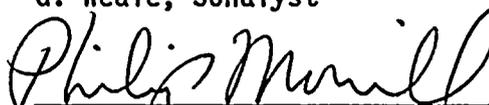


ENCLOSURE 1

Examination Report No.: 50-528/OL-92-02  
Facility: Palo Verde Nuclear Generating Station,  
Units 1, 2, and 3 (PVNGS)  
Facility Docket Nos.: 50-528, 50-529, and 50-530  
Facility License Nos.: NPF-41, NPF-51, and NPF-74  
Examinations administered at PVNGS, Wintersburg, Arizona.

Examiners: J. Russell, Chief Examiner, RV  
G. Weale, Sonalyst

Approved:

  
Philip Morrill, Chief  
Operations Section

11/2/92  
Date Signed

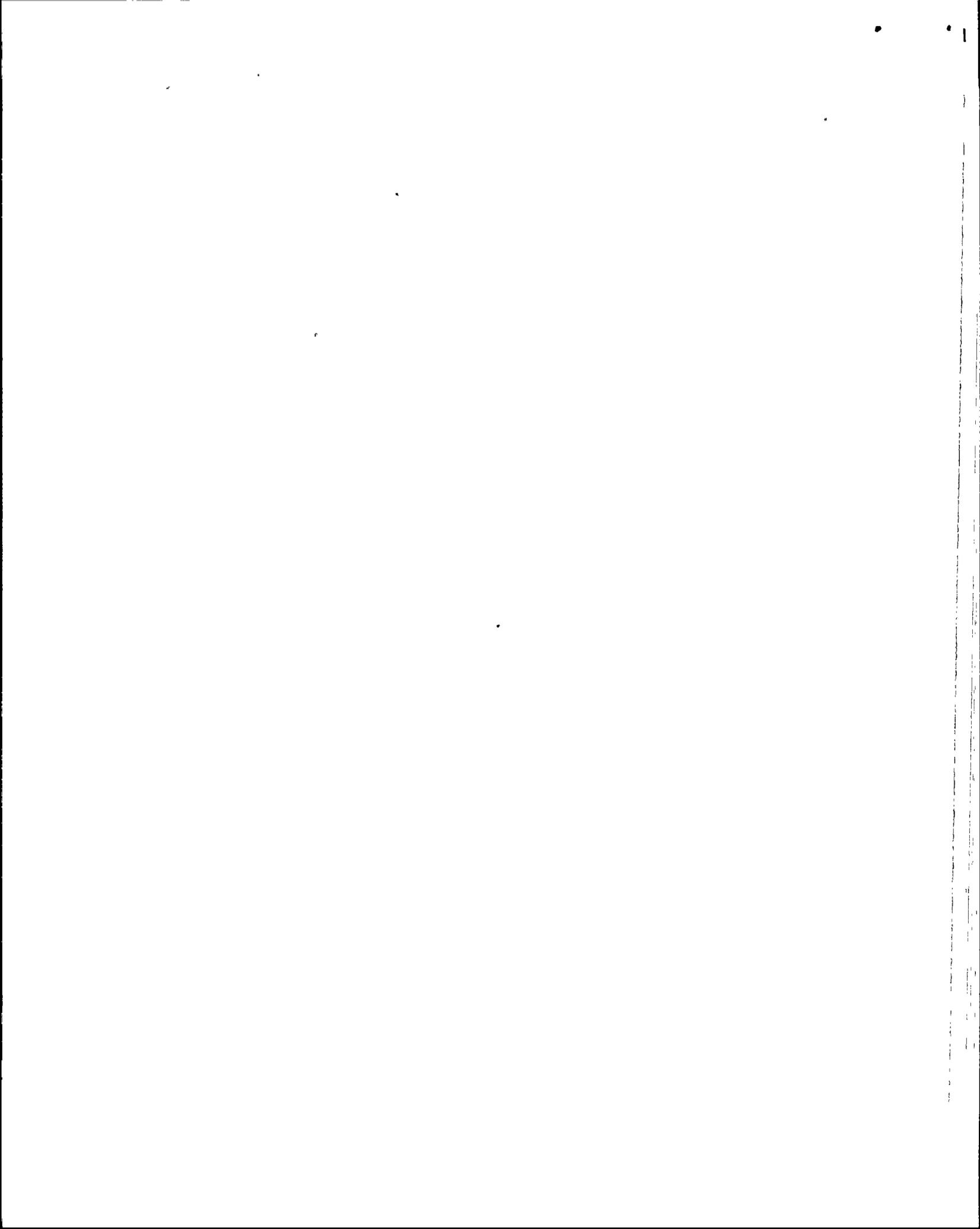
Summary:

Examinations on September 14-16, 1992

Written examinations and operating tests were administered to six Senior Reactor Operator limited to fuel handling (LSRO) candidates. One candidate failed the written examination and another candidate failed the operating test. Four candidates passed the overall examination.

Weaknesses Observed:

- On Tuesday, September 15, 1992, two licensee personnel entered a hot particle control area posted in the Unit III spent fuel pool area while not in compliance with the applicable radiation exposure permit (REP). Further details of this may be found in section 4.b of this report and in Inspection Report 50-528/529/530/92-30.
- The examiners determined that limits on the operational authority of the LSRO were not adequately described in the applicable procedure. "Mode 6 Operations," 41OP-1ZZ12, did not contain limits on the authority an LSRO could exercise during outage operations. See sections 2 and 4.a of this report.
- The examiners identified one generic training weakness. None of the candidates knew the proper action to be taken if the refueling area radiation monitor alarmed while a fuel assembly was suspended from the refueling machine. Further details of this may be found in section 3 of this report.



## REPORT DETAILS

### 1. Persons Contacted

#### NRC:

- \*J. Russell, NRC Chief Examiner
- \*G. Weale, NRC Contract Examiner

#### Arizona Public Service Company:

- \*J. Levine, Vice President, Nuclear Production
- \*W. Chapin, Manager, Refueling Services
- \*P. Coffin, Compliance Engineer
- \*R. Roehler, Compliance Supervisor
- \*L. Clyde, Unit III Operations Manager
- \*J. Dennis, Manager, Operations Standards
- \*D. Best, Supervisor, Operations Training
- \*E. Firth, General Manager, Nuclear Training
- \*R. Nunez, Manager, Operations Training
- \*C. McClain, Manager, Technical Training

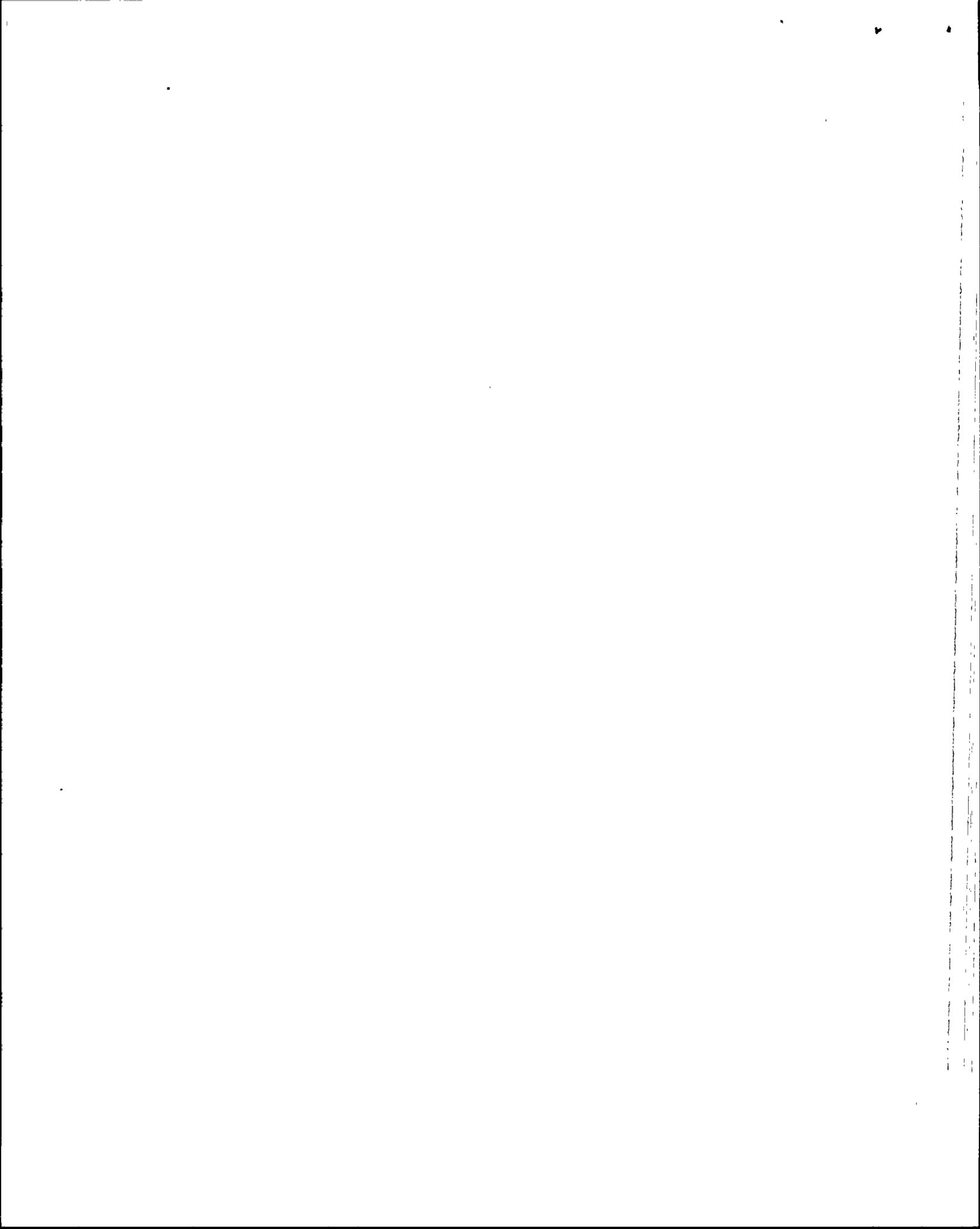
The examiners also interviewed and talked with other licensee employees during the course of the examination. These included shift supervisors, reactor and auxiliary operators, maintenance personnel, plant technicians and engineers, and quality assurance personnel.

\*Denotes those attending the exit interview.

### 2. Pre-examination Facility Meeting

A meeting was held between the chief examiner and members of the licensee staff on August 20, 1992, prior to this examination, at the Region V offices. The senior facility representative was Mr. Ed Firth, General Manager, Nuclear Training. Along with other issues, the duties and responsibilities of the Senior Operators limited to fuel handling (LSROs) and Commission approval of the LSRO program were discussed. Region V had not previously licensed LSROs at Palo Verde Nuclear Generating Station (PVNGS).

The chief examiner noted that the facility had performed a job task analysis (JTA) for LSROs and that their duties and responsibilities were outlined in section 1.0 of 410P-1ZZ12, "Mode 6 Operations." The chief examiner observed that the licensees' procedures did not describe the LSROs relationship to the Shift Supervisor. Consequently, the LSRO could assume more authority than intended by the LSRO license. As the examination was based on those abilities as delineated in the facility job task analysis (JTA) and the "Examiner Standards," the chief examiner concluded that specific operational limits that reflected the scope of



the examination should have been proceduralized. Further details of this are section 4.a of this report.

During this meeting, licensee representatives agreed to develop and incorporate limits on the authority of the LSRO into procedures.

The chief examiner also noted that PVNGS was seeking program approval of its LSRO program. This requirement for a Commission approved program was stated in 10 CFR 55.59(a)(1). The approval was later requested via letter from Arizona Public Service Company (APS) to the Office of Nuclear Reactor Regulation (NRR) dated September 8, 1992. The NRC determined that it was acceptable to proceed with the examination while program approval was being sought. The intent was not to issue licenses until the program had been approved. Commission approval for the LSRO program was subsequently obtained and this was documented in a letter from NRR to APS dated September 28, 1992.

PVNGS requested a waiver of the eligibility requirements for two applicants. The requirement was active participation in a refueling outage at PVNGS before the examination. The waiver was granted and allowed the applicants to take the examination. However, if the applicants passed they would not be given LSRO licenses until PVNGS certified that they had completed active participation in a refueling outage.

The licensee acknowledged the terms of the examination administration.

