



**Nebraska Public Power District**

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NLS2005056  
June 22, 2005

Regional Administrator Region IV  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Dr. Suite 400  
Arlington, TX 76011-4005

Subject: Post-Examination Comments  
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The purpose of this correspondence is transmit post-examination comments resulting from the Reactor Operator and Senior Reactor Operator initial licensing examinations which were administered at Cooper Nuclear Station (CNS) the week of June 13, 2005.

Pursuant to NUREG-1021 Revision 9, a post-examination analysis was performed by CNS and one comment on the examination is enclosed for your consideration. Feedback from the applicant is included in the comment.

Should you have any questions or require additional information, please contact Paul Fleming, Licensing Manager, at (402) 825-2774 or David Tune, Operations Training Superintendent, at (402) 825-5012.

Sincerely,

Stewart B. Minahan  
General Manager of Plant Operations

/em

Enclosures

cc: Paul Gage, Chief Examiner, USNRC - Region IV w/ encl  
Joe Waid w/o encl  
Dave Tune w/ encl  
Records w/o encl

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**Question #33**

**Comment:** The question asks for the maximum allowed temperature for the sodium pentaborate solution in accordance with Technical Specification 3.1.7, Standby Liquid Control (SLC). Choice "A" is 110, Choice "B" is 130, choice "C" is 150, and choice "D" is 170. The correct answer identified in the Key was Choice "C".

The question is recommended for a change in the correct answer from choice "C" to choice "B" because 130°F is the maximum temperature that would be permitted given the four choices listed in the question.

Technical Specification 3.1.7 does not contain an upper limit for sodium pentaborate; however the Operating Procedure 2.2.74 does contain a caution concerning the upper limit for sodium pentaborate. That limit is also contained in the USAR and is 140°F to prevent vapor binding or cavitation of the pumps. See attached Procedure 2.2.74 paragraph 2.9 and attached USAR Page III-9-2.

***NRC Resolution:***

<b>CNS OPERATIONS MANUAL</b> <b>SYSTEM OPERATING PROCEDURE 2.2.74</b>  <b>STANDBY LIQUID CONTROL SYSTEM</b>	<b>USE: REFERENCE</b> <span style="float: right;">Ⓢ</span> <b>EFFECTIVE: 9/14/04</b> <b>APPROVAL: ITR-RDM</b> <b>OWNER: OSG SUPV</b> <b>DEPARTMENT: OPS</b>
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<b>REVISION VERIFICATION:</b> (initial use + every 7 days)
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REV.	DATE	CHANGES
36	6/3/04	Revised PPE requirements. Changed SS to SM.
37	see above	Re-arranged steps when sparging.

1. PURPOSE

This procedure provides instructions for Operations personnel to operate the Standby Liquid Control (SLC) System and for the addition of sodium pentaborate to the SLC storage tank.

2. PRECAUTIONS AND LIMITATIONS

- 2.1 Specified SLC storage tank zero level is 14.32" above tank bottom.
- 2.2 Wear protective clothing when handling or processing sodium pentaborate. Sodium pentaborate contains borax and boric acid both of which are toxic when ingested.
- 2.3 Steps shall be taken to minimize boric acid and borax from becoming airborne.

- 2.4 Caution shall be exercised when opening following drain valves as any water from these drains may be radioactive:
- 2.4.1 SLC-21, INJECTION LINE TEST CONNECTION ROOT, and SLC-22, INJECTION LINE TEST CONNECTION SHUTOFF.
  - 2.4.2 SLC-31, INJECTION LINE TEST CONNECTION ROOT, and SLC-32, INJECTION LINE TEST CONNECTION SHUTOFF.
- 2.5 Inadvertent operation of SLC System is very undesirable. Operator shall make a positive action to inject solution into reactor. This shall be done only after proper deliberation and as directed by EOPs.
- 2.6 On activation of SLC System, Operator should ensure RWCU System isolates.
- 2.7 Stuffing box drain valves need to be left open to prevent packing leakage from collecting in stuffing box and leaking into lubricating oil through plunger stub ports.
- 2.8 SLC System shall be injected when required by EOPs.
- 2.9 SLC storage tank temperature above 140°F reduces NPSH below minimum required for SLC pump OPERABILITY making SLC System inoperable.
- 2.10 SLC storage tank solution concentration shall be maintained  $\geq 15\%$  under normal conditions per Procedure 8.3. Failure to maintain  $\geq 15\%$  will invalidate design calculations associated with SLC concentration and require them to be re-calculated. Refer to Steps 2.6.2 through 2.6.6 on Information Sheet.
- 2.11 FME requirements shall be applied per Procedure 0.45 when accessing SLC storage tank.

