips OPEN due to loss of power to the UNDERVOLTAGE coil.
c. Is NOT capable of tripping on a SHUNT trip.
d. Is NOT capable of tripping on an UNDERVOLTAGE trip.

49. Given the following conditions:

- Unit 2 is in MODE 3 at 500°F
- The MCB indication for DC Bus 211 indicates 0 volts
- Pressurizer Spray Valve 2RY455B is stuck open
- RCS pressure is lowering

Which of the following will stop the RCS depressurization?

a. Energize all Pressurizer heaters.
b. Trip the 2D RCP locally at its breaker.
c. Isolate Instrument Air to Containment.
d. Secure the 2C RCP from the Main Control Room.

50. The 1A DG is not running.

Which of the following combinations of Diesel Generator Air Receiver pressures is sufficient to maintain the 1A Diesel Generator OPERABLE per BwOP DG-1 "Diesel Generator Alignment to Standby Condition?"

	Receiver A (PSIG)	Receiver B (PSIG)
a.	170	100
b.	0	240
c.	170	170
d.	0	170

51. The 2A Diesel Generator is NOT running. The lead Fuel Oil Transfer pump starts in response to low level in the Fuel Oil Day Tank. This pump fails to develop adequate discharge pressure but continues to run.

The second Fuel Oil Transfer pump will ...

a. NOT start because it is not selected to start on low level.
b. NOT start unless DG engine speed reaches 100 RPM.
c. start if in AUTO.
d. start immediately if the running pump is placed in Pull Out.

52. The waste gas discharge control modulating valve (RCV 014)....

a. must be opened by first dialing the controller to 50%, then placing the open control switch to the OPEN position.
b. will close automatically and an alarm will be activated when vent stack activity exceeds the high alarm setpoint on 0PR2J.
c. controls pressure at 1.3 psig from a gas decay tank to the hold up tanks.
d. maintains a constant downstream pressure to ensure a constant discharge flowrate.

53. The Main Control Room Outside Air Intake Radiation Monitors (gaseous) are separated into Train A and Train B (0RE-PR031B and 0RE-PR032B for Train A and 0RE-PR033B and 0RE-PR034B for Train B).

Which of the following is correct regarding the Main Control Room Outside Air Inlet Radiation Monitors (gaseous)?

The MINIMUM conditions to initiate automatic actions are...

a. 0RE-PR031B and 0RE-PR034B are in the OPERATE FAILURE condition.
b. 0RE-PR031B and 0RE-PR033B are in the OPERATE FAILURE condition.
c. 0RE-PR031B in HIGH alarm.
d. 0RE-PR031B and 0RE-PR033B are in HIGH alarm.

54. The unit is presently at 90% and shutting down due to a loss of Instrument Bus 114. All systems are in automatic.

A Loss of Coolant Accident (LOCA) occurs. Which of the following statements best describes response of the 1B SX pump?

a. Will automatically start on low system pressure.
b. Will have to be manually started.
c. Cannot be started from the control room.
d. Will automatically start on a Manual SI actuation.

55. Given the following Unit 1 conditions:

-Reactor power - 100%
-1B D/G surveillance test in progress - full load
-1B SX pump - running
-1A SX pump - available

The 1B SX pump tripped due to electrical problem with Bus 142. The US directs a start of the 1A SX pump.

What is the SEQUENCE for starting the 1A SX pump in these conditions?

The operator will ...

a. take the 1A SX pump switch to START and release. The pump will start after a delay.
b. take the 1A SX pump switch to START and hold until the pump starts.
c. start the auxiliary oil pump, take the 1A SX pump switch to START and release. The pump will immediately start.
d. start the auxiliary oil pump, wait 5 seconds, take the 1A SX pump switch to START and hold until the pump starts.

56. Which of the following would occur on a small tube leak in the Component Cooling Water (CC) Heat Exchanger?

a. Automatic CC System makeup from the Primary Water System only would occur, providing the necessary level for CC pump operation.

b. CC System liquid inventory would increase, thus increasing the CC flowrate to components cooled by the CC System.

c. CC would leak into the Essential Service Water (SX) System, potentially contaminating the SX System.

d. CC surge tank level would increase, which would cause water to overflow through the vent valve.

57. Unit 1 is currently in Mode 4.
1A RH train is in service providing shutdown cooling.
RCS temp - 340°F
RCS pressure - 350 psig

Unit 2 is in Mode 1 at 100% power.

Equipment OOS for maintenance:

1B CW pump	"OC" WS pump
1A CC pump	U2 SA Compressor

A loss of the Unit 1 SAT occurs due to a sudden pressure actuation.

With NO operator action, Unit 1 will experience an uncontrolled _____ and Unit 2 will _____.

a. cooldown trip on Lo-Lo S/G level.

b. heatup not be affected

c. cooldown not be affected

d. heatup trip on Lo-Lo S/G level.

58. Unit 1 is at 36% power, when a rapid drop in reactor power occurs and a rod bottom light (DRPI panel) appears for a rod in Control Bank A. The crew enters 1BwOA ROD-3, Dropped or Misaligned Rod, for determining, correcting, and recovering a dropped control rod.

Which of the following actions will actuate the ROD CONT URGENT FAILURE (Annun. 1-10-C6) alarm during the dropped rod recovery?

a. Resetting Group 1A step counter to ZERO.

b. Resetting Control Bank A P/A Converter to ZERO.

c. Withdrawing the dropped rod to its bank position.

d. Opening the Lift Coil Disconnect switches for the unaffected rods in CB "A".

59. Given the following Unit 1 conditions:

Reactor power is at 100% steady state

	_1_	_2_	_3_	_4_
Power range NIS	102%	103%	102%	102%
PZR pressure	1880 psig(455)	1910 psig(456)	2500 psig(457)	1905 psig(458)
PZR level	90%(459)	92%(460)	90%(461)	72%(462)
Tave	584°F	585°F	582°F	586°F
SG levels	43%(1A)	34%(1B)	89%(1C)	40%(1D)

(all S/G instruments for a S/G read the same level)

What is the FIRST required action for these conditions?

a. Verify a turbine runback is initiated.

b. Reduce power to LESS THAN 100% indicated to ensure 8 hour average does NOT exceed 100% power.

c. Trip the reactor and initiate actions of 1BwEP-0.

d. Initiate a MANUAL Safety Injection and initiate actions of 1BwEP-0.

60. A reactor trip has occurred due to a turbine trip from full power. Narrow range steam generator levels are off scale low.

Why does 1BwEP ES-0.1, Reactor Trip Response, instruct the operator to feed the steam generators at greater than 500 GPM?

a. Enhance natural circulation.

b. Provide an adequate heat sink for decay heat removal.

c. Ensure the steam generator U-tubes remain "wet" preventing dry steam generators.

d. Prevent the formation of steam in the steam generator feed ring.

61. Given the following plant conditions on Unit 1:

-A reactor trip and SI signal have been generated due to a PZR vapor space LOCA
-ALL RCPs are stopped
-RCS subcooling is inadequate
-PZR level is 68% and INCREASING
-CNMT pressure is 6 psig and slowly INCREASING

The US is directing actions of 1BwEP ES-1.2 "Post LOCA Cooldown And Depressurization" and
is checking to see if an RCP should be started.

Which of the following describes the correct actions?

a. Start the 1A or 1B RCP.

b. Start the 1C or 1D RCP.

c. Do NOT start an RCP since PZR level in inadequate.

d. Do NOT start an RCP since subcooling is inadequate.

62. The plant is operating at 100% power when a pressurizer safety valve inadvertently lifts. The PRT pressure is 20 psig.

Which of the following most closely approximates the tail pipe temperature of the open safety valve?

a. 235°F

b. 265°F

c. 295°F

d. 325°F

63. If Unit 1 is operating at 20% power with control rods in MANUAL and 1C RCP trips but the reactor is NOT manually tripped, which of the following sets of conditions describes the expected conditions for the parameter listed below?

	Actual Reactor Power	Steam Flow for Affected Loop SG	Steam Flow for Other SGs
a.	DECREASE,	DECREASE,	DECREASE
b.	CONSTANT,	INCREASE,	INCREASE
c.	CONSTANT,	DECREASE,	INCREASE
d.	DECREASE,	INCREASE,	CONSTANT

64. The following plant conditions exist on Unit 1:

- PZR Level is 34%
- Combined RCP Seal Return flow is 12 gpm
- 1BwOA PRI-1 has been entered due to an Identified RCS leakage of 8 gpm
- Letdown Flow is isolated

Assume:
Tave constant
92 Gallons/% PZR Level

A loss of all CV pumps is preventing makeup to the RCS. With NO OPERATOR ACTION what is the longest amount of time the crew will have until they are procedurally required to trip?

a. 78 minutes.

b. 138 minutes.

c. 195 minutes.

d. 345 minutes.

65. The following plant conditions exist:

- Unit 1 — 40% reactor power steady state conditions
- Rod Control — Automatic
- Letdown — 75 gpm through 1A L/D Hx

Temperature Control Valve (1CC130A), CC flow control valve, repositions due to a loss of IA to the valve positioner. Which of the following describes the plant response to the event?

a. 1TCV-129 opens bypassing flow around the demineralizers.

b. Control rods step out due to a reduction in RCS temperature.

c. Control rods step in due to rising RCS temperature.

d. RCS temperature falls requiring dilution to restore temperature.

66. Which of the following valve combinations and flows for emergency boration are allowed in accordance with 1BwOA PRI-2, "Emergency Boration?"

a. 1CV112B, VCT Outlet Isolation Valve FULL OPEN and 1CV121, Charging Line Flow Control Valve, FULL OPEN with maximum charging header flow.

b. 1CV112C, VCT Outlet Isolation Valve, CLOSED, and 1CV8104, Emergency Boration Valve, FULL OPEN with maximum charging header flow.

c. 1CV112D, RWST to Cent Chg Pump Suction Valve, FULL OPEN, and 1CV8485A, CV Pump Disch Valve THROTTLED to balance high head SI flow and Letdown flow.

d. 1CV8104, Emergency Boration Valve, FULL OPEN, and 1CV8485A, CV Pump Disch Valve THROTTLED to balance high head SI flow and Letdown flow.

67. Given the following plant conditions on Unit 1:

- Reactor power 75%
- PZR pressure control selected to 455/456
- Pressure channel 1PT-457 fails LOW

1BwOA INST-2 "Operation With A Failed Instrument Channel" is entered and the required actions for the failed channel are performed.