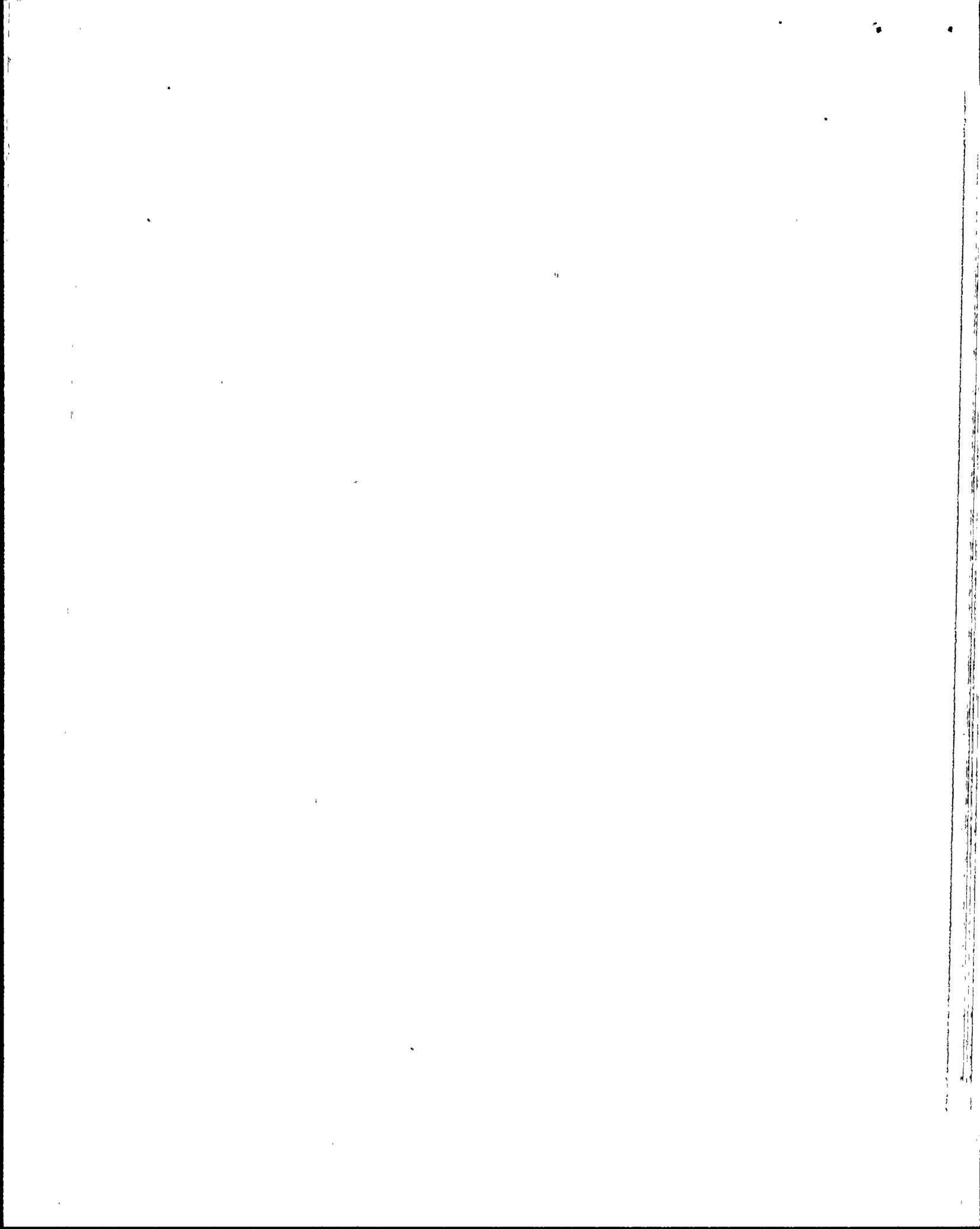
### 3. Written Examination

The examiners administered the written examination on Monday, September 14, 1992. The examination had 60 multiple choice questions each worth one point. The written examination was in accordance with Revision 6 of NUREG/ BR-0122, "Examiner Standards." The facility reviewed the examination in the Region V offices prior to administration.

The facility staff had no comments on the examination after it was administered. NRC examiner review of the examination grading did not result in any changes to the examination or the answer key.

One PVNGS employee failed the written examination and the remaining five candidates passed the written examination. The examiners noted that the average score was 81.4 %. Passing criteria for the examination was 80.0 %. A review of examination results identified the following five weaknesses:

- Three out of six candidates could not determine the required action when given a question concerning Technical Specification 3.1.2.6. A copy of this Technical Specification and required plant data was provided. The question should have prompted them to determine if the spent fuel pool was operable as a source of borated water for the reactor.



- During a scenario given in a question, shutdown cooling was to be used to augment fuel pool cooling. Three out of six candidates did not know the preferred pump to be used and why it was the preferred pump.
- Three out of six candidates could not identify symptoms of a loss of shutdown cooling as seen in the refueling pool.
- Four out of six candidates could not determine allowable 10 CFR Part 20 dose limits when given all required information.
- None of the candidates knew the proper action to be taken if the refueling machine area radiation monitor alarmed while a spent fuel assembly was suspended from the refueling machine. The correct action was to place the fuel assembly in a safe configuration.

Regarding the last weakness, the candidates all answered that they would immediately evacuate the area, even though placing the fuel assembly in a safe configuration (the correct answer) was one of the distractors. This answer was confirmed in PVNGS procedures 72IC-1RX03, "Core Reloading," and 41AO-1ZZ26, "Irradiated Fuel Damage." This answer was also confirmed as a management expectation, by the licensee, during the pre-examination review. The fact that all of the candidates would have evacuated, and left the fuel assembly hanging from the grapple, was considered a generic training weakness.

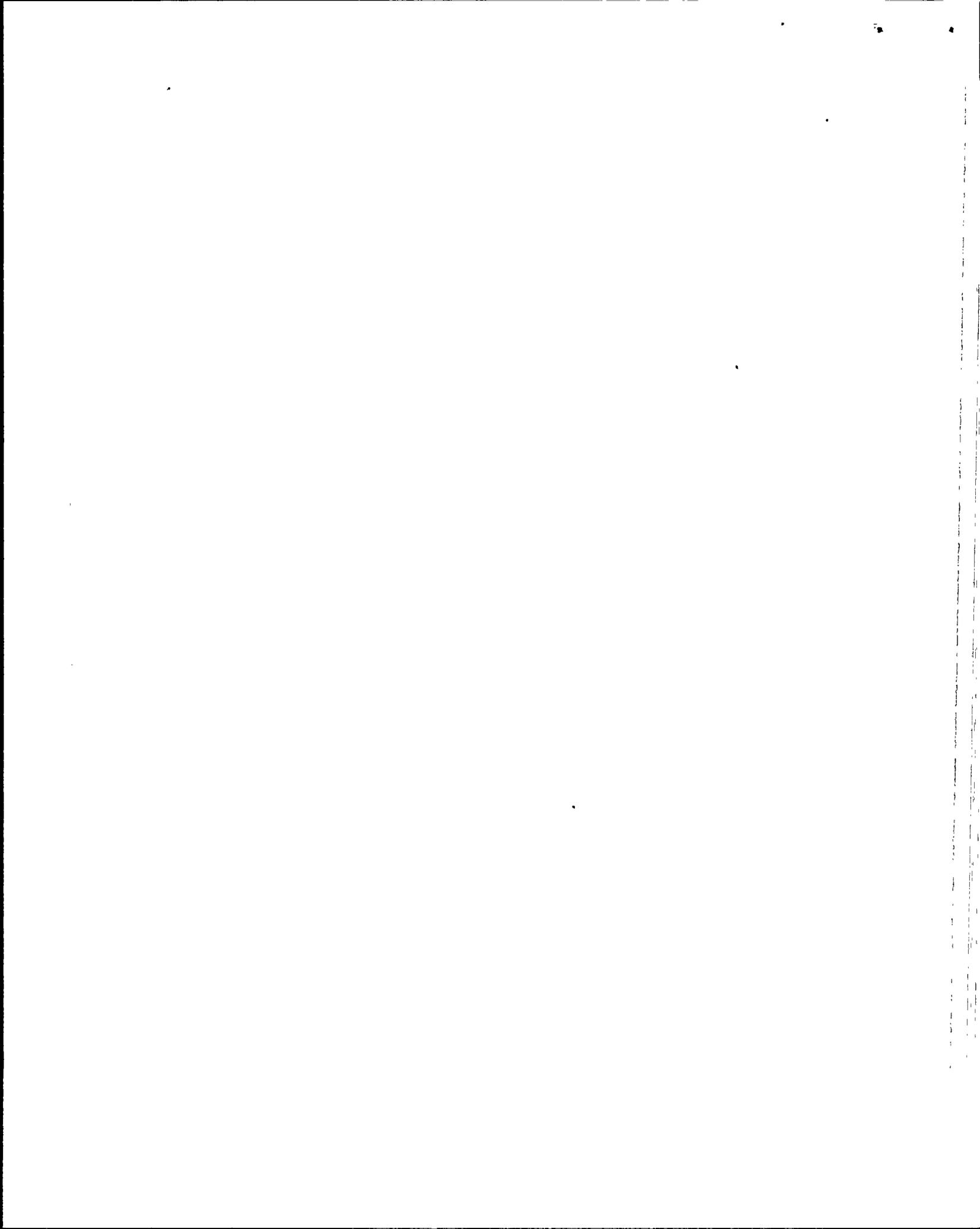
The facility acknowledged the generic training weakness identified above during a telephone conversation held with licensee staff after the exit interview.

#### 4. Operating Examination

##### a. Test Administration and Observed Deficiencies

Operating examinations were administered to the six LSRO candidates on September 15 through 16, 1992. One of the candidates failed this portion of the examination. Five of the candidates passed this portion of the examination.

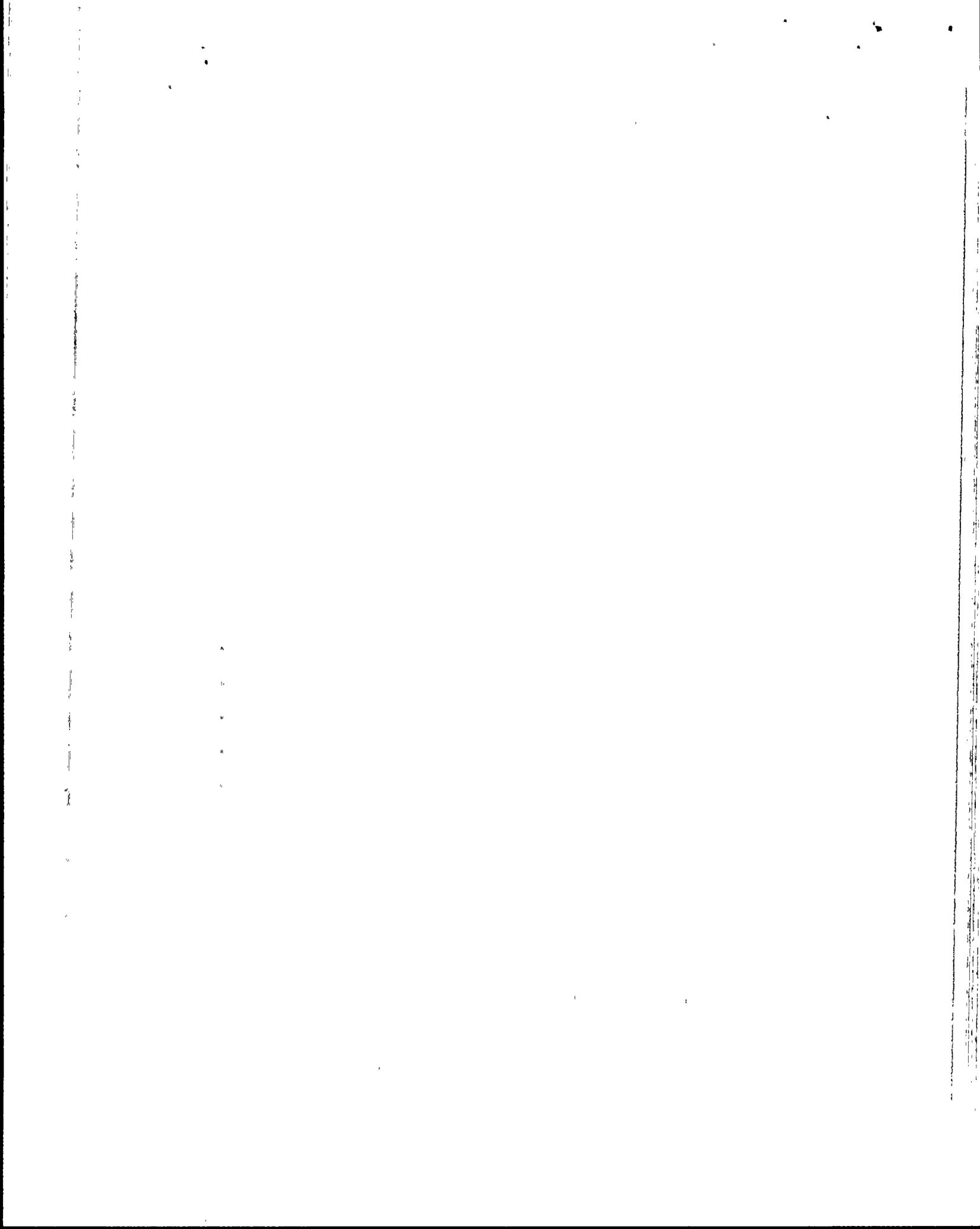
The operating examinations were developed and administered using Revision 6 of the "Examiner Standards." Each candidate was administered two scenarios. These scenarios incorporated six job performance measures (JPMs). Each candidate operated the Unit 3 spent fuel handling machine (SFHM) to move a dummy fuel assembly and simulate events. Each candidate also operated an interactive refueling machine (RFM) that was staged adjacent to the Unit 3 spent fuel pool (SFP). The facility provided a certified operator for the SFHM, a certified operator for the RFM, continuous radiological protection (RP) coverage, and continuous quality control (QC) coverage. RP was required as the examination was performed partially in a hot particle control area. QC was



required because the area of the SFHM was a cleanliness control area (zone III) during the examination administration. These additional personnel were required by the facility procedures.