### 3. REQUIREMENTS

- 3.1 Following support systems are available:
- 3.1.1 Plant Air Systems.
  - 3.1.2 Demineralized Water System.
- 3.2 Ensure both SLC PUMP A and SLC PUMP B keylock switches (Panel 9-5) are in STOP and keys are removed.
- 3.3 Ensure special tools and nitrogen gas charging unit with pressure gauge for charging accumulators are available, as required.

USAR

The SLC system is required to shut down the reactor at a steady rate and keep the reactor from going critical again as it cools.

The SLC system is needed only in the special event that not enough control rods can be inserted in the reactor core to accomplish shutdown and cooldown in the normal manner.

The boron solution tank, the test water tank, the two positive-displacement pumps, the two explosive valves, and associated local valves and controls are mounted in the reactor building outside the primary containment. The liquid is piped into the reactor vessel and discharged near the bottom of the core shroud so it mixes with the cooling water rising through the core (see USAR Sections IV-2, "Reactor Vessel and Appurtenances Mechanical Design," and III-3, "Reactor Vessel Internals Mechanical Design").

The boron absorbs thermal neutrons and thereby terminates the nuclear fission chain reaction in the uranium fuel.

The specified neutron absorber solution is sodium pentaborate decahydrate ( $\text{Na}_2\text{B}_{10}\text{O}_{16} \cdot 10\text{H}_2\text{O}$ ). It is prepared by dissolving stoichiometric (enriched) quantities of borax and boric acid in demineralized water. This is accomplished by placing sodium pentaborate in the SLC storage tank and filling with demineralized water to at least the low level alarm volume. The solution is at design concentration at the low level alarm point and can be diluted with water up to the high level alarm to allow for evaporation losses, or to the overflow level volume to lower the saturation temperature. An air sparger is provided in the tank for mixing. To prevent system plugging, the tank outlets are located on the side of the tank above the bottom.

In MODES 1 and 2, the SLC system shall be able to deliver a sodium pentaborate solution or equivalent into the reactor as specified in the Technical Specifications.

The saturation temperature of the specified solution is 63°F at the low level alarm volume and approximately 51°F at the tank overflow volume (see Technical Specification Figures 3.1.7-1 and 3.1.7-2). A heater system maintains the solution temperature to prevent precipitation of the sodium pentaborate from the solution during storage and to prevent cavitation at temperatures above 140°F. High or low temperature causes an alarm in the control room. The high and low temperature alarms are set at 110° and 85°F, respectively. Tank level is also monitored in the control room. The high and low level alarms are set to indicate a change in solution volume, which might indicate a solution concentration change. Tank level is controlled within the volume and concentration limits specified by the Tech. Specs. Solution Volume vs. Concentration requirements. The tank overflow volume is 4565 gallons.

The equipment containing the solution is installed in a room in which the air temperature is normally maintained within the range of 50° to 100°F. In the event the heater system fails and the room temperature is below the minimum tank temperature of 85°F, the solution concentration in the tank can be reduced by adding water to the tank until an acceptable concentration level is reached (see Technical Specification Figures 3.1.7-1 and 3.1.7-2). By adding water to the storage tank, the solution concentration in the suction line can be reduced to the allowable 11.5% (see Technical Specification Figure 3.1.7-1). This corresponds to an adjusted saturation temperature\* of 62°F (see Technical Specification Figure 3.1.7-2).).

\*The adjusted saturation temperature is equal to the actual saturation temperature plus 10°F.

Examination Outline Cross Reference	Level	RO	SRO
	Tier Number	2	
	Group Number	1	
	K / A Number	211000	2.1.12
	Importance Rating	2.9	

Proposed Question 33:

33. According to Technical Specification 3.1.7, Standby Liquid Control (SLC), the maximum allowed temperature for the sodium pentaborate solution is:

- A. 110
- B. 130
- C. 150
- D. 170

Proposed Answer: (C) According to the referenced techspec, the maximum allowable temperature for sodium pentaborate is 150 degrees.