How is the PZR PORV operation affected with the failed channel Out of Service?

a. ONLY PORV PCV-456 will NOT CLOSE, if OPEN in AUTO, when PZR pressure decreases to the PORV blocking signal.

b. Neither PORV will CLOSE, if OPEN in AUTO, when PZR pressure decreases to the PORV blocking signal.

c. ONLY PORV PCV-456 will NOT OPEN when PZR pressure increases to its OPEN setpoint.

d. Neither PORV will OPEN when PZR pressure increases to their OPEN setpoint.

68. Given the following plant conditions on Unit 1:

- Power level 77%
- PZR pressure 2235 psig
- RCS Tave 577°F (A) 575°F (B) 579°F (C) 575°F (D)
- PZR Level Channel Selector Switch - 459/460 position

The CV121 Flow Controller, FK-121, fails such that charging flow to the RCS is increased.

What would PZR level read on 1LI-459 when annunciator 1-12-C3, "PZR LEVEL CONT DEV HIGH HTRS ON", actuates?

a. 52%

b. 56%

c. 57%

d. 61%

69. Given the following conditions:

- The unit is at 8% power.
- Plant startup is in progress
- Pzr level instrument 1LT-459 has failed LOW.
- All actions of 1BwOA INST-2 "Operation with a Failed Instrument Channel" Attachment C are complete.

Which of the following describes the crews minimum course of action if there is a subsequent failure of Pzr level instrument 1LT-460 HIGH?

a. Verify reactor trip.

b. Stop the startup and restore one of the failed channels of pressurizer level to OPERABLE status prior to increasing power above 10%.

c. Stop the startup and restore both of the failed channels of pressurizer level to OPERABLE status prior to increasing power above 10%.

d. Within one hour initiate ACTION to be in at least HOT STANDBY within the next 6 hours.

70. While performing the immediate actions of BwFR-S.1," Response to Nuclear Power Generation/ATWS", the operator was directed to verify a turbine trip. Subsequently, in Step 8, the operator is again directed to verify a turbine trip. If the main turbine has not tripped at this point, the crew is directed to trip the main turbine locally.

Why wasn't the operator directed to trip the main turbine locally during the immediate actions of the procedure?

a. Local operators are busy isolating the steam dumps.
b. The main turbine can still be used to draw steam for RCS temperature control.
c. The main turbine can still be used to maintain S/G water level due to no MFW pump trip.
d. Local operator actions are more time consuming to initiate and complete.

71. The following plant conditions exist:

- A fuel assembly has just been removed from the core.
- Immediately after initiating transit to the upender, the refueling cavity level is reported to be a foot below normal and dropping at a visible rate.

Which of the following is the preferred course of action?

a. Stop the refuel movement at the current location in transit to the upender.
b. Place the fuel assembly back into the reactor vessel.
c. Place the fuel assembly in the upender and lower it to the horizontal position.
d. Position the mast over the deepest part of the cavity and lower the assembly to the bottom.

72. A SGTR has occurred on Unit 1. Current conditions are:

- RCS pressure 1350 psig
- RCS temperature (CETCs) 545° F
- SG pressures 930 psig (A) 1145 psig (B) 940 psig (C) 940 psig (D)
- SG 1B has been confirmed as the SG with the rupture.

While performing the steps of 1BwEP-3, "Steam Generator Tube Rupture", the Unit Supervisor found ALL available copies of the procedure had an illegible page. This page contained the required temperatures for determining RCS cooldown temperatures.

The US directs you to use the steam tables to determine the required RCS (core exit) temperature with an allowance of 50° F for subcooling.

The required core exit temperature after the RCS cooldown is ...

a. 513°F

b. 518°F

c. 534°F

d. 538°F

73. The following plant conditions exist:

- An initial plant startup is in progress, per 1BwGP 100-3, from a refueling outage.
- The reactor is initially at 13% power.
- The Main Turbine is at 600 rpm.
- Trips associated with Permissive P-10 have been blocked.
- Fouling of the circ water traveling screens has caused a reduction in condenser CW flow.
- Condenser vacuum decreases to indicate 7.0 inches Hg absolute.

Assuming no operator action, choose the statement below which describes the effect on the plant.

a. The reactor will trip due to a turbine trip.

b. The reactor will trip on NIS IR FLUX HI Setpoint.

c. RCS temperature will increase until steam dumps actuate.

d. RCS temperature will increase until Steam Generator PORVs actuate.

74. While at 35% power, a main feed water regulating valve fails open causing the affected SG level to exceed the hi-hi level setpoint. The reactor trips; however, NO SG level drops below the LO-LO level setpoint. Assuming NO operator action is taken, how many AF pump Lube Oil Pumps will be running 1 minute after the trip?

a. None.

b. One.

c. Two.

d. Three.

75. Given the following plant conditions on Unit 1:

- Reactor power is 90%.
- RCS Tave is stable at 579°F on all 4 loops.
- RCS pressure is stable at 2235 psig.
- Containment Pressure is INCREASING.
- 1C SG Feed Flow is pegged HIGH.
- 1C SG Main FW Reg Valve is full OPEN.
- 1C SG pressure is STABLE.
- 1C SG level is DECREASING.

Which of the following events is in progress?

a. Main FW Reg Valve failed OPEN.

b. Feed Flow Indicator failed HIGH.

c. Feed Line Break INSIDE Containment.

d. Main Feed Pump trip.

76. Given the following plant conditions on Unit 1:

- 100% reactor power.
- A voltage transient caused the DC Bus 113 supply fuses to blow.
- The reactor was manually tripped due to adverse secondary transients.
- One minute after performing the immediate action steps of 1BwEP-0 "Reactor Trip or Safety Injection", an operator was dispatched to open the PMG output Breaker.

After the PMG output breaker is opened, Bus 143 will be _____ and Bus 144 will be _____ .

a.	energized	energized
b.	energized	de-energized
c.	de-energized	energized
d.	de-energized	de-energized

80. - You are the Unit 1 Unit Supervisor.
- A fire has occurred in the Main Control Room.
- Smoke in the Main Control Room is growing very heavy.
- The order has been given to evacuate the control room.

You should direct a reactor trip and go to the...

a. Remote Shutdown Panel to obtain plant control.

b. Reactor trip breakers to verify Reactor Trip.

c. Fire Hazards Panel to obtain plant control.

d. Auxiliary Electric Room to align needed instrumentation.

81. Per Tech Spec Basis regarding high containment pressure, which of the following events could lead to the highest pressure/leakage out of containment?

a. Design Basis LOCA.

b. Design Basis Steam Line Break inside Containment.

c. Inadvertant Containment Spray Initiation.

d. Pressurizer vapor space LOCA.

82. Which of the following is NOT a high level action of 1BwFR-Z.1, "Response to Containment High Pressure?"

a. Verify containment isolation.

b. Verify containment heat removal.

c. Reduce heat input to containment.

d. Check for and isolate faulted steam generator.

83. 2BwFR-C.1, "Inadequate Core Cooling" must be entered if CETCs are greater than or equal to...

a. 700°F ONLY.

b. 1200°F ONLY.

c. 700°F AND RCS Subcooling Unacceptable.

d. 1200°F AND RCS Subcooling Unacceptable.

84. The following plant conditions exist:

A reactor trip and loss of offsite power occurred.
Reactor power was initially at 100%.
Tavg is 531°F.
Tcold is at 527°F.
Thot is at 534°F.
Average of the ten (10) hottest CETC's is 538°F.
Pressurizer pressure is at 2185 psig.

Which of the following is the subcooling that currently exists?

a. 92°F

b. 102°F

c. 111°F

d. 121°F

85. A Small Break LOCA occurred on Unit 2 resulting in a reactor trip/SI.
While performing the Immediate Actions of 2BwEP-0, the Main Turbine did not trip and the crew successfully performed ALL actions of the RNO for verifying a Turbine Trip.
From 2BwEP-0 the crew transitioned to 2BwEP-1.
At step 6 of 2BwEP-1, "Check if ECCS flow should be reduced" RCS pressure starts decreasing rapidly.
The crew notes steam flows on ALL 4 Steam Generators.
The crew transitions to 2BwEP ES-0.0 "Rediagnosis"

From 2BwEP ES-0.0, the crew should transition to...

a. 2BwEP-2, "Faulted Steam Generator Isolation."
b. 2BwCA-2.1, "Uncontrolled Depressurization of All SGs."
c. 2BwEP ES-1.1, "SI Termination."
d. 2BwEP-0, "Reactor Trip or Safety Injection."

86. Which of the following is NOT a condition in which a transition to 1BwEP ES-0.0, "Rediagnosis", is allowed?

a. Large Break LOCA, RCS Temperature 563°F, RCS Pressure 1000 psig, PZR Level Off-Scale Low.
b. Main Steam Line Break inside containment, Containment Pressure 23 psig.
c. Main Steam Line Break outside containment, SG Pressures - 1A - 560 psig, 1B - 570 psig, 1C - 570 psig, 1D - 590 psig.
d. Reactor Trip due to P-14, RCS Temperature 557°F, RCS Pressure 2100 psig, PZR Level 20%.

87. A small break LOCA has occurred on Unit 1. The crew has transitioned to 1BwEP-1, "Loss of Reactor or Secondary Coolant" and is evaluating SI termination criteria in step 6.

Which of the following is used to determine if adequate core cooling exists?

a. RCS wide range temperature.
b. ECCS injection flow rate.
c. RVLIS indication.
d. Subcooling margin.

88. Which of the following describes the methods in order of preference used in 1BwEP ES-1.2, "Post LOCA Cooldown and Depressurization" during the performance of step 10, Depressurize RCS to Refill PZR?

a. One Pzr PORV, Normal Spray. Aux. Spray.

b. One Pzr PORV, Aux. Spray, Normal Spray.

c. Normal Spray, Aux. Spray, One Pzr PORV.

d. Normal Spray, One Pzr PORV, Aux. Spray.

89. A Large Break LOCA has occurred on Unit 1 and a transition to 1BwEP-1, "Loss of Reactor or Secondary Coolant," has been made. Subsequently, 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," was implemented. Currently, the operators are aligning the SI and CV pumps for Cold Leg Recirculation per Step 5. The STA reports a RED path in Heat Sink.

The proper course of action for the operator is to...

a. immediately suspend 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," and implement 1BwFR H.1, "Loss of Secondary Heat Sink."

b. only complete aligning ECCS for Cold Leg Recirculation steps of 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation," and then implement 1BwFR H.1, "Loss of Secondary Heat Sink."

c. complete all steps of1Bw EP ES-1.3, "Transfer to Cold Leg Recirculation," and then implement 1BwFR H.1, "Loss of Secondary Heat Sink."

d. immediately implement 1BwFR H.1, "Loss of Secondary Heat Sink," while concurrently aligning ECCS for Cold Leg Recirculation per 1BwEP ES-1.3, "Transfer to Cold Leg Recirculation."