The examiners noted the following deficiencies during the performance of the operating tests:

- During the performance of 780P-9FX03, Appendix G, "SFHM Shiftly Check," two small pieces of electrical tape were found loose on the SFHM bridge. Also, the cover for the hoist motor was found to be missing one of the captive bolts. The examiners concluded the loose tape should not have been present. This shiftly check should have been performed by the facility SFHM operator prior to the beginning of the operating tests and he should have discovered the tape. This was also a cleanliness zone where foreign material should not have been present. The examiners also concluded the missing bolt should have been replaced or documented by the facility as an equipment deficiency.
- The examiners observed that two out of the six candidates, while they had safety belts on, did not secure them to the SFHM during operation of this machine. This is contrary to facility safety procedures.
- During one scenario a candidate acting as LSRO was operating the RFM staged adjacent to the SFP. The candidate was simulating lowering a new fuel assembly into the core. The RFM lost power while the assembly was suspended from the hoist. The candidate was informed it would take four hours to regain power. The candidate said he would station an operator at the RFM and leave the fuel assembly hanging until power was restored. The candidate said he did not want to manually lower the assembly because it was labor intensive and no automatic interlocks would be present for the hoist to cease movement. The examiner, acting as shift supervisor, assured the candidate that he understood his concerns and ordered him to manually lower the fuel assembly. The candidate refused. The examiner concluded that lowering the fuel assembly manually, in this situation, was the intent of facility procedure and the prudent and safe action to take. 721C-3RX03, "Core Reloading," stated that an assembly should NOT be left suspended from the hoist during an interruption of movement except to transport it to a safe storage location. The examiners concluded that an assembly left hanging was vulnerable to damage. The examiners concluded that this candidate did not understand the limits on his authority as an LSRO. Specifically, when ordered by the Shift Supervisor and when this order was the procedurally correct action, the candidate should have complied with the order.



The facility acknowledged the above comments during the Exit interview and a subsequent telephone conversation with the chief examiner on October 2, 1992.

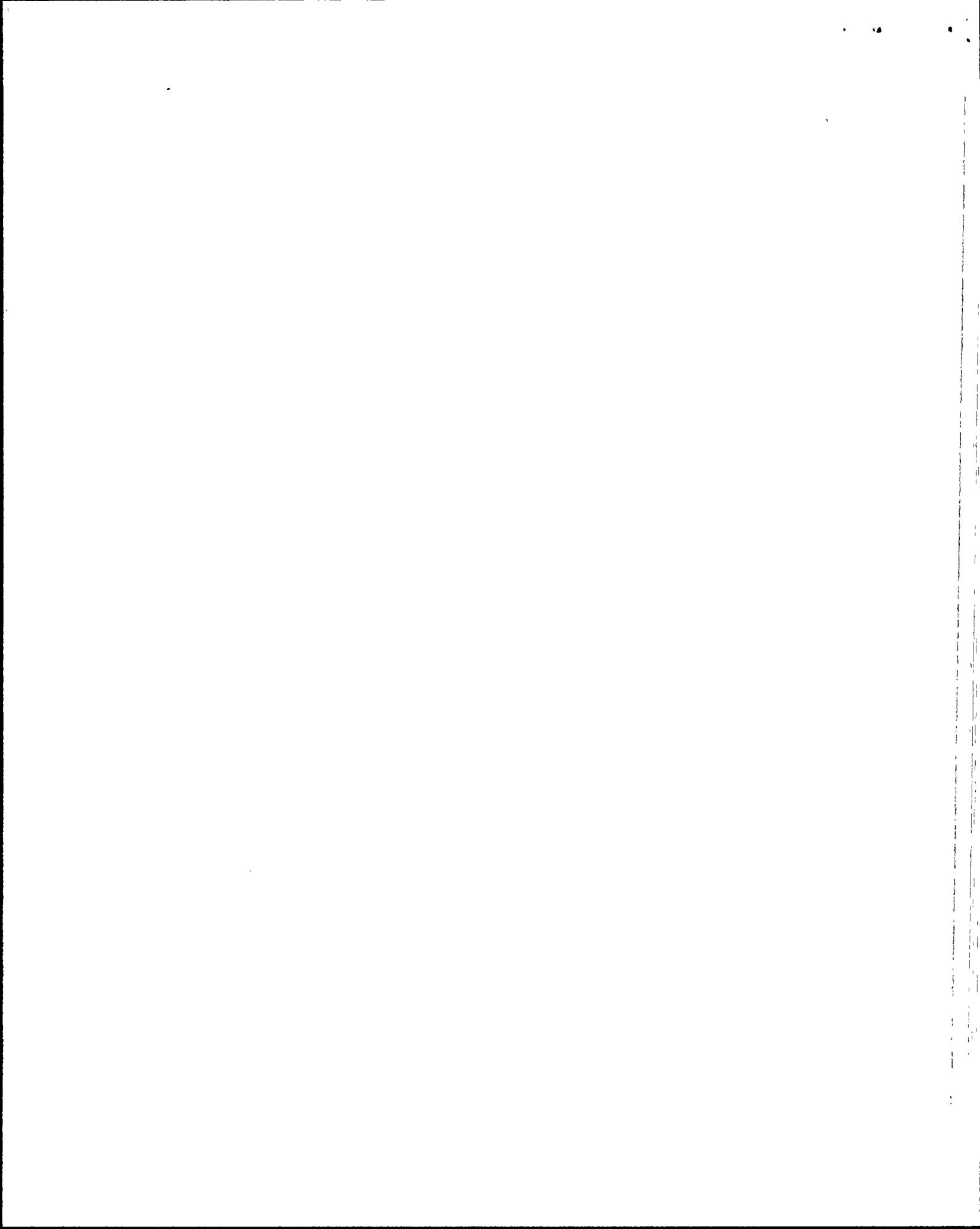
b. Radiological Controls

The examiners conducted the operating test in the spent fuel pool area, the auxiliary building, and the control room of Unit III. The candidates and the SFHM operator assigned to monitor machine operations all entered the Unit III SFP area under radiological exposure permit (REP) 229.

The examiners noted this REP specified plastic booties be worn. The examiners concluded these plastic booties were specified due to the possibility of the individual operating the spent fuel handling machine getting his feet wet from potentially contaminated water. The operating area for the SFHM was posted as a hot particle control area. The operator stood approximately one foot from the shaft of the SFHM and was required to touch this shaft in order to operate the machine. The REP also called for double gloves. The shaft was wet with potentially contaminated water from the SFP. On the morning of September 15, 1992, the examiners observed that the candidate operating the SFHM, and the PVNGS operator assigned to monitor this operation, wore cotton booties vice plastic booties. Other PVNGS employees operating the SFHM that day wore plastic booties. The examiners also observed that radiological protection and quality control were providing continuous coverage throughout.

On the morning of Wednesday, September 16, 1992, the examiners observed the PVNGS operator assigned to monitor SFHM operation again entered the SFP area in cotton booties. At this point the examiners questioned the RP technician providing coverage as to whether the REP was being complied with. The RP technician then obtained supervisory approval and changed REP 229 to specify plastic or cloth booties. Entering the hot particle area and operating the SFHM, while in cotton booties, on Tuesday, September 15, 1992, was not in compliance with the REP.

The examiners were shown Company Correspondence from W. E. Sneed to all Unit III personnel, dated April 24, 1991, stating: "For purposes of REPs, if plastic booties are specified in the clothing requirements of the REP, wear cloth booties unless a plastic suit/bottom is to be worn for wet conditions." Based on discussions with the candidates, the examiners determined that the majority of the candidates were unaware of the memo and complied with REP 229. The examiners concluded that PVNGS had two established methods to change a REP. One would have been to revise the REP and the other would have been to cancel the REP and issue a new REP. The



examiners concluded that this memo was not a satisfactory method to change the requirements on a REP.

These items were referred to an NRC inspector, specializing in radiological controls, on site during the week of the examination for further follow up and resolution. The inspector was conducting a separate inspection at the time. Refer to Inspection Report 50-528/529/530/92-30 for further discussion of these issues.

The facility acknowledged the items described above during the exit interview.

#### 5. Reference Material Deficiencies

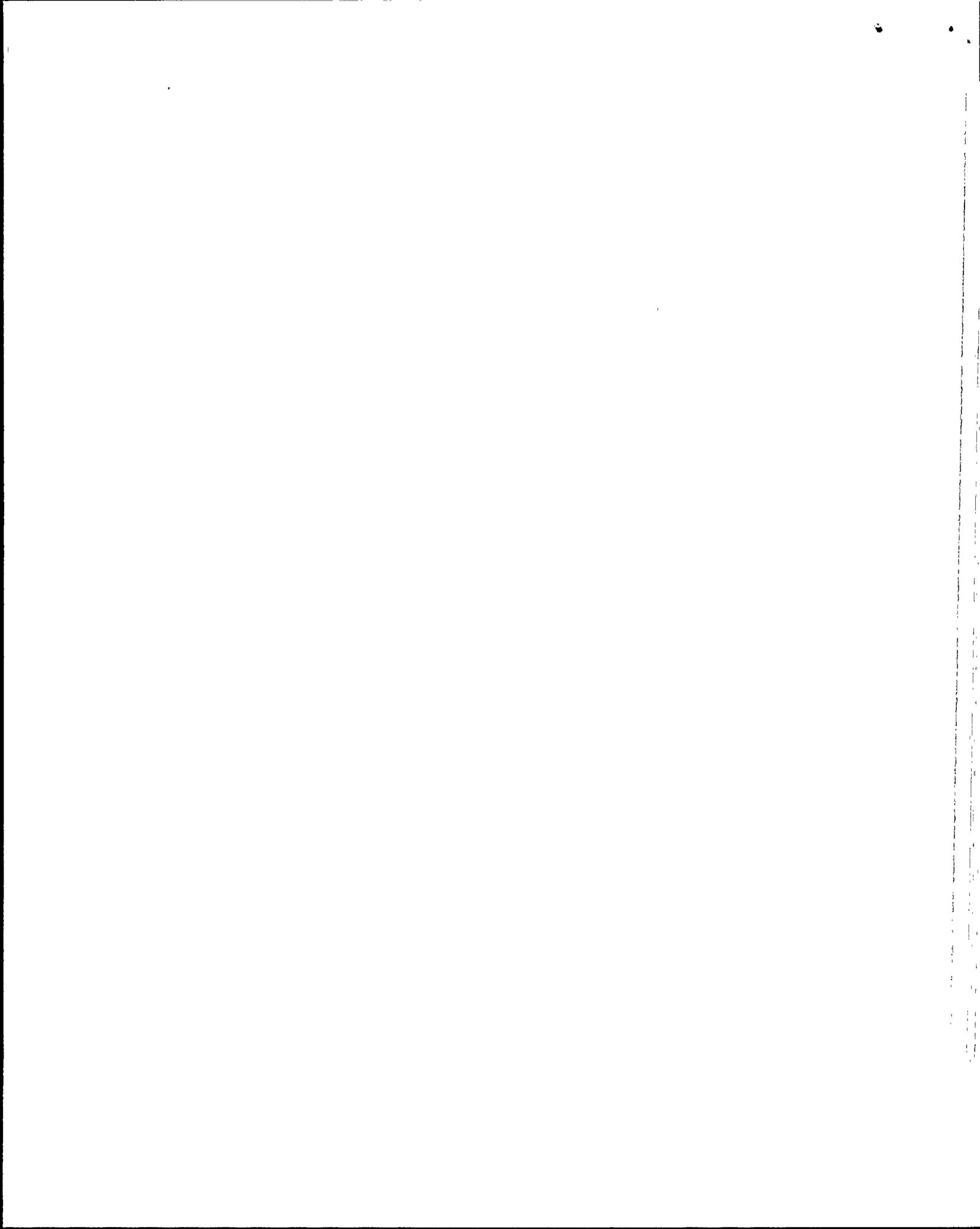
The examiners identified two procedural deficiencies. These are discussed below.

- Procedural steps 72IC-1RX03, "Core Reloading," step 7.14 and 41AO-1ZZ26, "Irradiated Fuel Damage," step 3.1 both directed the operator to place any fuel assembly in transit in a safe configuration, if refueling was interrupted for any reason. However, step 2.1 of 41AO-1ZZ26, "Irradiated Fuel Damage," was the first procedural step an operator would encounter if a radiation alarm were received. This step directed the operator to evacuate the area. The licensee stated that management expectation was to place the fuel assembly in a safe configuration and then evacuate. The licensee then acknowledged this conflict and revised the guidance in section 2 of 41AO-1ZZ26, "Irradiated Fuel Damage," to be consistent with management expectation.
- Step 5.5.5 of 780P-9FX03, "Spent Fuel Handling Machine," directed that the manual load brake be adjusted during manual operation of the SFHM hoist. During the examination the manual load brake was not physically adjustable. PVNGS agreed to evaluate changing this step.

The facility acknowledged the above comments during the exit interview.