Technical References: Technical specification 3.1.7, Standby Liquid Control.

Proposed References to be provided to applicants during examination: None

Learning Objective

Question Source: New Question

Question History: Never Used

Question Cognitive Level: Fundamental Knowledge

10 CFR Part 55 Content: 55.41.5

Comments:

(KA) Ability to apply technical specifications for 211000, Standby Liquid Control system.

Answers A, C, and D are all incorrect because the only maximum allowable temperature is 150 degrees.

**ATTACHMENT 2**

**EXAMINATION/QUESTION  
COMMENT FORM**

Initiator: Michael Barton	Exam Date: 6/13/2005
Exam Title: 2005 NRC RO Written Exam	TaskMaster Number: N/A
Notification #	Exam Question Number: 33

**Initiator Comments:**

(Attach additional material as required)

The question asks for the maximum allowed temperature for the sodium pentaborate solution in accordance with Technical Specification 3.1.7, Standby Liquid Control (SLC). Choice "A" is 110, Choice "B" is 130, choice "C" is 150, and choice "D" is 170. Technical Specification 3.1.7 does not contain an upper limit for sodium pentaborate, however the Operating Procedure does contain a caution concerning the upper limit for sodium pentaborate. That limit is also contained in the USAR and is 140°F to prevent vapor binding or cavitation of the pumps.

Initially the question was written, as follows...

Proposed Question 33:

Procedure 2.2.74, Standby Liquid Control (SLC) System, states that when the SLC Storage Tank temperature exceeds \_\_\_\_\_ degrees, both SLC pumps must be declared inoperable.

- A. 120
- B. 140
- C. 160
- D. 180

Proposed Answer: (B) According to the referenced procedure, the maximum allowable temperature for the SLC system to be considered operable is 140 degrees.

This question was good as written and received no licensee comments however this is **not** the same question that was placed on the exam that the students took on 6-13-05. The question that the students saw was as stated in the paragraph above.

Training Program Superintendent Resolution:

I agree "B" is the correct answer, the maximum temperature is 140 degrees.

PER E-MAIL,  6-21-05

Superintendent signature: David Tune

Date: 6-21-05

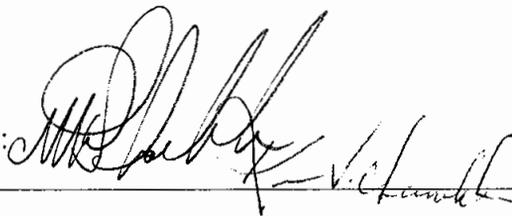
Line Supervisor Resolution:

Based on the current wording of the question, 130 deg F would be allowed, 150deg F would not be allowed.

"B" is the only correct answer.

MARK SCHABLER

Line Supervisor signature:



Date:

6/21/05

6/22/05

Page 3 of 3

Training Manager - Final Resolution:

Based on an allowance of  $140^\circ$ , answer 'B' of  $130^\circ$  should be the correct answer as the current keyed answer of 'C' @  $150^\circ$  is greater than  $140^\circ$ .

Recommend changing correct answer to 'B'

Training Manager signature:



Date: 6/21/05

Original sent to Training Records  
Copy sent to Initiating Student

Initiator Suggested Resolution:

The question is recommended for a change in the correct answer from choice "C" to choice "B" because 130°F is the maximum temperature that would be permitted given the four choices for the question.

Examination developer's Resolution:

Same as Initiator

Examination Developer's Signature: Michael Barton  Date: 06-21-05

Training Program Guardian or Supervisor Resolution:

The question given to the license candidates had no 140°F choice. <sup>ERL 6/21/05</sup> ~~The~~ There is no reference in the CNS technical specification for 140°F. Due to the information in the Station Operating procedure and the USAR, 130°F is a correct answer.

I recommend changing in the correct answer from choice "C" to choice "B" because 130°F is the maximum temperature that would be permitted given the four choices for the question.

Jeffrey W. Boyd

Supervisor or Guardian signature:  Date: 6/21/05