90. Unit 1 is in MODE 4 on RH cooldown with the following plant conditions:

RCS Temperature	340°F slowly lowering			
RCS pressure	300 psig lowering			
PZR level	42% lowering			
CNMT pressure	0.2 psig			
Alarm received for ECCS cubicle radiation (GRID 2)				
SG levels	42% (A)	40% (B)	43% (C)	40% (D)
SG pressures	115 psig (A)	115 psig (B)	115 psig (C)	115 psig (D)

What event is taking place?

a. A steam leak has occurred inside CNMT.

b. The Cold Overpressure system has actuated.

c. Letdown line pressure control valve, 1PCV-131, has failed open.

d. A LOCA has occurred on the suction of the RH pump.

91. The following conditions exist on Unit 2:

- Reactor power was 8% prior to the event below.
- A failure in the feedwater control system caused ONE S/G level to rise to 83%.
- The main turbine tripped.
- S/G levels have returned to their normal level range
- The Startup FW Pump is running

What are the minimum set of conditions that would have to be met to feed the S/Gs using the 2FW034s Feedwater Tempering Flow Control valves?

a. The FW Isolation Aux Relays would have to be reset and 2FW035 Feedwater Tempering Isol valves opened.

b. The reactor trip breakers would have to be cycled, the FW Isolation Aux Relays would have to be reset and 2FW035 Feedwater Tempering Isol valves opened.

c. The FW Isolation Main Relays and Aux Relays would have to be reset and 2 FW035 Feedwater Tempering Isol valves opened.

d. The reactor trip breakers would have to be cycled and FW Isolation Main Relays and Aux Relays reset and 2FW035 Feedwater Tempering Isol valves opened.

92. All reactor core heat removal systems have failed and the RCS temperature is increasing.

When core exit thermocouple temperatures are greater than 700°F...

a. the DNBR decreases to less than 1.3.
b. the core is superheated.
c. RCP damage is prevalent.
d. fuel cladding failure is prevalent.

93. A steam void has been detected in the Unit 2 reactor vessel head during natural circulation cooldown. RVLIS is NOT available.

Which of the following means can be utilized by the operators to estimate the growth of the steam void per 2BwEP ES-0.4, "Natural Circulation Cooldown with Steam Void in Vessel (Without RVLIS)"?

a. Pressurizer pressure indication changes.
b. Pressurizer level indication changes.
c. RCS Hot Leg temperature indications.
d. Core Exit Thermocouple indications.

94. Step 1 of 1BwFR-C.3, "Response to Saturated Core Cooling," checks if the RH system has been placed in shutdown cooling mode.

Which of the following describes the basis for this step?

a. To ensure a ORANGE or RED condition in Core Cooling will not arise while performing this procedure.
b. To verify RH is aligned for long term cooling if the appropriate conditions are met.
c. If RH is in shutdown cooling mode, the saturated core cooling condition is a problem with RH and this procedure will not address this condition.
d. If RH is in shutdown cooling mode, the saturated core cooling condition is a problem with RH and this procedure will identify and isolate the affected train.

95. The following conditions exist on Unit 1:

- A natural circulation cooldown is in progress per 1BwEP ES-0.2 "Natural Circulation Cooldown."
- Pressurizer pressure is being controlled using Aux. Spray and Pzr heaters.
- As pressure is being lowered through 1300 psig, a rapid increase is noted in Pzr level.
- Charging and letdown are in manual and are balanced.

What action is required to be taken by the operators?

a. Repressurize the RCS.

b. Isolate the SI Accumulators.

c. Increase the RCS cooldown rate.

d. Place excess letdown in service.

96. Which of the following describes why it is important to run CRDM fans when performing a natural circulation cooldown?

a. Provides the heat removal mechanism for the vessel head area.

b. Aids in natural circulation flow through the RCS vessel head region.

c. Prevents erratic indication of SR instrumentation.

d. Aids in natural circulation flow through the RCS.

97. What are the MAXIMUM cooldown rates that apply for a cooldown from normal operating temperature for the RCS to 500°F in the following indicated procedures? (NOTE: all choices are applicable in any ONE hour period.)

1BwEP ES-0.3 "Natural Circulation Cooldown With Void In Vessel (With RVLIS)"
1BwEP ES-0.4 "Natural Circulation Cooldown With Void In Vessel (Without RVLIS)"

	1BwEP ES-0.3 value	1BwEP ES-0.4 value
a.	50°F	50°F
b.	50°F	100°F
c.	100°F	50°F
d.	100°F	100°F

98. Unit 1 reactor tripped approximately 1 hour ago due to a large steam break inside containment. The crew is currently in 1BwEP ES-0.3, "Natural Circulation Cooldown with Steam Voids in Vessel (with RVLIS)". Pressurizer level is currently at 95%.

Per 1BwEP ES-0.3, PZR Level should be reduced to less than 90% by ...

a. cycling PZR heaters and securing the RCS cooldown.
b. controlling charging and letdown.
c. closing PZR sprays and energizing PZR heaters.
d. ONLY establish maximum letdown.

99. Why are the S/Gs depressurized to less than 670 psig according to 1BwCA-1.1, "Loss of Emergency Coolant Recirculation"?

a. To allow maximum AF flow to the S/Gs.
b. To ensure adequate subcooling for restart of the RCPs.
c. To set up conditions for controlled injection to the RCS from the accumulators.
d. To decrease RCS temperature and pressure which reduces break flow in a LOCA condition.

100. The NSO reports that the Spray Additive Tank low-2 level light has just been received as a result of a Containment spray system actuation during a steam line break. Containment Pressure is currently 24 psig. Which of the following is correct concerning this situation? (Assume CS Actuation signal has been RESET)

a. Allow the Containment spray system to operate AS-IS until containment pressure is < 15 psig.
b. Manually shift the Containment spray system lineup to the post accident recirculation lineup.
c. Manually close the motor operated isolation valve between the eductor and the spray additive tank (1CS019A/B).
d. Stop all containment spray pumps until the spray additive tank is filled and vented per BwOP CS-3.

Senior Reactor Operator Answer Key

1. c
2. b
3. a
4. c
5. b
6. c
7. c
8. a
9. b
10. d
11. a
12. a
13. d
14. c
15. b
16. c
17. ~~d~~ C 11-1-00
18. b
19. b
20. b
21. d
22. b
23. c
24. b
25. b
26. a
27. d
28. d
29. b
30. d
31. a
32. c
33. a
34. b
35. d
36. c
37. d
38. b
39. a
40. a
41. c
42. d
43. d
44. c
45. a
46. c
47. a
48. c
49. b
50. b

Senior Reactor Operator Answer Key

51. a
52. b
53. c
54. b
55. b
56. c
57. d
58. c
59. c
60. b
61. d
62. b
63. c
64. b
65. c
66. c
67. c
68. d
69. b
70. d
71. b
72. a
73. d
74. a
75. c
76. c
77. c
78. c
79. b
80. a
81. a
82. c
83. b
84. c
85. b
86. d
87. d
88. d
89. b
90. d
91. a
92. b
93. b
94. c
95. a
96. a
97. c
98. b
99. c
100. c

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT A (PG 1 OF 1)
ACCEPTABLE PRESSURE CALCULATION

1 Calculate absolute pressure for affected gas decay tank:

P_A = (indicated pressure) + 15 psi

2 Calculate pressure of affected gas decay tank at which activity will be within limits:

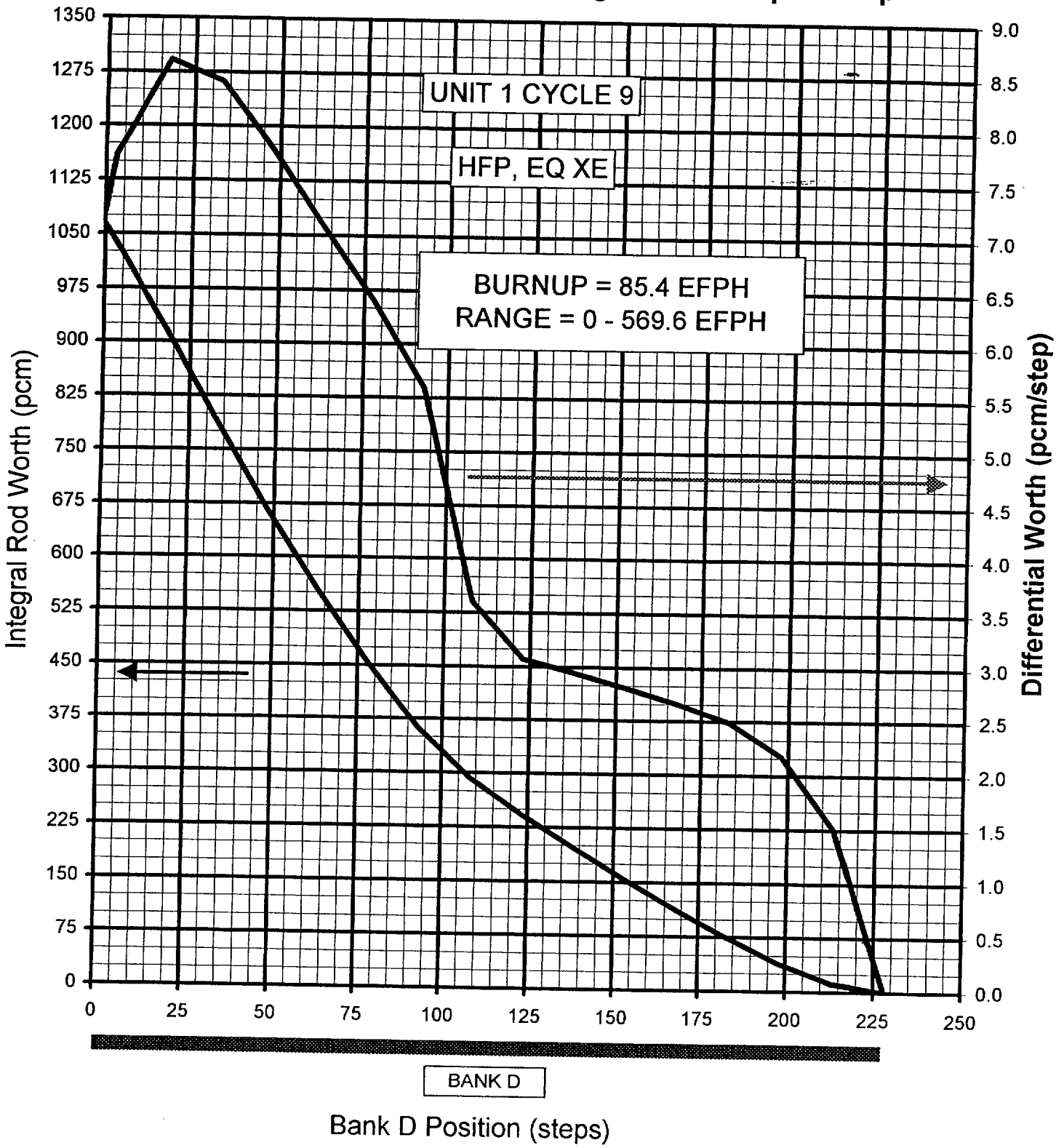
$$P_{Lim} = \frac{P_A \times 5 \times 10^4 \text{ curies}}{\text{(present tank activity in curies)}}$$