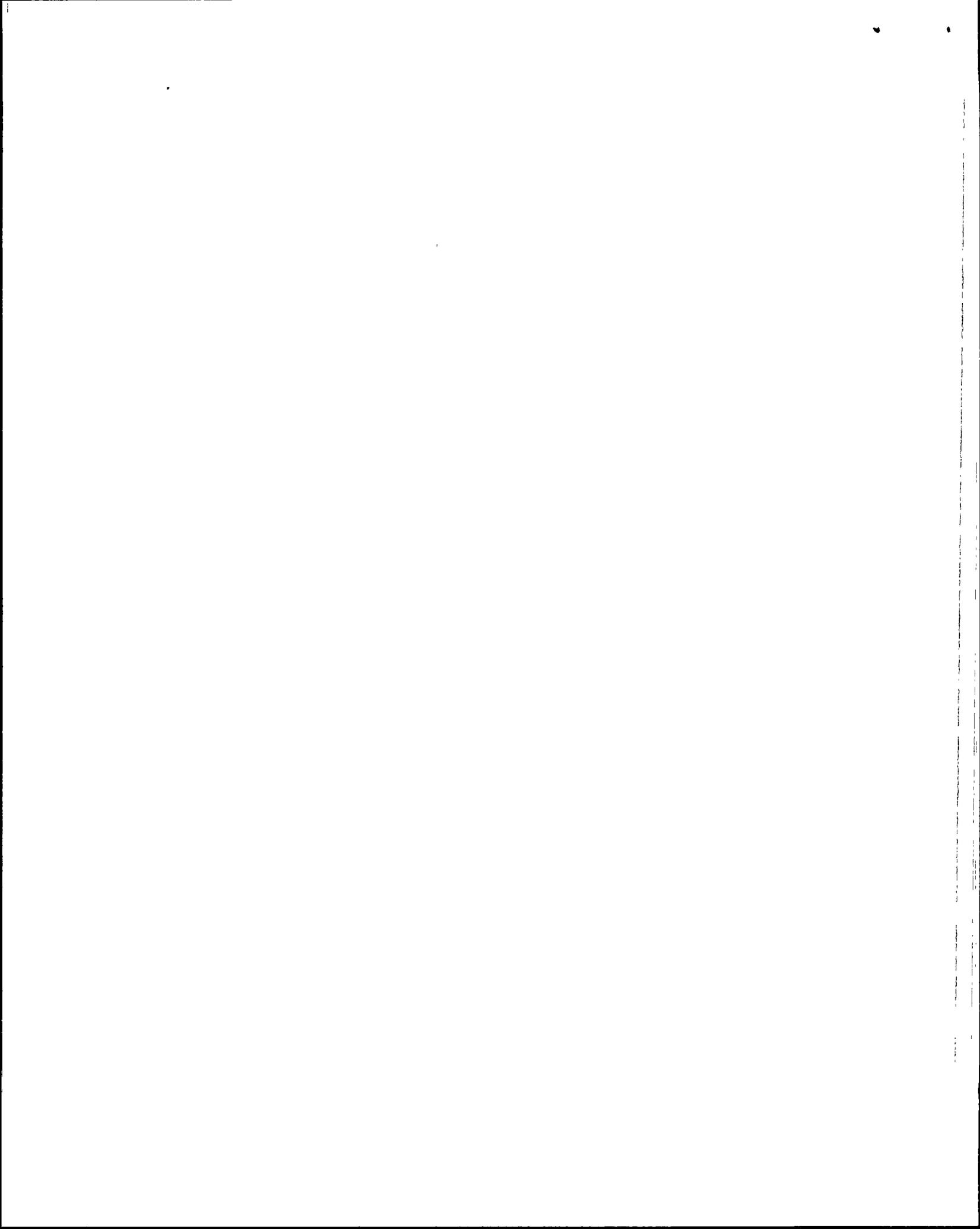
#### 6. Exit Meeting

An exit meeting was held by the NRC examiners with representatives of the licensees staff on September 17, 1992. Issues identified in this report were discussed during the exit meeting and subsequent telephone conversations with the licensee staff. The licensee staff acknowledged the NRC observations and stated deficiencies.



Enclosure 2

Written Examination and Answer Key



QUESTION 001 (1.0)

MULTIPLE CHOICE (Select the correct answer)

An individual is reviewing his occupational dose.

- He is 30 years old, male, and a licensed operator.
- He has a current NRC Form 4 on file.
- His lifetime whole body dose is 59 Rem.
- He has facility approval to exceed site limits.

Which one of the following is his maximum occupational dose limit to the whole body allowable under 10 CFR 20, for the current quarter?

- a. 1 Rem
- b. 1 1/4 Rem
- c. 3 Rem
- d. 5 Rem

ANSWER

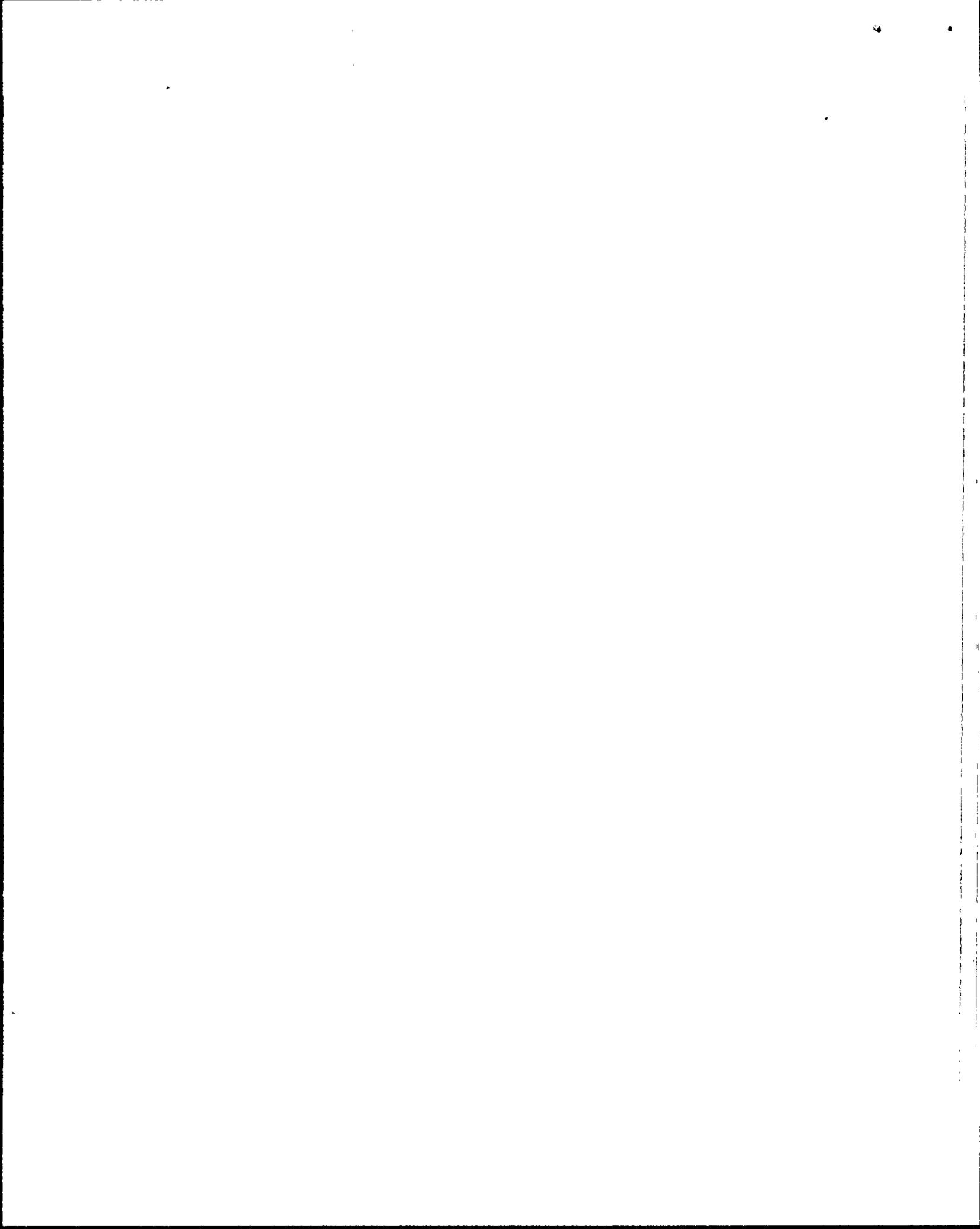
b.

REFERENCE

10 CFR 20.101, RWP L. O. C2-5

(2.8/3.4)

KA 194001K1.03



QUESTION 002

(1.0)

MULTIPLE CHOICE (Select the correct answer)

You are working in the Radiologically Controlled Area (RCA). You are wearing partial protective clothing (Boots, gloves, and labcoat). Rad Protection (RP) has not given you any specific direction.

What is the MAXIMUM amount of time that you can go without a whole body frisk?

- a. 4 hours
- b. 5 hours
- c. 6 hours
- d. There is no maximum

ANSWER

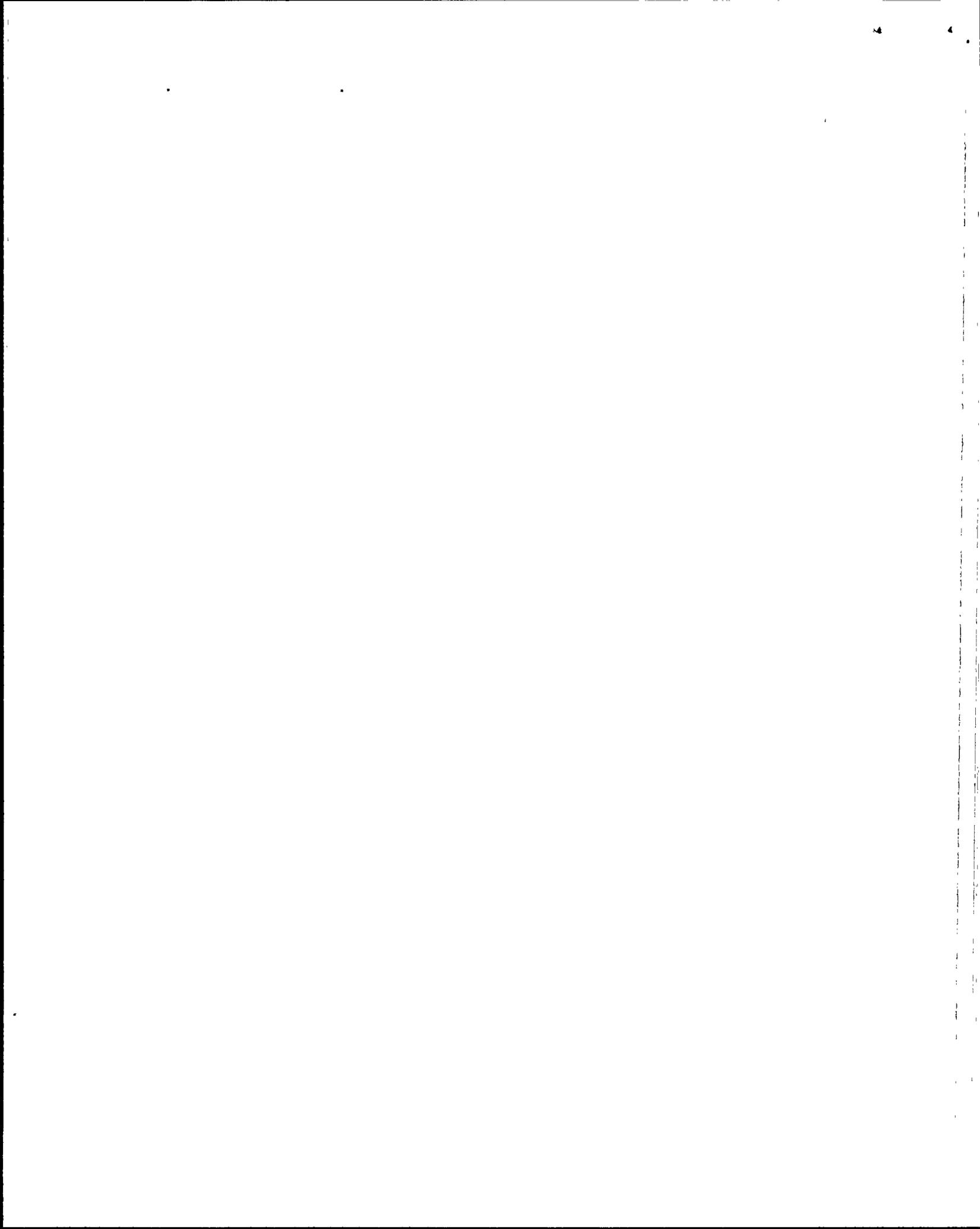
a.

REFERENCE

75AC-9RP01, p.6, 2.1.23, RWP L.O. E2-8

(3.3/3.5)

KA 194001K1.04



QUESTION 003

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What is the BINDING ENERGY that is associated with IONIZATION ENERGY?

- a. A negative number representing the energy required to completely free a proton from the nucleus.
- b. A positive number representing the energy required to completely free a proton from the nucleus.
- c. A negative number representing the energy required to move an electron to its next higher valence state.
- d. A positive number representing the energy required to move an electron to its next higher valence state.