3 Calculate indicated pressure equivalent to P_{Lim}:

Indicated pressure = P_{Lim} - 15 psi

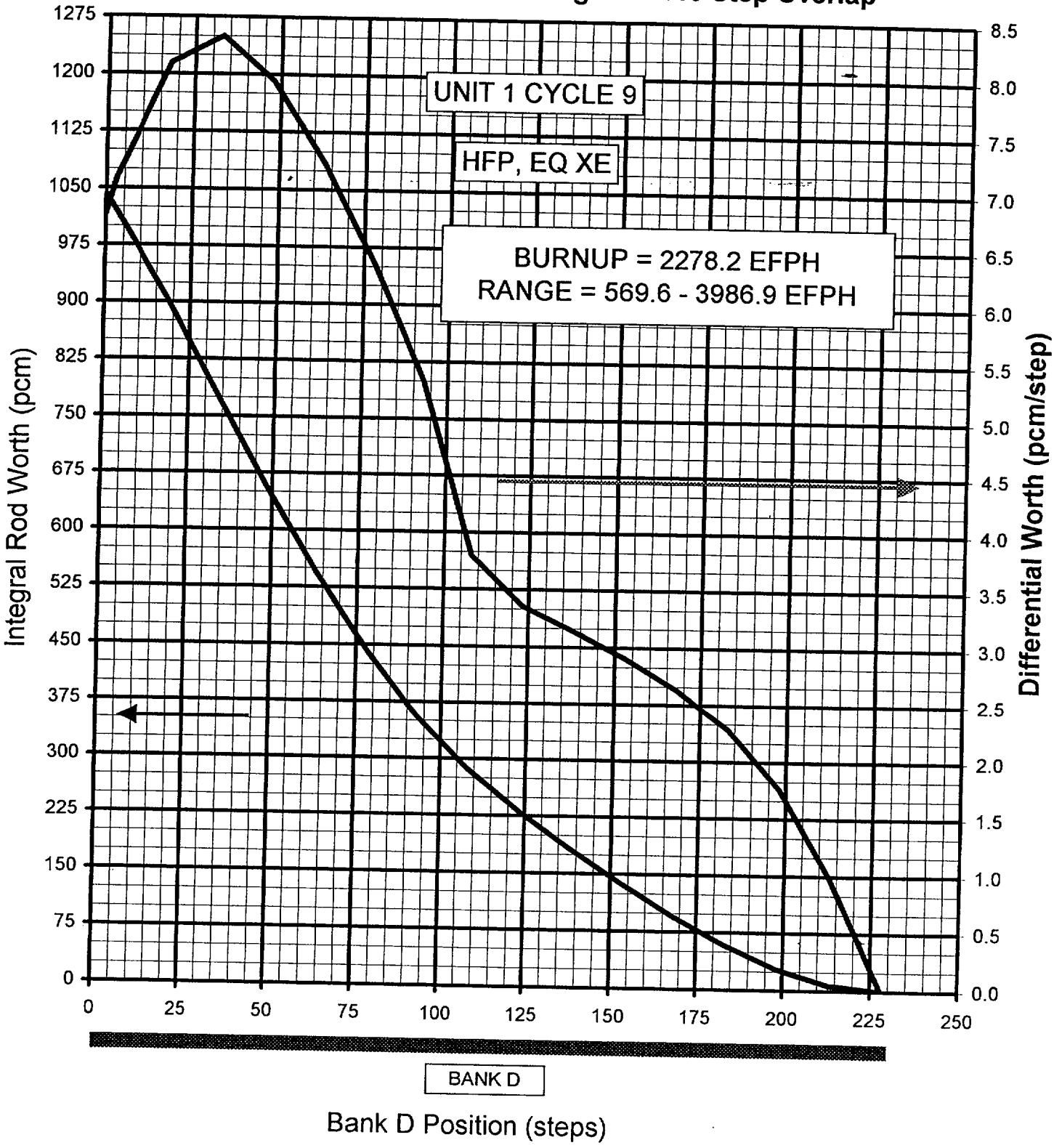
-END-

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



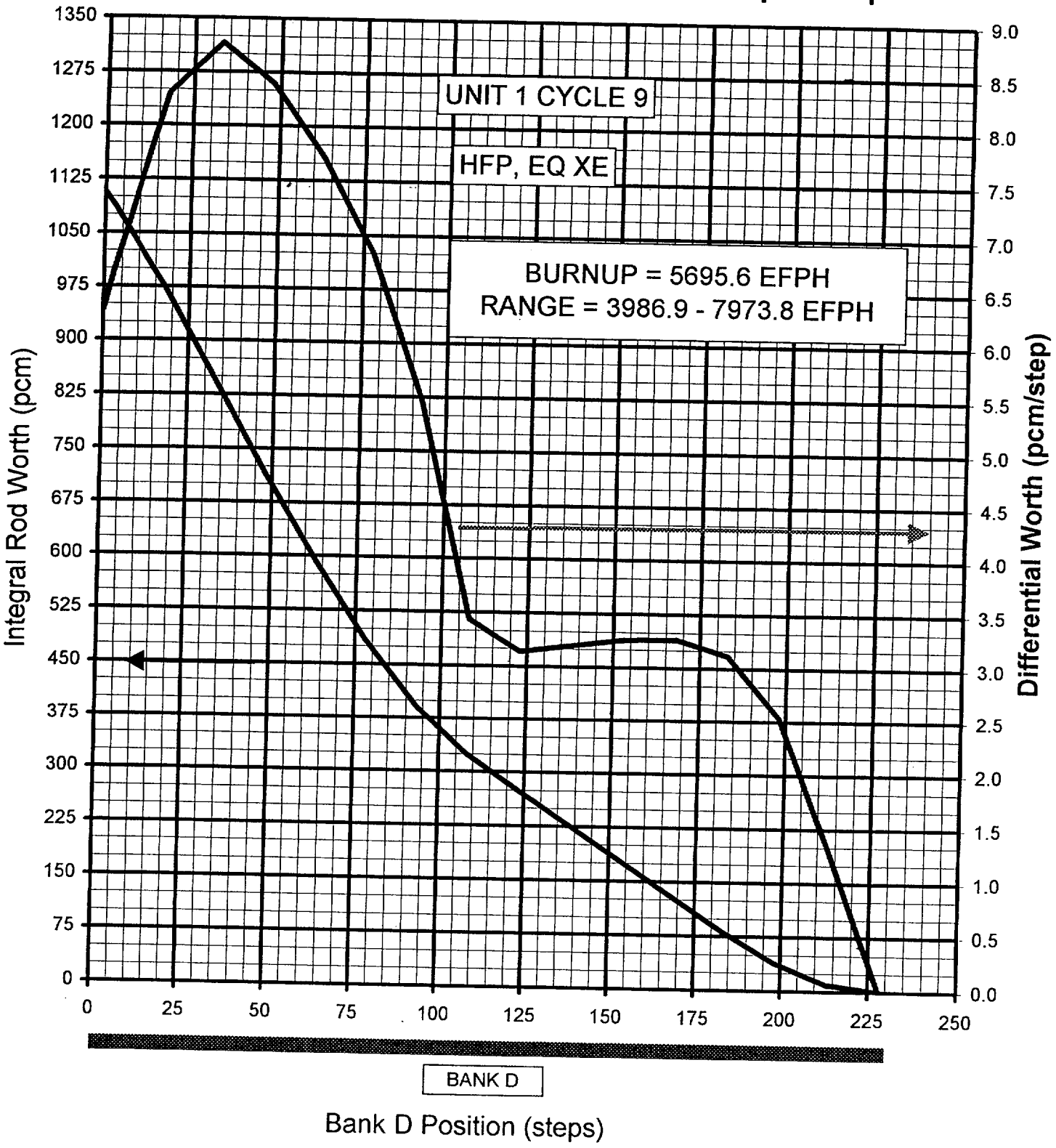
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



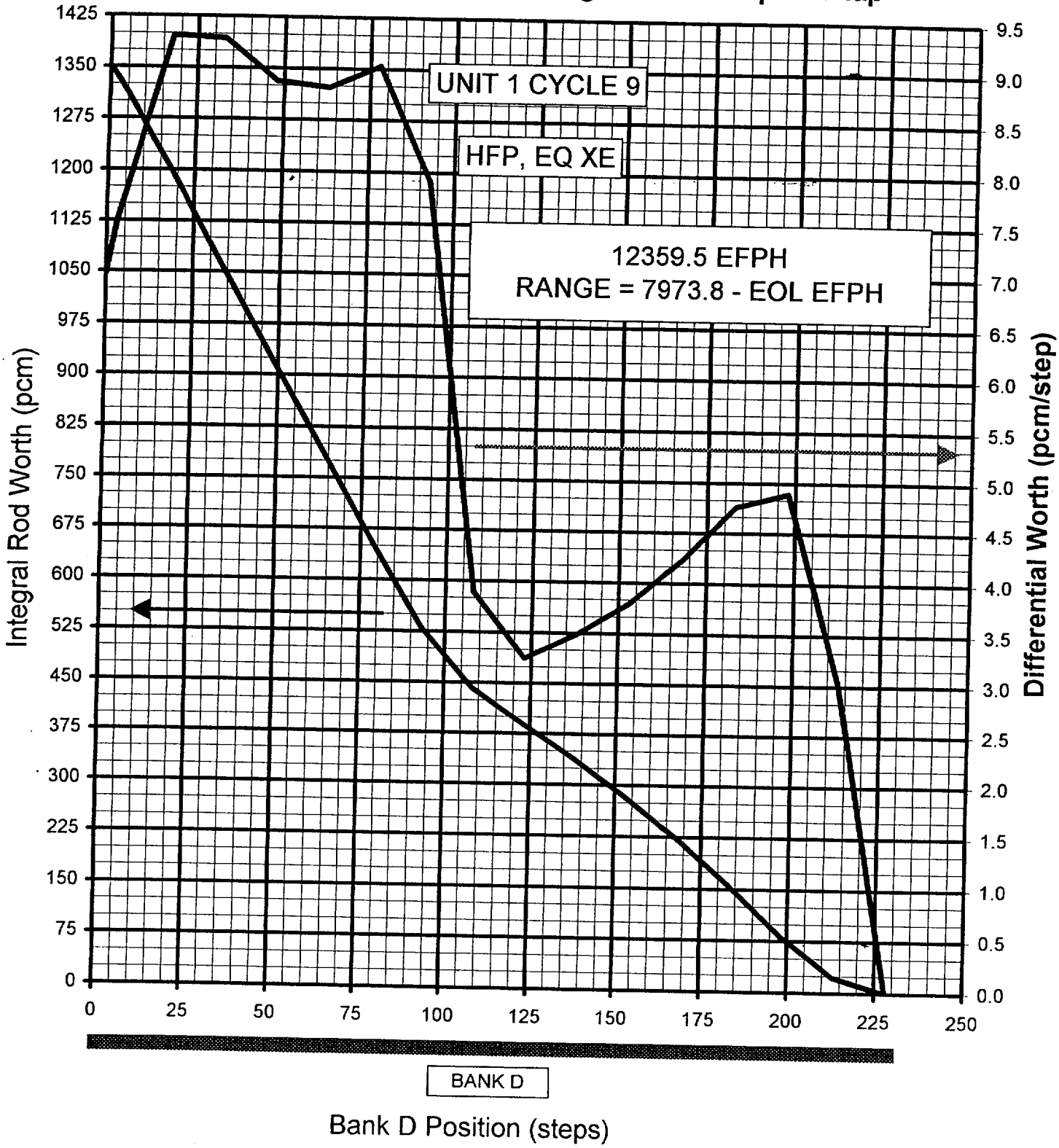
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



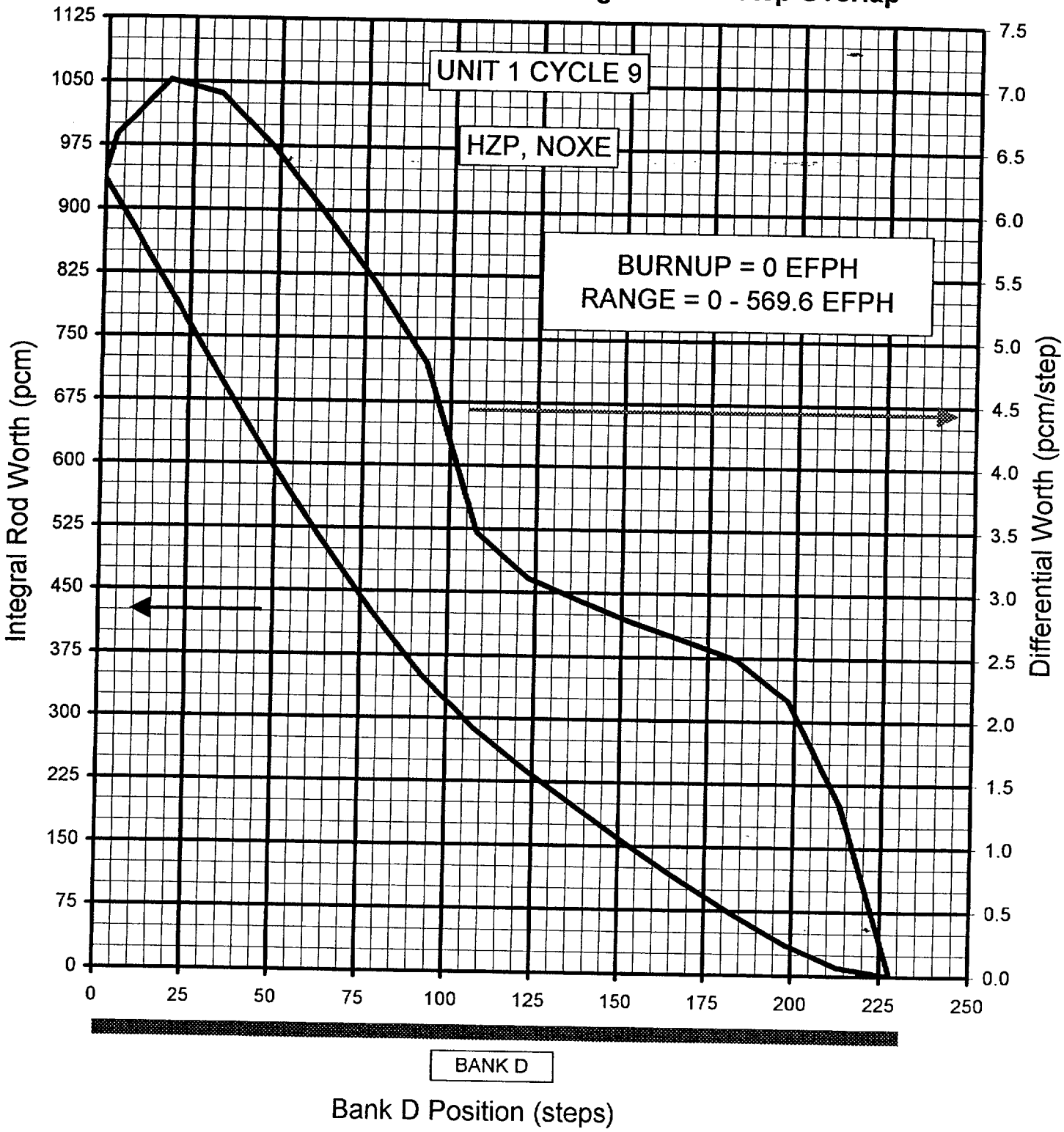
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



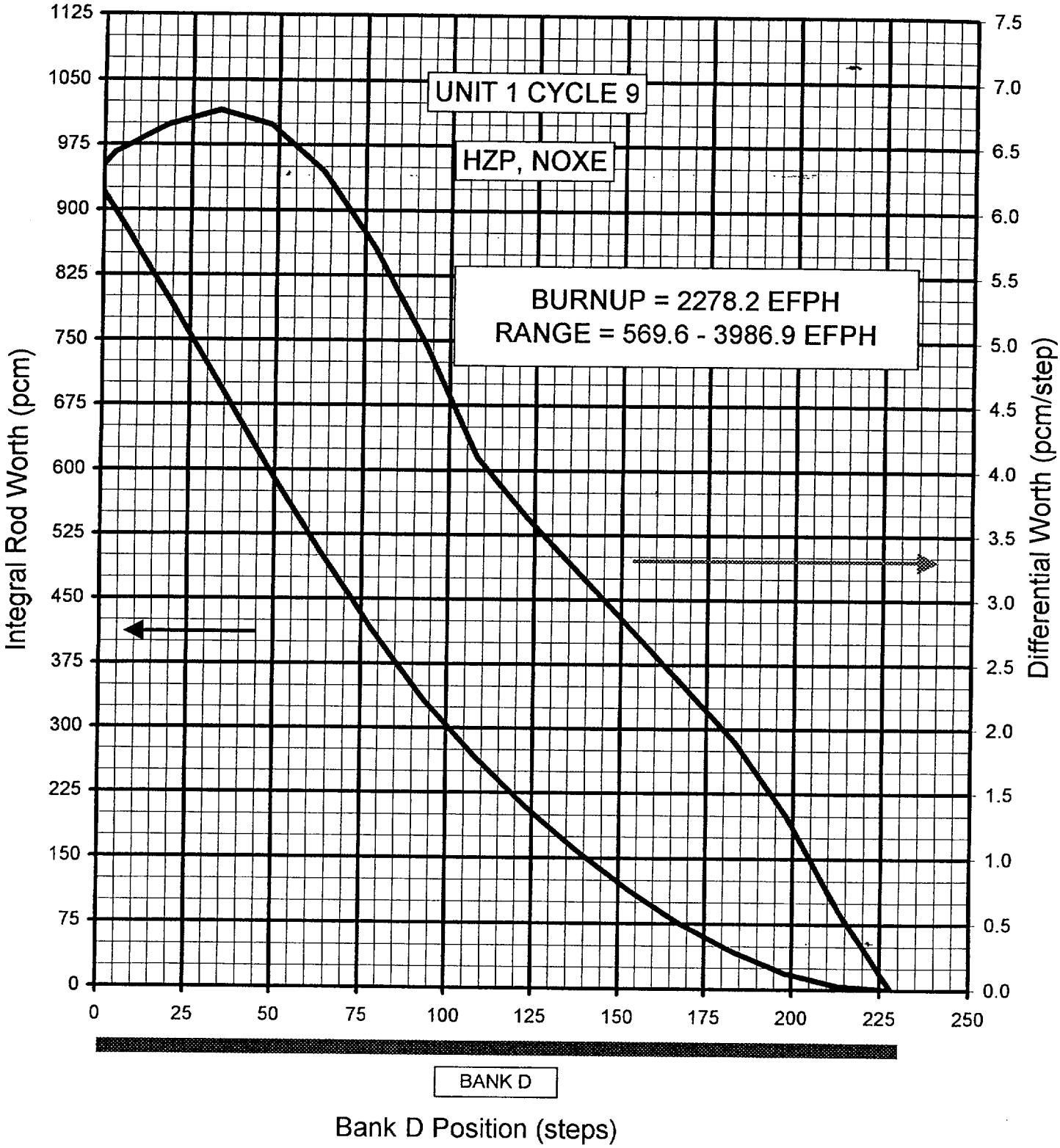
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