ANSWER

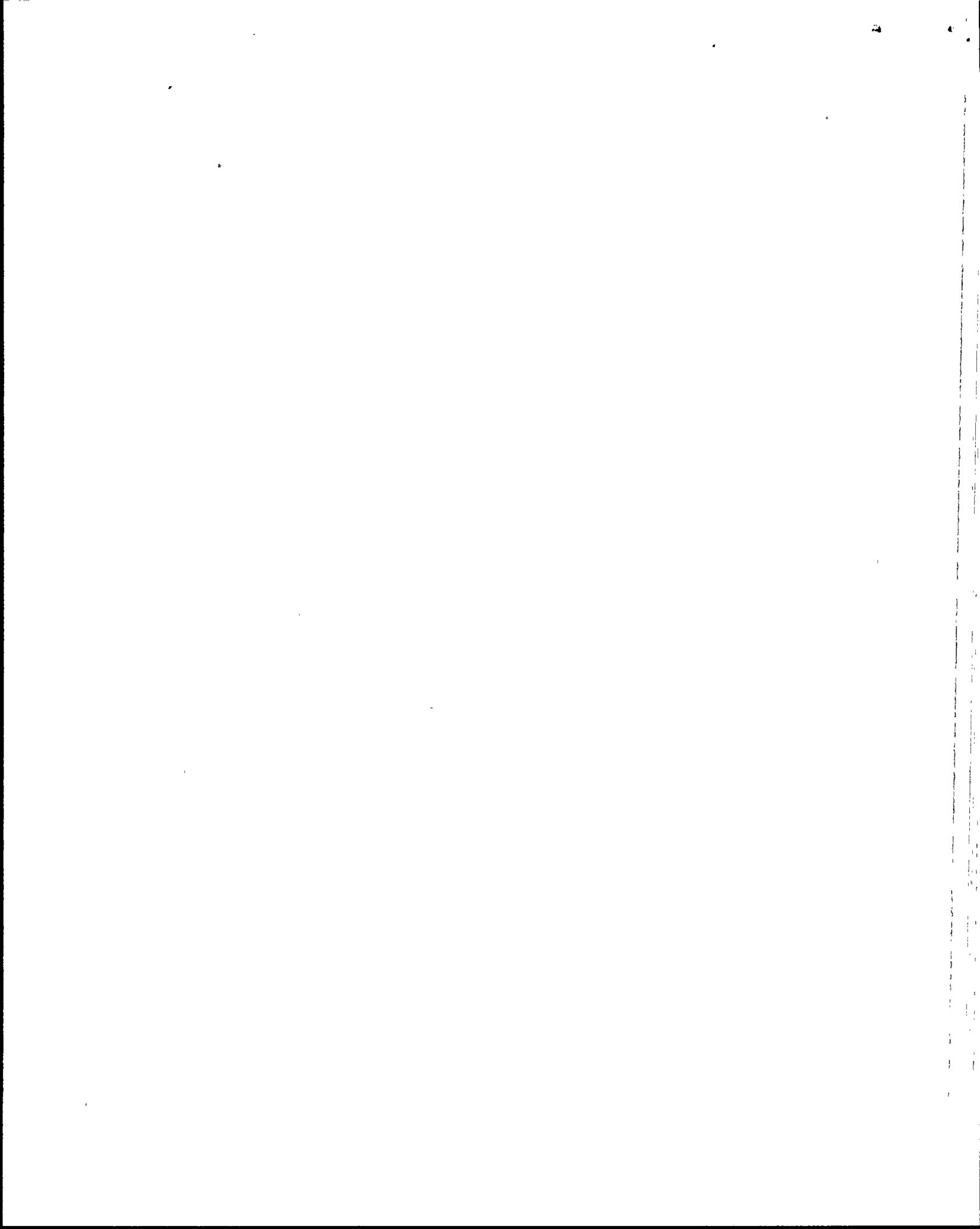
c.

REFERENCE

Nuc Physics LP, p.23, LO E003

(2.7/3.0)

KA 072000K5.01



QUESTION 004

(1.0)

MULTIPLE CHOICE (Select the correct answer)

If I double the distance between myself and a small, spherical radiation source, how should my radiation exposure rate from this source change?

- a. Increase by about a factor of 2
- b. Decrease by about a factor of 2
- c. Increase by about a factor of 4
- d. Decrease by about a factor of 4

ANSWER

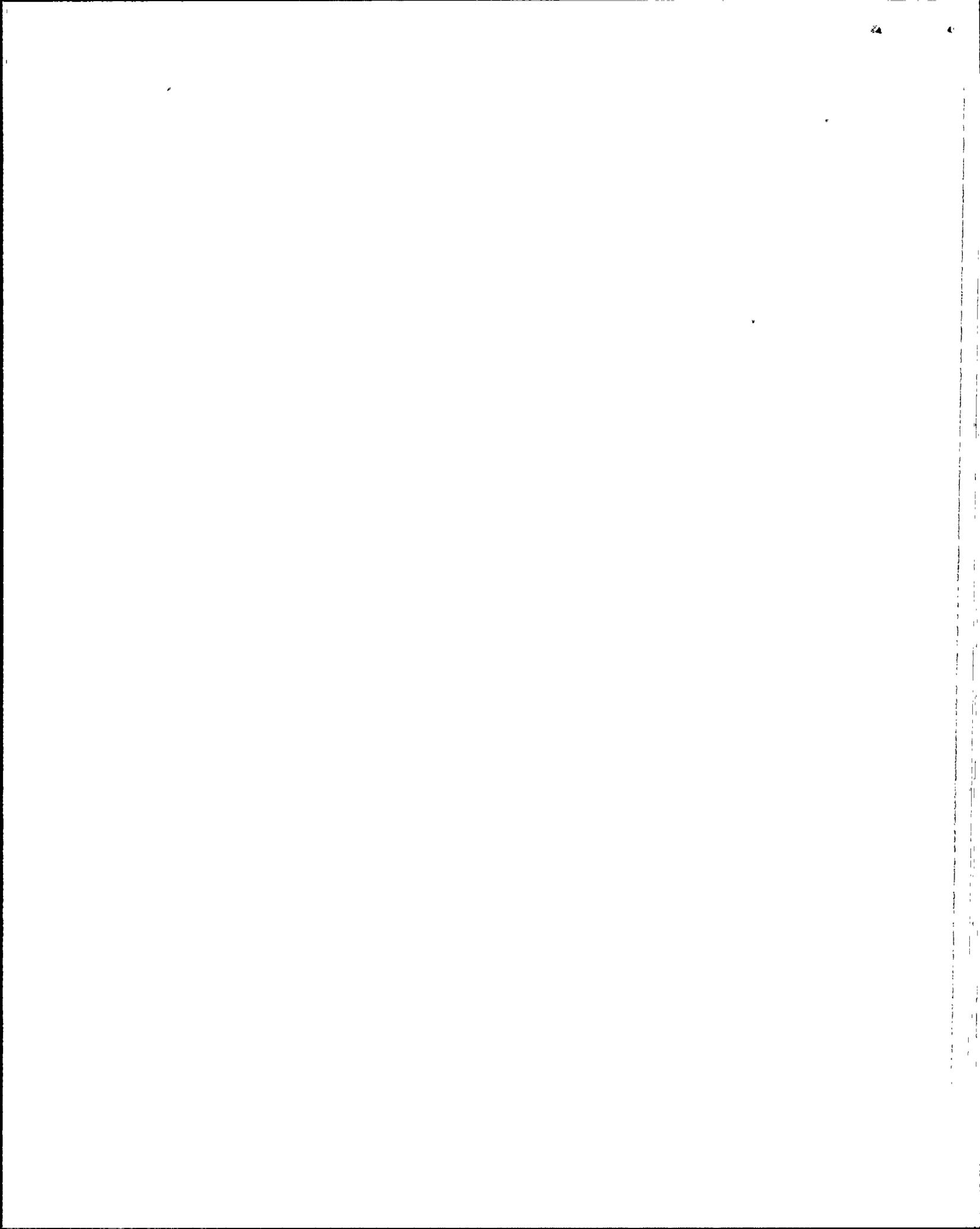
d.

REFERENCE

GET, Rad Work Pract., p. H4, LO-H2-4

(2.5/3.2)

KA 072000K5.02



QUESTION 005

(1.0)

MULTIPLE CHOICE (Select the correct answer)

You are the LSRO on duty during a core onload. You are on the refueling machine talking to your refueling machine operator. She tells you that she is seventeen years old, but needed the job, so she said she was eighteen on all her employment paperwork.

At this point what should you do and why?

- a. WAIT till the end of your shift and report this to management because of potential security problems.
- b. WAIT till the end of your shift and report this to management because of potential dose limit problems.
- c. IMMEDIATELY cease core alterations and escort her out of the RCA because of a potential Technical Specification violation.
- d. IMMEDIATELY cease core alterations and escort her out of the RCA because of potential doubt as to proper reload configuration.

ANSWER

c.

REFERENCE

75AC-9RP01, p.23, 3.9.5, RWP LO C2-5  
T.S. Ch. 6

(3.3/3.5)

KA 194001K1.04



QUESTION 006

(1.0)

MULTIPLE CHOICE (Select the correct answer)

You are in the spent fuel pool area with no protective clothing on . You note that an operator, in full protective clothing, is operating the spent fuel pool machine. He or she slips, hits his or her head, and is knocked unconscious. You can see blood and feel this injury is serious. You are with an operator qualified to give first aid who also has no protective clothing on.

What should you tell him to do, after you call for help?

- a. Locate and don full protective clothing, enter the spent fuel pool machine, and render first aid.
- b. Enter the spent fuel pool machine as you are dressed, and render first aid.
- c. Remain out of the contaminated area as much as possible, attempt to pull the individual off the spent fuel pool machine, remove his or her protective clothing, and render first aid.
- d. Locate and don boots and gloves only, enter the spent fuel pool machine, and render first aid.

ANSWER

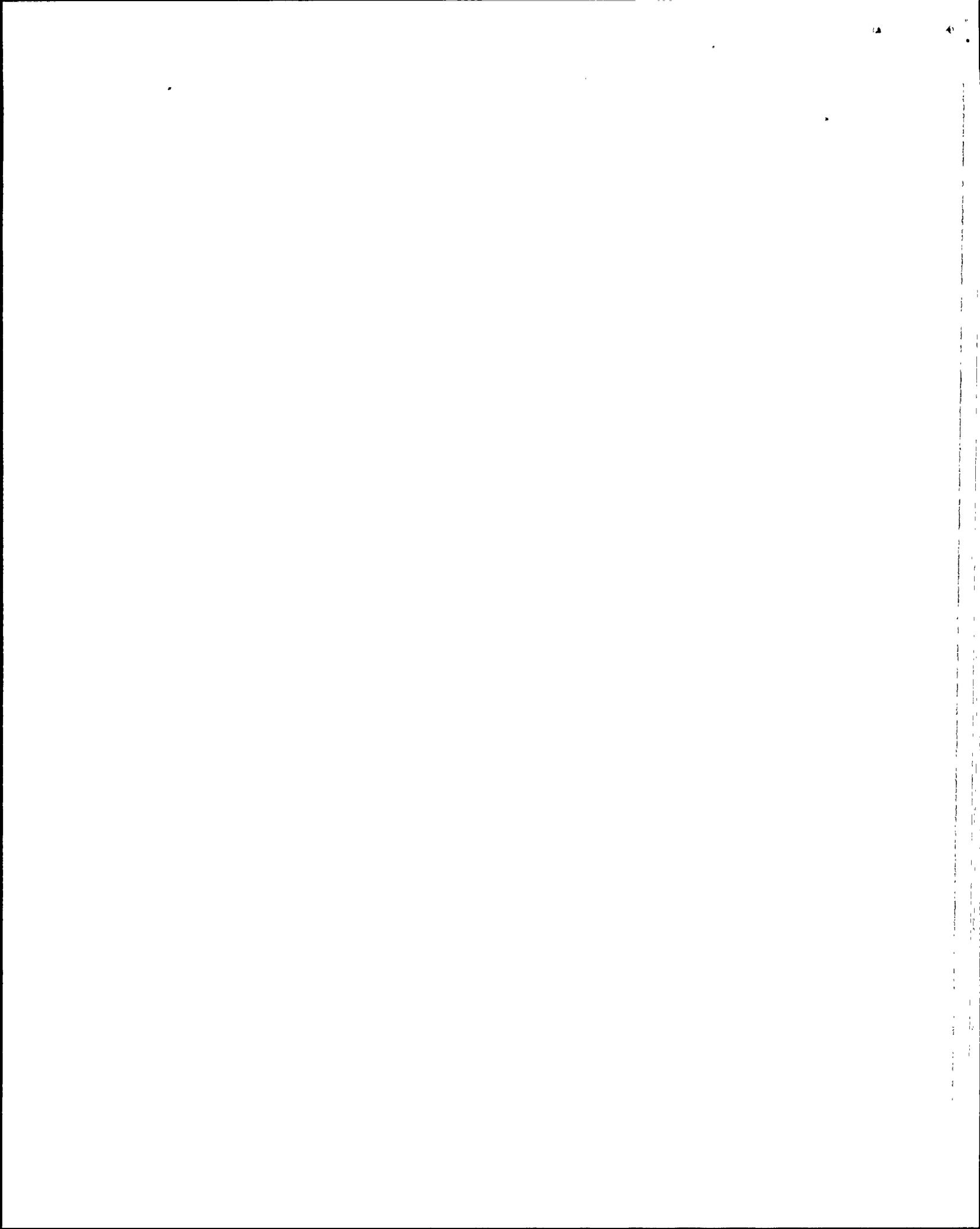
b.