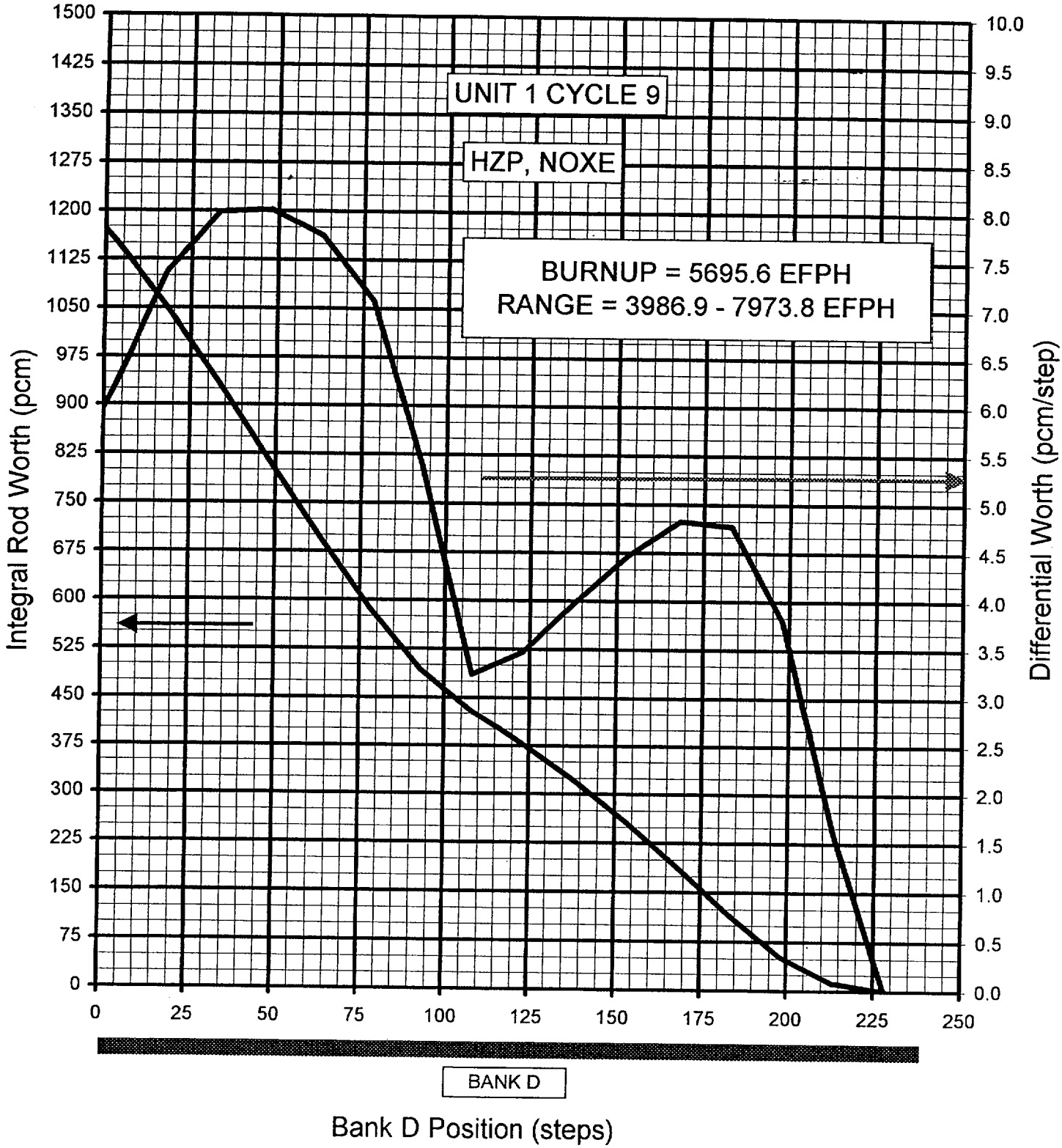
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



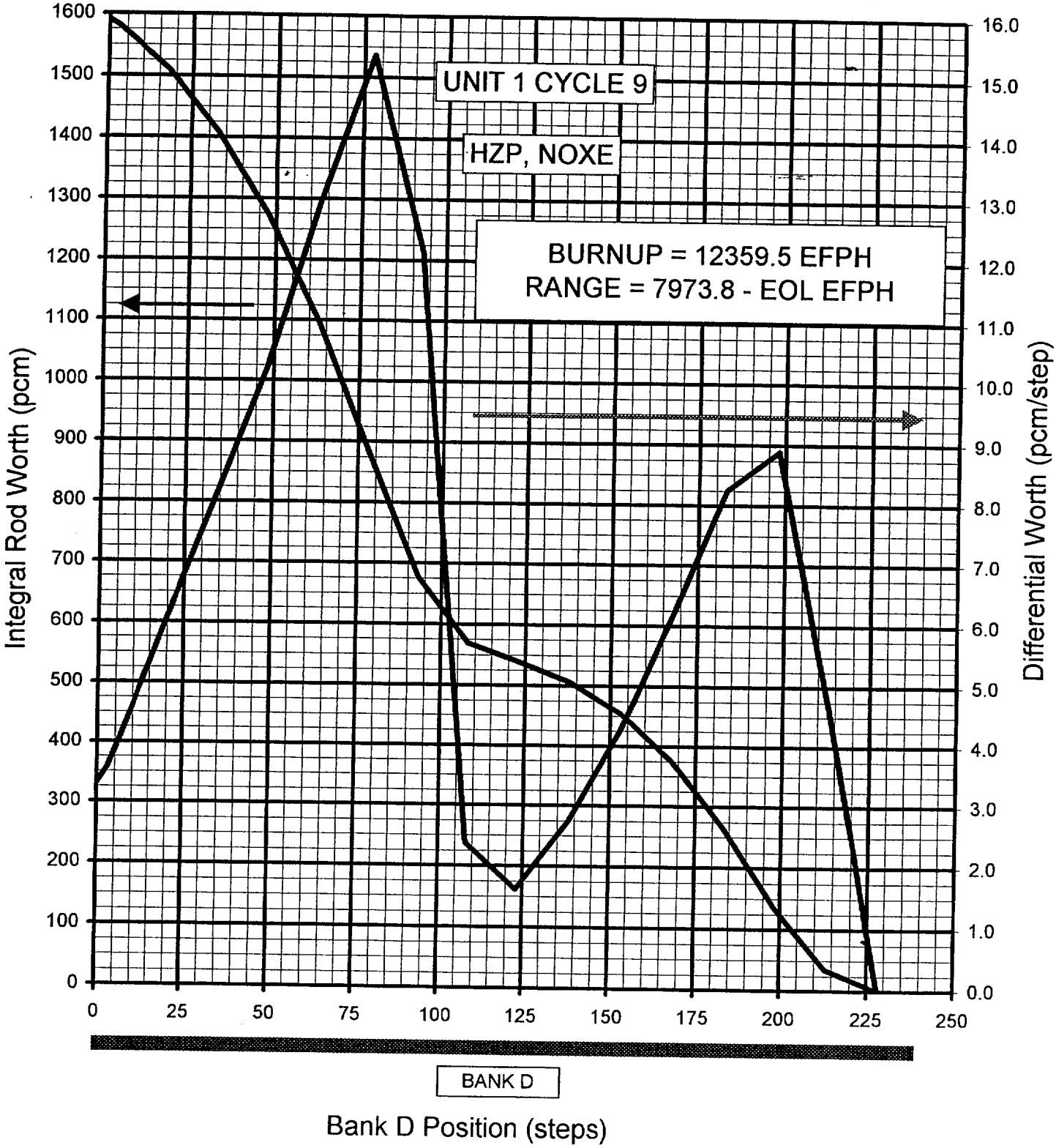
** EXPANDED SCALE **

Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



** EXPANDED SCALE **

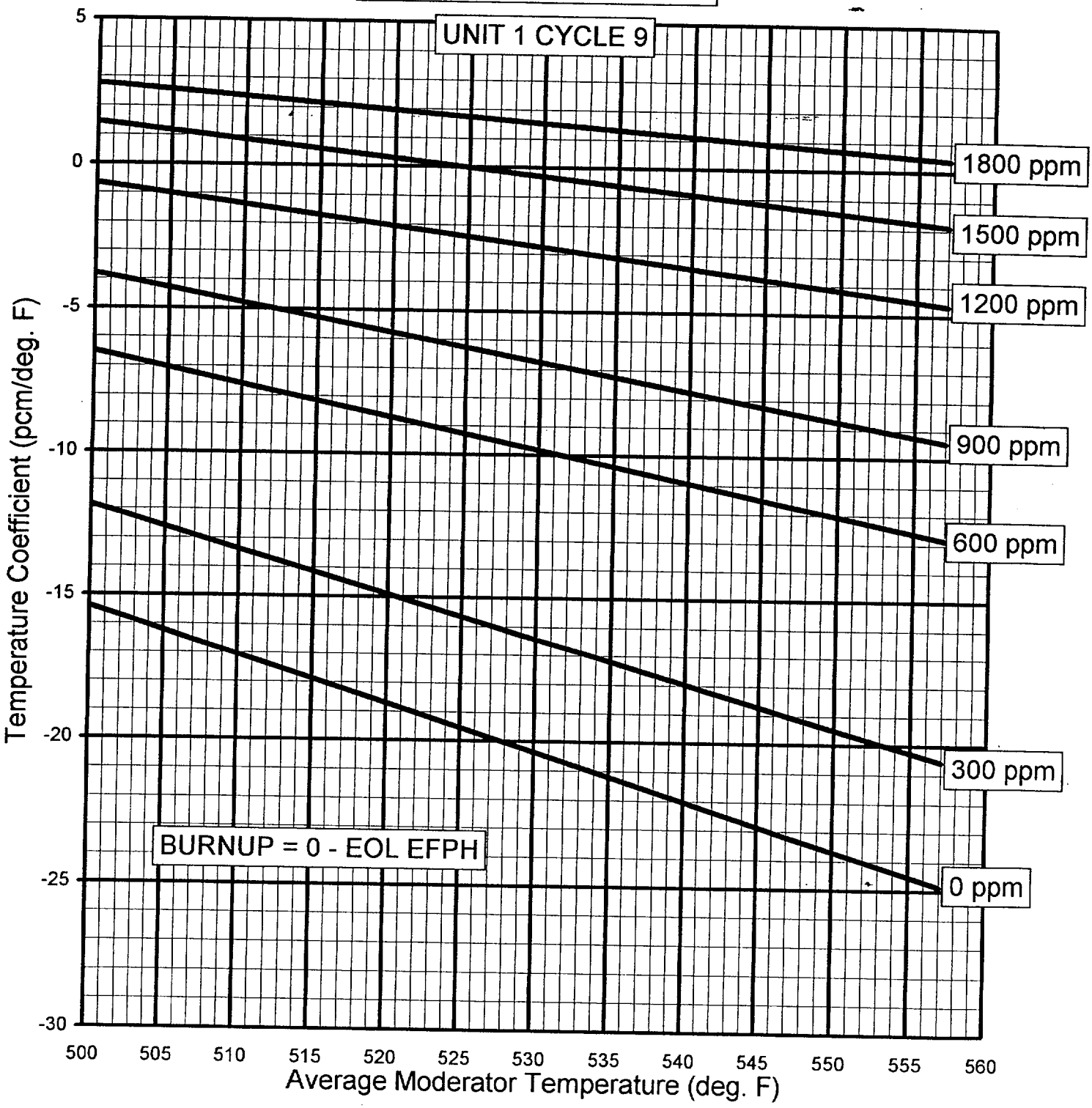
Differential and Integral Rod Worth vs. Steps Withdrawn
Control Banks D and C Moving with 113 Step Overlap



** EXPANDED SCALE **

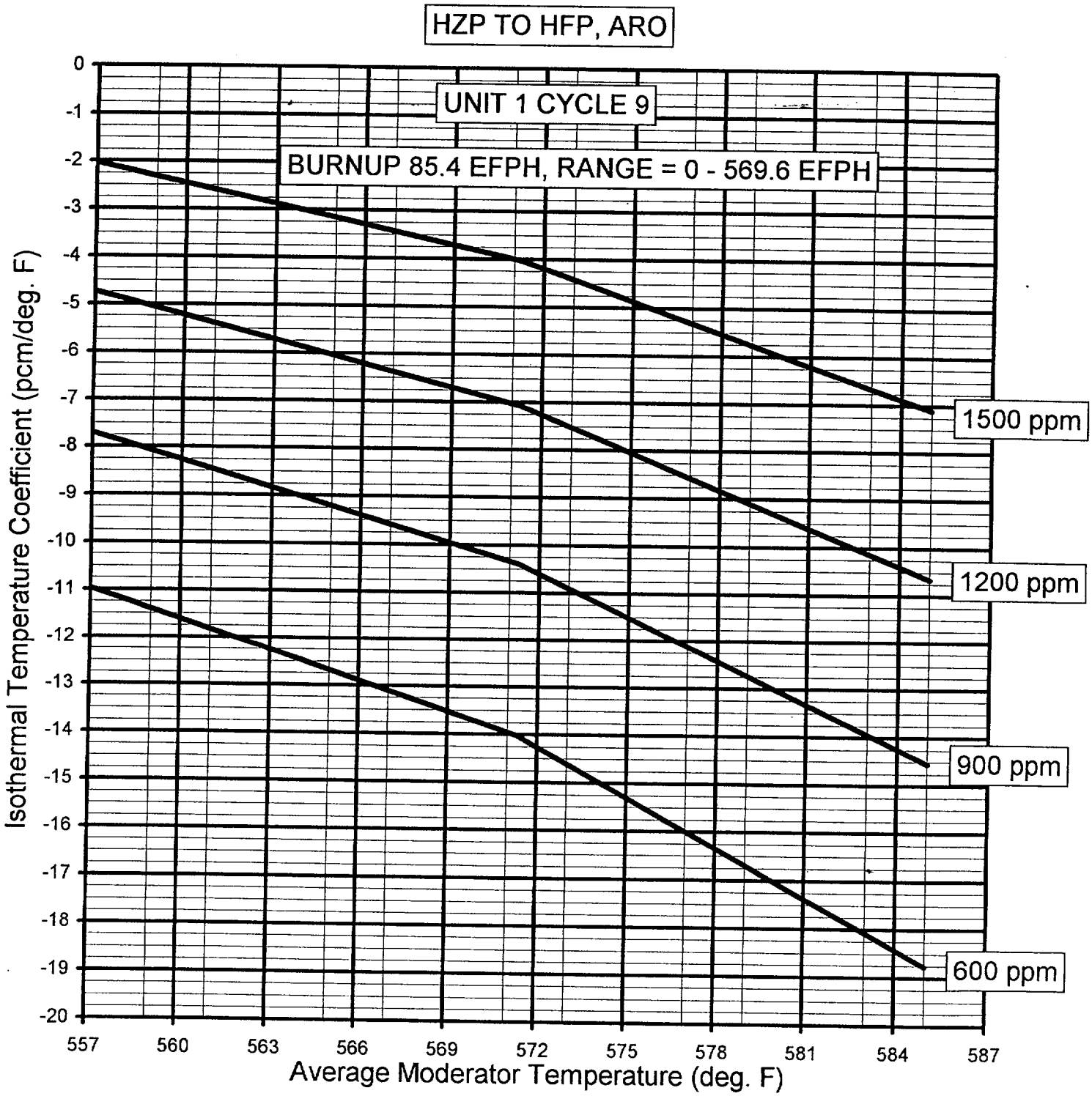
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE

CZP TO HZP, ARO, NO Xe

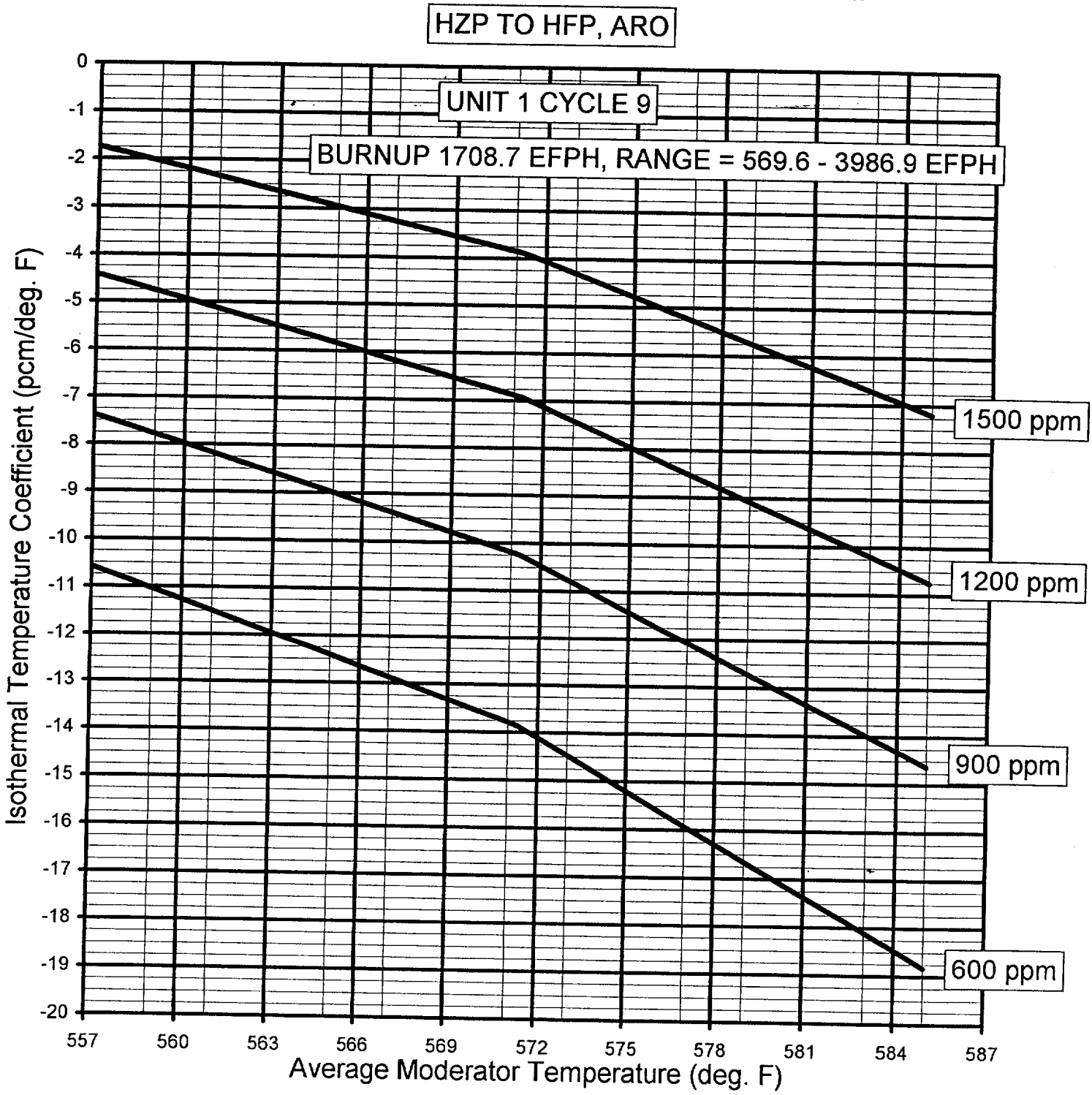


See following pages for Hot Full Power Curves.

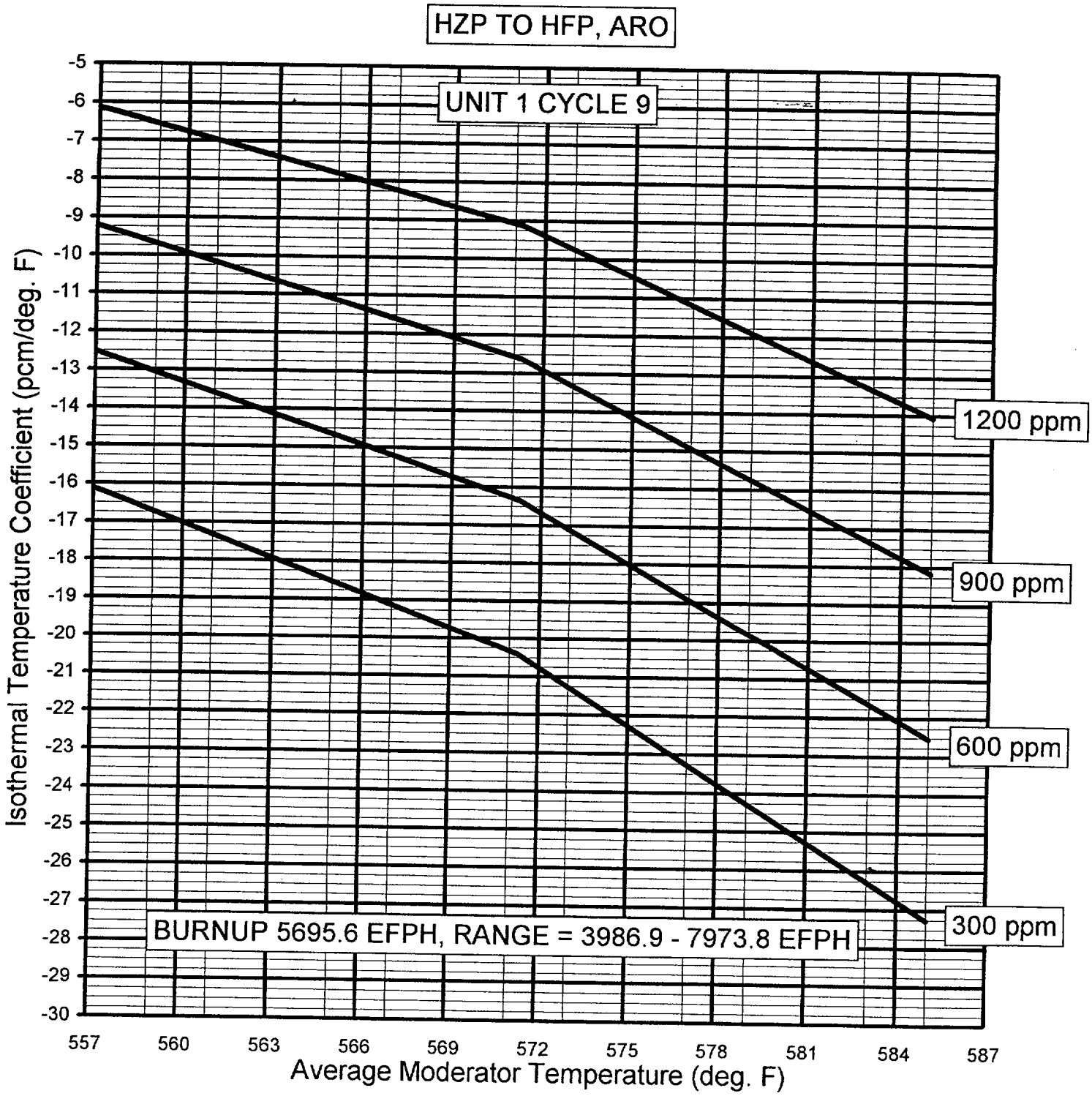
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