REFERENCE

GET, Rad Work Pract, p.E17, LO E3-14

(3.1/4.1)

KA 194001A1.12



QUESTION 007

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the reason for the HIGHER SENSITIVITY of a Geiger-Mueller tube radiation detector?

- a. Changes in applied detector voltage have little effect on detector output.
- b. Geiger-Mueller tubes are longer than other detector types.
- c. Any incident radiation event causing primary ionization results in ionization of the entire detector.
- d. Geiger-Mueller tubes are capable of operating at lower detector voltages than Ion-Chamber tubes, allowing detection of lower energy radiation.

ANSWER

c.

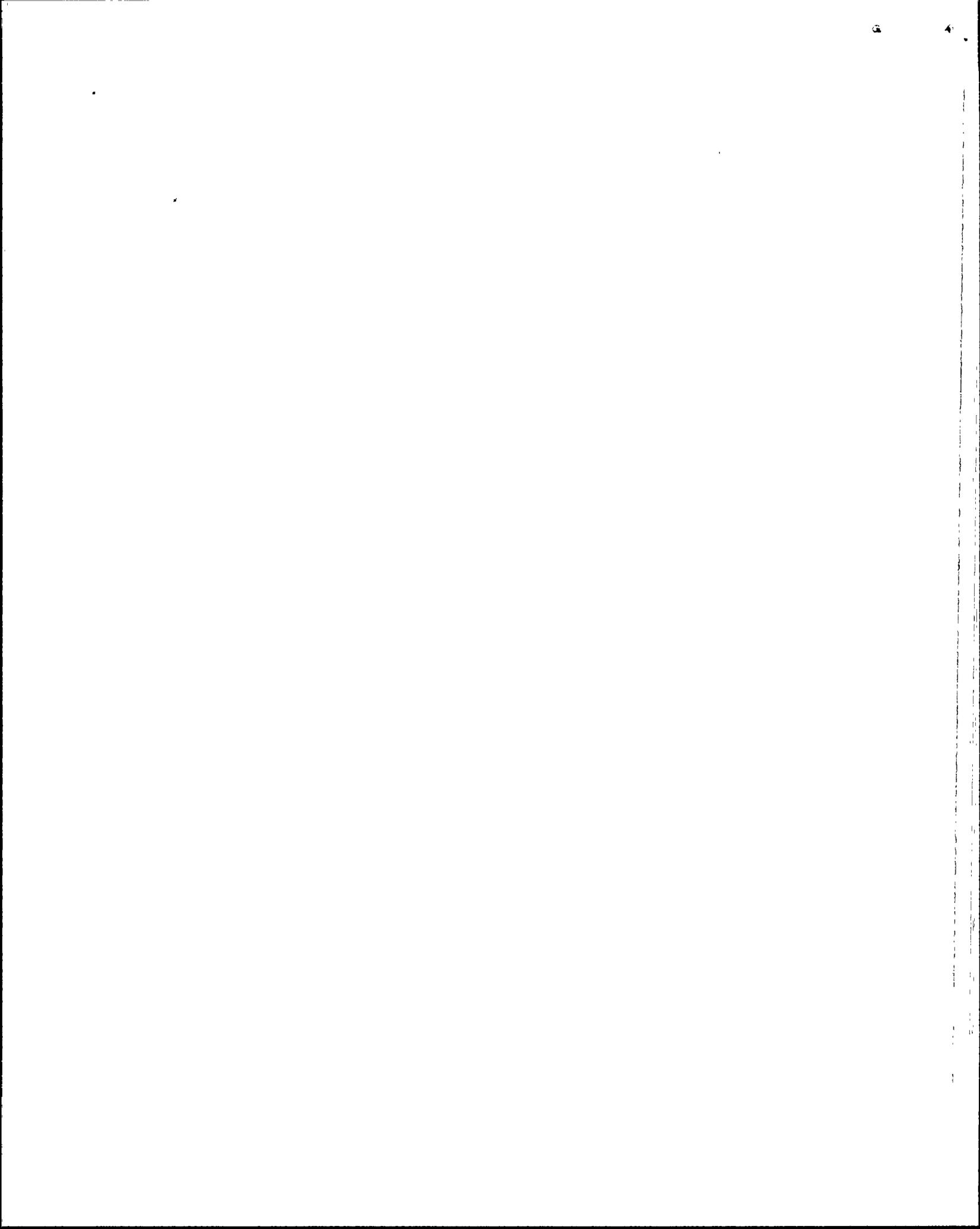
REFERENCE

GFES 15, A Feb 90

LP Rad Prin., p.37, LO E021

(2.1/2.6)

072000K6.01



QUESTION 008 (1.0)

MULTIPLE CHOICE (Select the correct answer)

An emergency has been declared. The emergency coordinator asks you to volunteer to enter the refueling floor to save the life of an operator who is injured. General area rad levels you will be exposed to are 100 Rem/ Hr.

Using emergency exposure guidelines, what is the MAXIMUM amount of time (in minutes) you can spend in this radiation field?

- a. 30
- b. 45
- c. 60
- d. 75

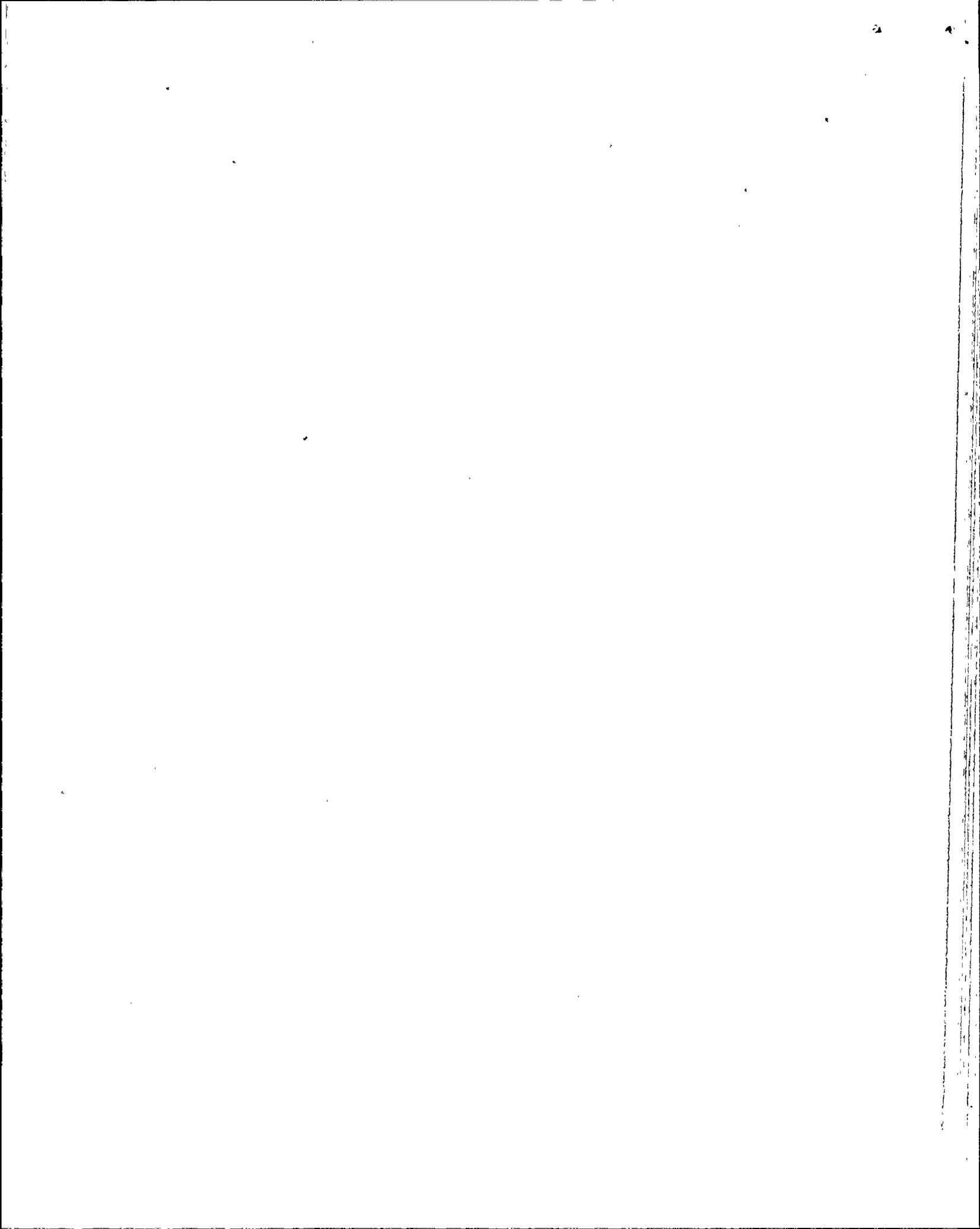
ANSWER

b.

REFERENCE

GET, Rad Work Pract., p.C9, LO C3-10  
100 R/75 R/Hr = 3/4 Hr = 45 min.

(3.1/4.4)  
KA 194001A1.16



QUESTION 009 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following is a measure of the dose of any ionizing radiation in terms of its estimated biological effect?

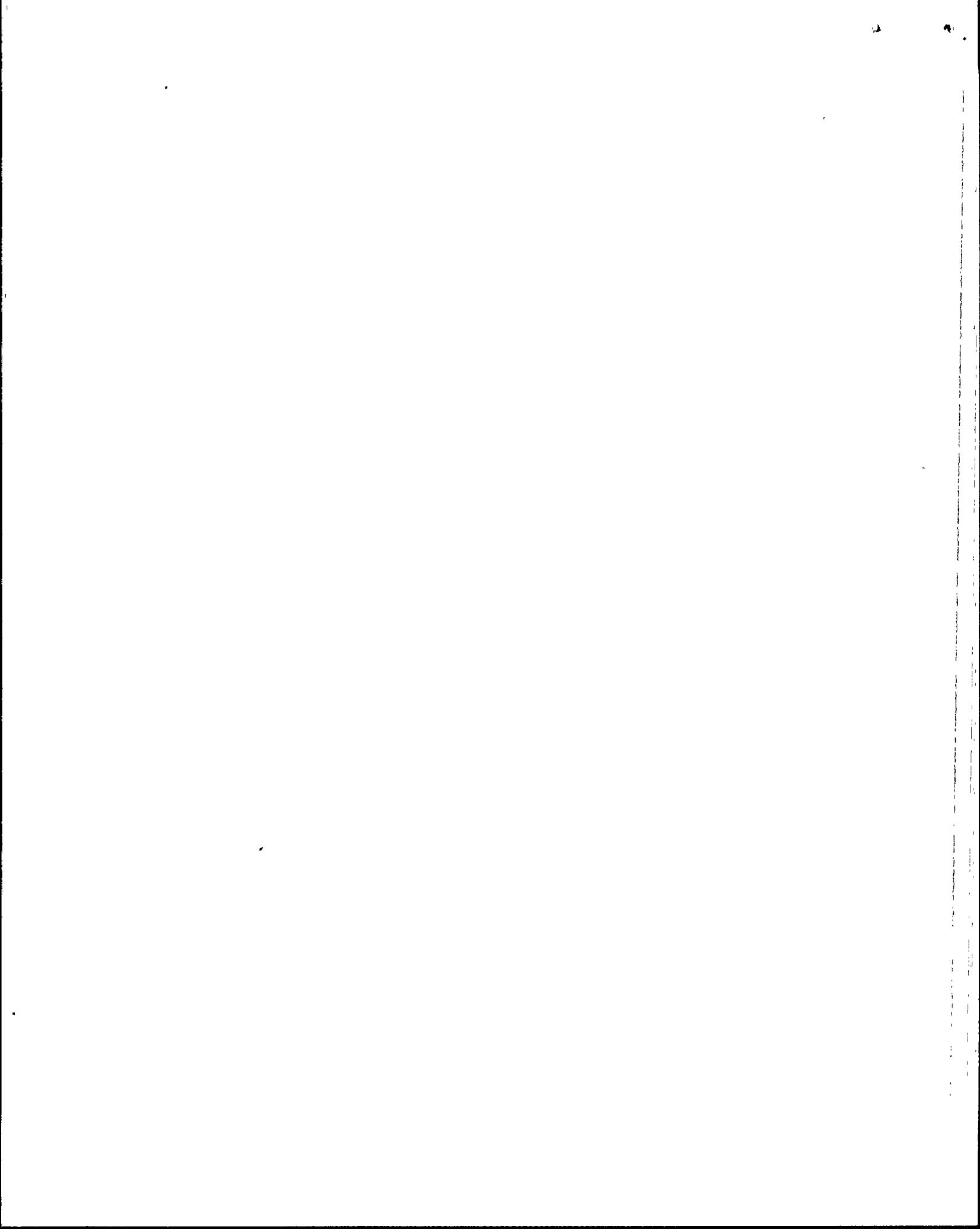
- a. Rad
- b. Rem
- c. Curie
- d. Roentgen

ANSWER

b.

REFERENCE  
LP Rad princ, p. 25

(2.7/3.0)  
KA 072000K5.01



QUESTION 010

(1.0)

MULTIPLE CHOICE (Select the correct answer)

There is an area radiation survey in progress. You have a portable Ion Chamber instrument (an R02) and are wearing protective glasses. The instrument has a shield that can be positioned opened or closed. You read 100 mr/hr with the shield open and 50 mr/hr with the shield closed, at a certain location.