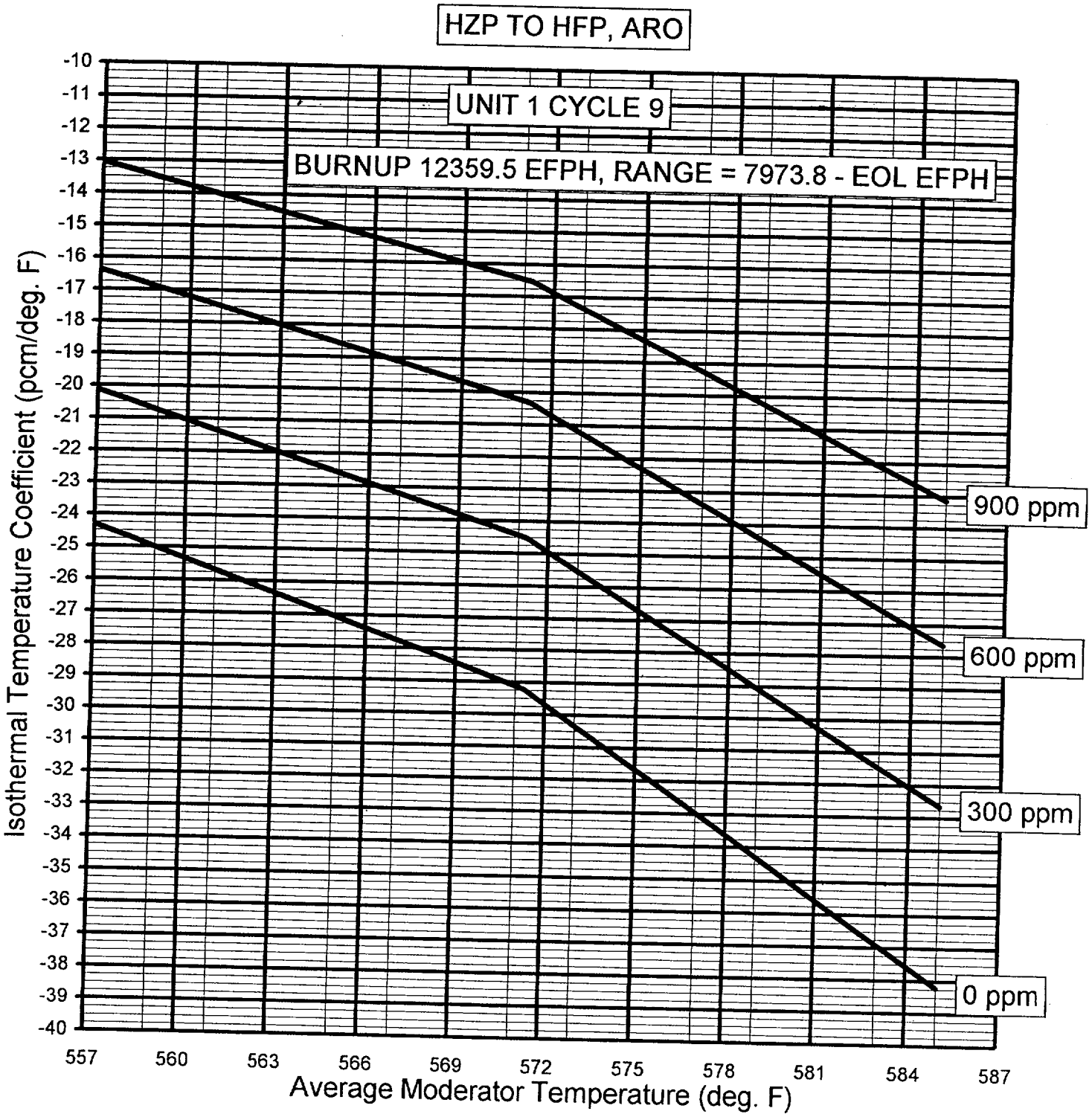
TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



TEMPERATURE COEFFICIENT VS. MODERATOR TEMPERATURE



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	**CHECK IF ANY SG SECONDARY PRESSURE BOUNDARY IS INTACT:**	
	a. Check pressure in all SGs - ANY SG PRESSURE STABLE OR INCREASING	a. IF a controlled cooldown is in progress, THEN GO TO Step 2 (Next Page). IF NOT, THEN the following applies: o IF main steamlines are NOT isolated, THEN you should be in 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION. -OR- o IF main steamlines are isolated, THEN you should be in 1BwCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	**CHECK IF ALL SGs SECONDARY PRESSURE BOUNDARIES ARE INTACT:**	
	a. Check pressure in all SGs: · NO SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER · NO SG COMPLETELY DEPRESSURIZED	a. You should be in 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION. IF NOT, THEN GO TO 1BwEP-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
3	**CHECK IF SG TUBES ARE RUPTURED:** o ANY SG LEVEL INCREASING IN AN UNCONTROLLED MANNER -OR- o ANY ABNORMAL SECONDARY RADIATION	You should be in a 1BwEP-1, or 1BwCA-1 series procedure. IF NOT, THEN GO TO 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
4	**YOU SHOULD BE IN A 1BwEP-3, OR A 1BwCA-3 SERIES PROCEDURE**	GO TO 1BwEP-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

-END-

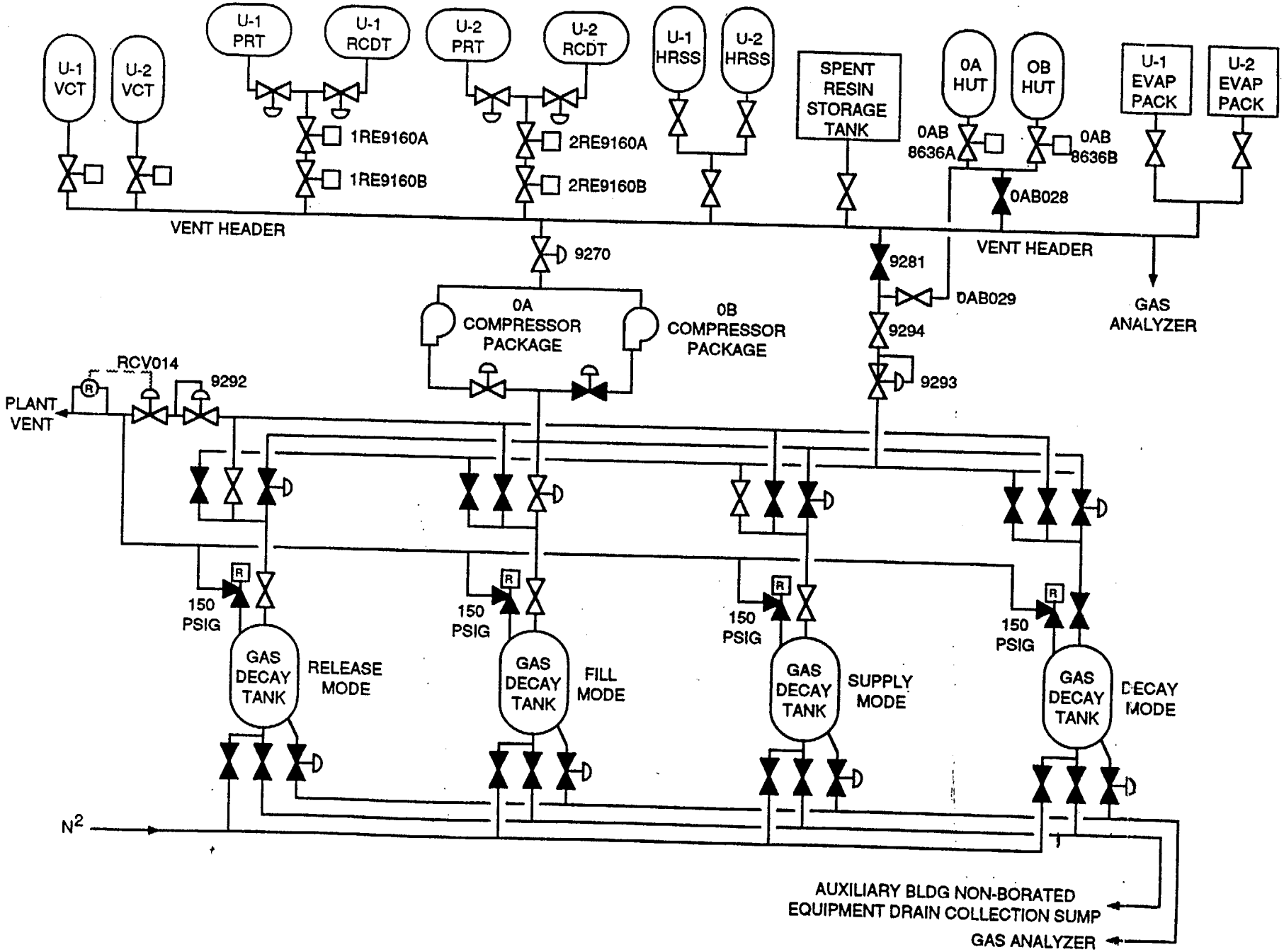


FIGURE 46-1 GASEOUS RADIOACTIVE WASTE SYSTEM (REV. 0)