It is the first day of the quarter. You have 1050 mr already this year.

How long can you stand in this radiation field until you reach your Palo Verde administrative limit for whole body exposure?

- a. 7 hours.
- b. 10 hours.
- c. 20 hours.
- d. 40 hours.

ANSWER

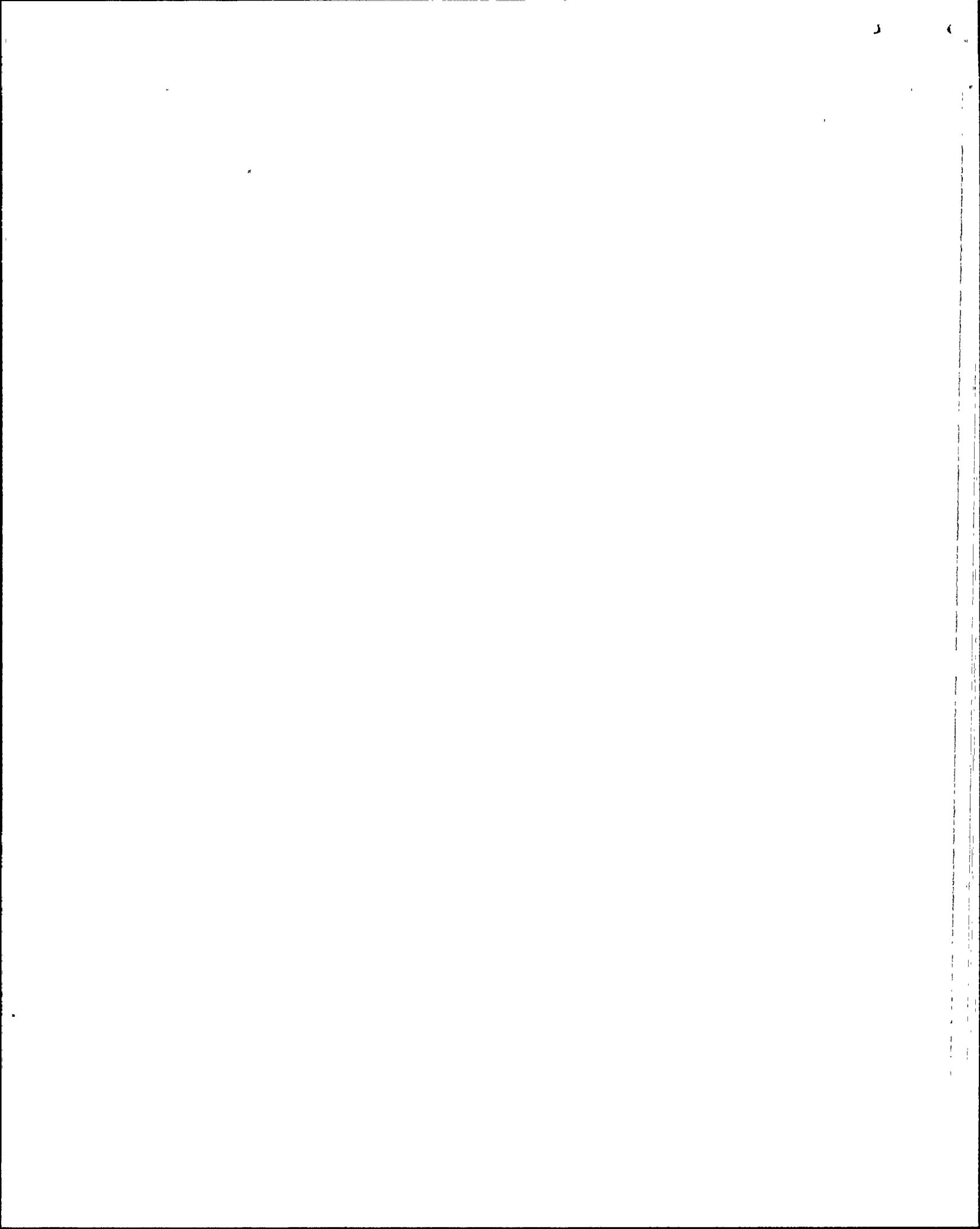
c.

REFERENCE

GET p. C7, 1000 mR/Qtr  
LO, LP Rad Prin, E021

(3.4/3.6)

KA 072000A1.01



QUESTION 011 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Your coworker states that he has received an acute whole body dose of 150 Rem. Which of the following describes the PROBABLE short term and long term effects of this dose?

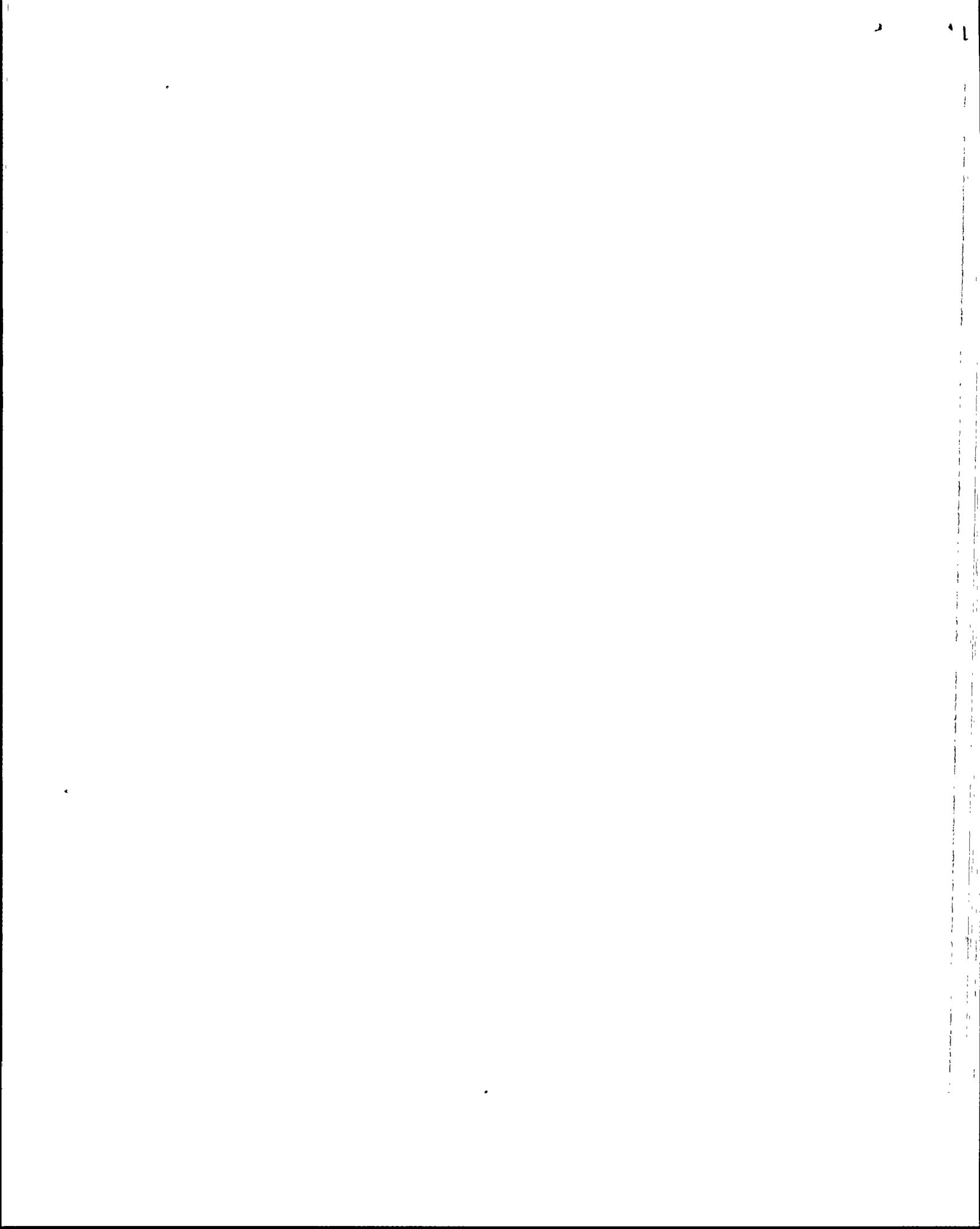
- a. Clinically detectable blood changes, tremors, an injury but no disability.
- b. Nausea, vomiting, internal bleeding, blood disorder, an injury and a disability.
- c. Nausea, vomiting, an injury but no disability.
- d. Nausea, vomiting, possible death, an injury and a disability.

ANSWER

c.

REFERENCE  
Exam Bank #851  
LP NSF01, LO E006, p. 15

(3.3/3.5)  
KA 194001K1.04



QUESTION 012 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Should you use a supplied air respirator in a tritium environment ? Why or why not?

- a. Yes, as long as you use a plastic or rubber suit.
- b. Yes, tritium will be filtered out through the mask.
- c. No, tritium particulate can be adsorbed through the skin.
- d. No, the maximum permissible concentration will be too high.

ANSWER

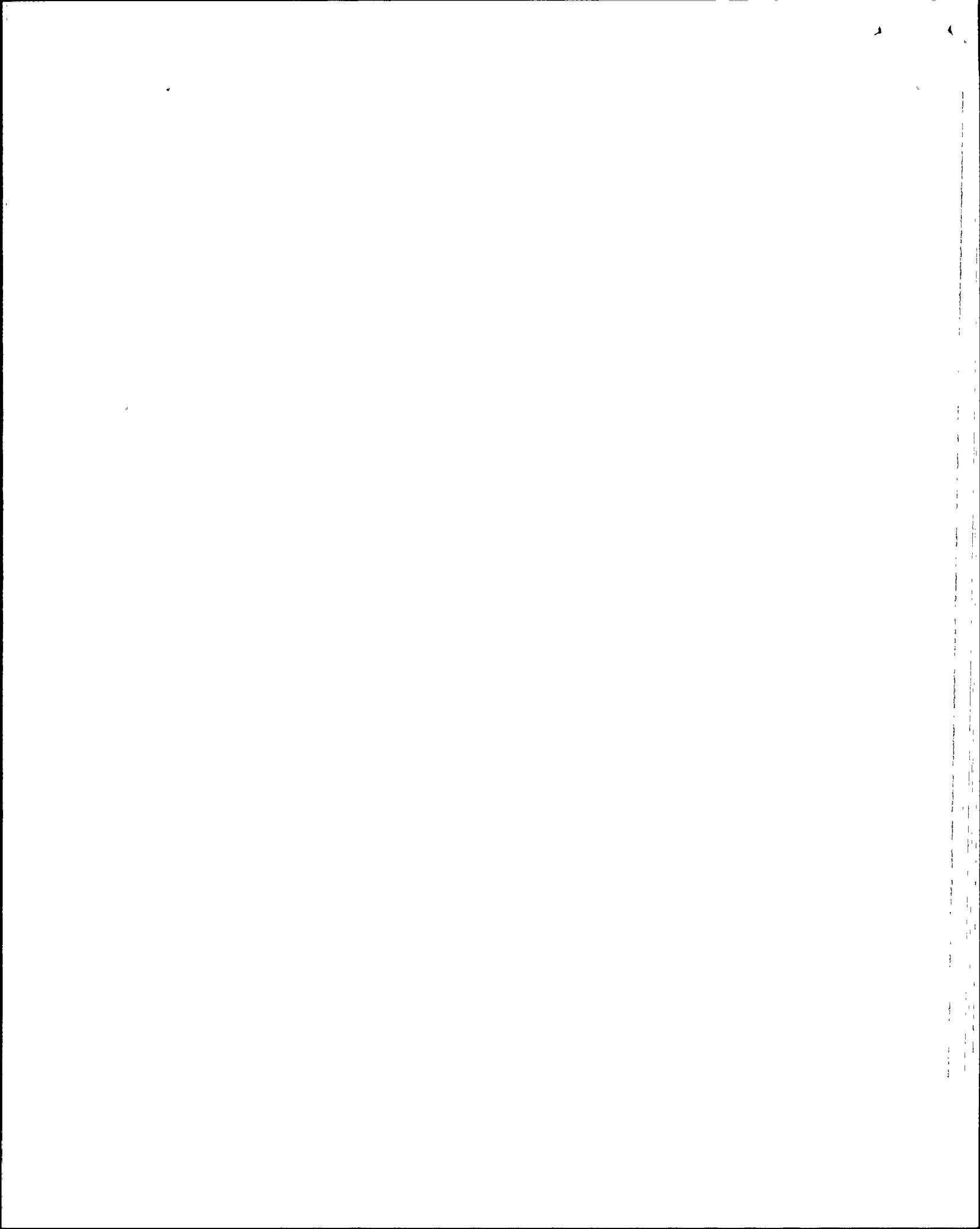
a.

REFERENCE

LP NSF01, p. 20, LO E011

(2.8/3.4)

KA 194001K1.03



QUESTION 013

(1.0)

MULTIPLE CHOICE (Select the correct answer)

K-effective is 0.94. What is the value of net reactivity ( $\rho$  in  $\Delta k/k$ ) and what does this mean?

- a. -0.064, neutron population is decreasing by 6.4 % each generation.
- b. +0.064, neutron population is increasing by 6.4 % each generation.
- c. +16.67, neutron population is increasing by 16.67 % each generation.
- d. -16.67, neutron population is decreasing by 16.67 % each generation.

ANSWER

a.

REFERENCE

LO Reactor Theory, E002

Reactor Theory LP p. 13

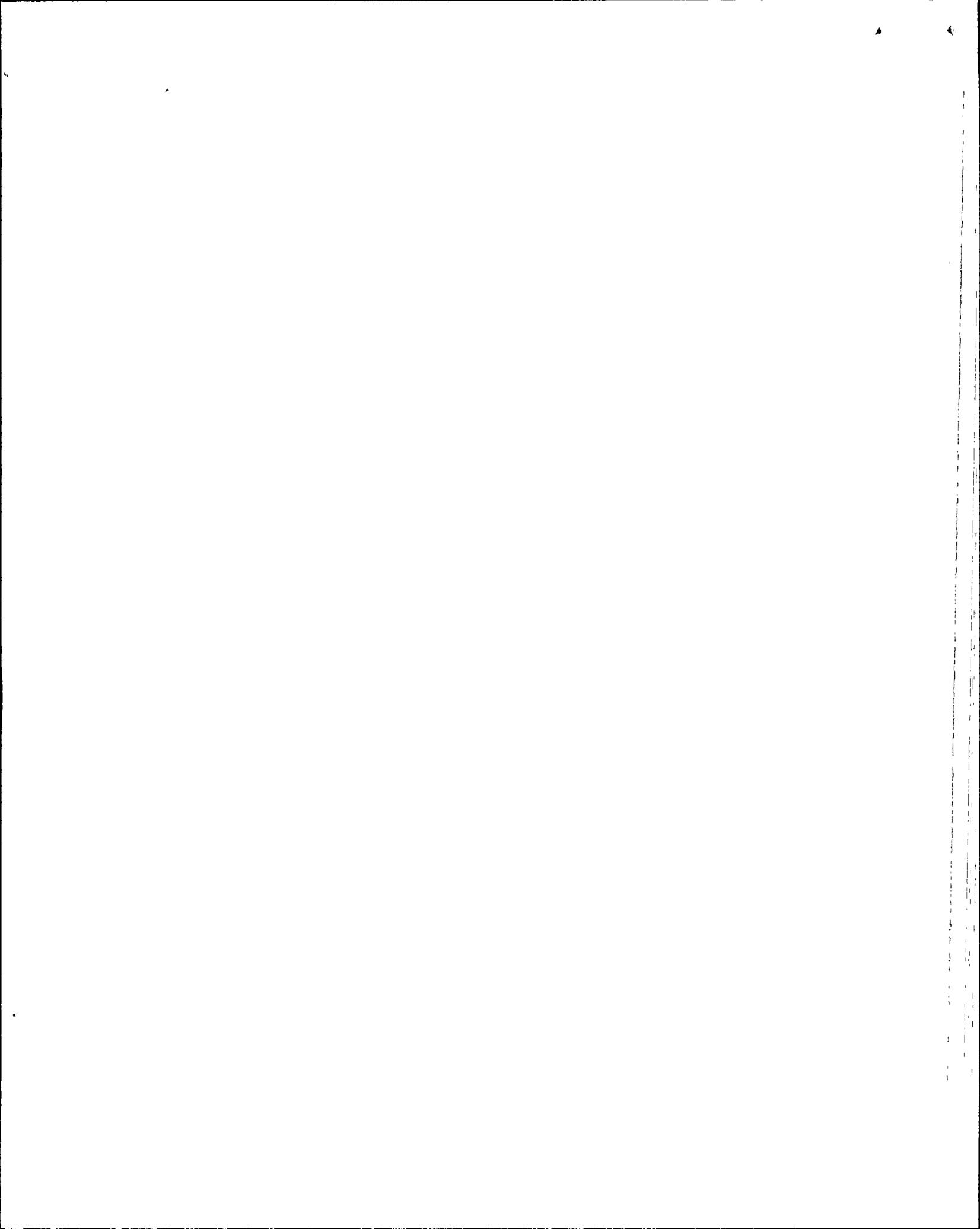
$.94 - 1/.94 = -.064$

(2.7/2.9)

KA 001000K5.39

(2.9/3.0)

KA 192002K1.11



QUESTION 014

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The following question concerns the Fuel Temperature Coefficient (Doppler Coefficient). Refer to the attached diagram.

The temperature of the fuel DECREASES. The microscopic cross section for absorption, ( $\sigma_a$ ), for off resonance neutrons, changes in what manner?

- a. The base of spike broadens and peak drops.
- b. The base of spike narrows and the resonance integral decreases.
- c. The base of spike narrows and the peak increases.
- d. The base of spike broadens and the resonance integral increases.

ANSWER

c.

REFERENCE

Reactor Theory LP p.36

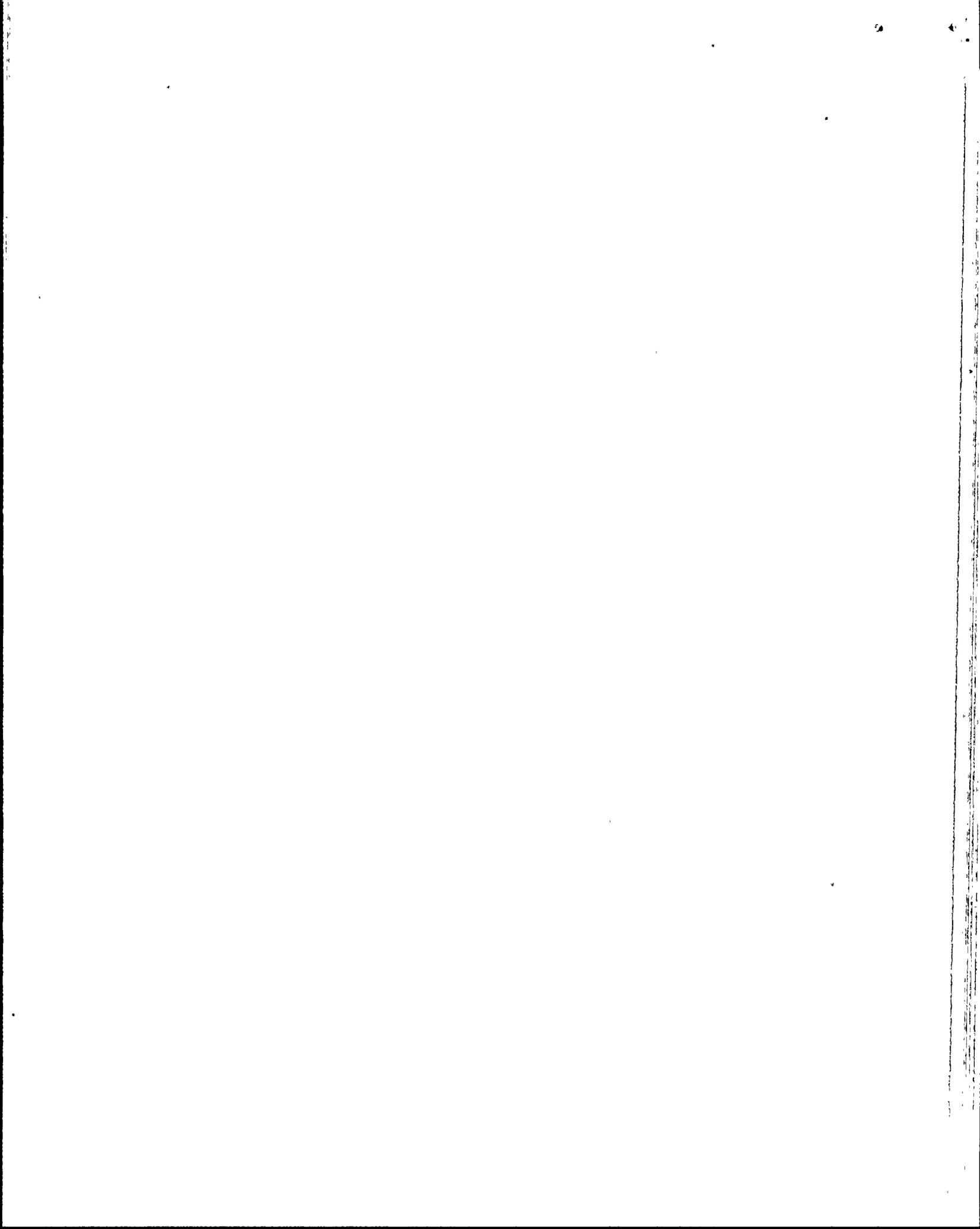
LO E016

(3.3/3.5)

KA 001000K5.48

(2.9/2.9)

KA 192004K1.13



QUESTION 015

(1.0)

MULTIPLE CHOICE (Select the correct answer)

No delayed neutrons are required to maintain a constant neutron population in the core.

Which of the following describes reactor status?

- a. Critical
- b. Supercritical
- c. The reactor has an extremely long period.
- d. The reactor has a negative Start Up Rate.

ANSWER

b.

REFERENCE

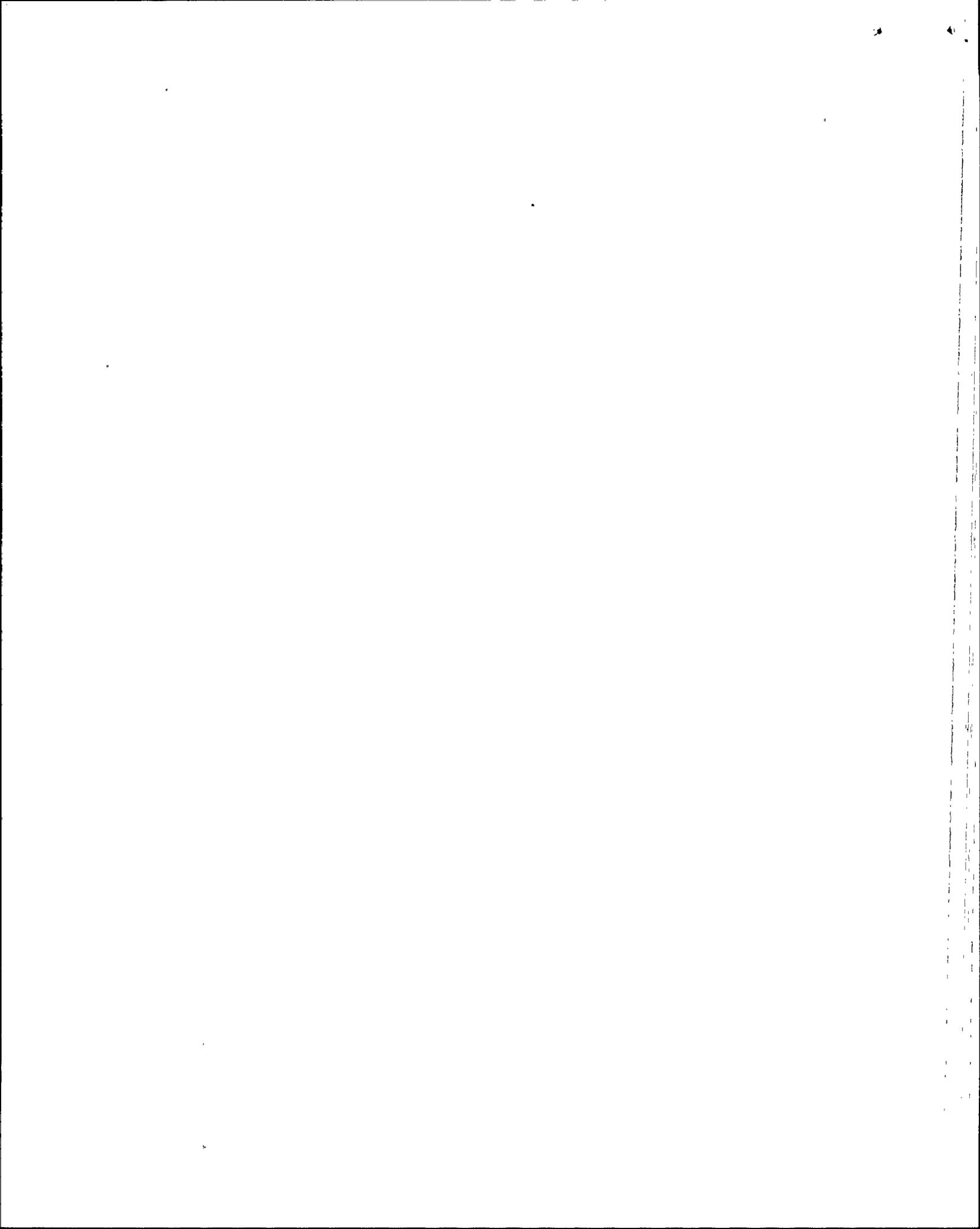
Reactor Theory LP, p. 99. LO E043

(2.5/2.8)

KA 001000K5.32

(3.1/3.2)

192002K1.07



QUESTION 016

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Given that  $Q/L$  is heat transfer rate per unit length.

How does the buildup of a corrosion layer on the fuel clad effect the fuel centerline temperature and why?

- a. Decreases because  $Q/L$  increases.
- b. Increases because  $Q/L$  decreases.
- c. Remains the same because heat generation is constant.
- d. Remains the same because the corrosion layer has the same thermal conductivity as the clad.

ANSWER

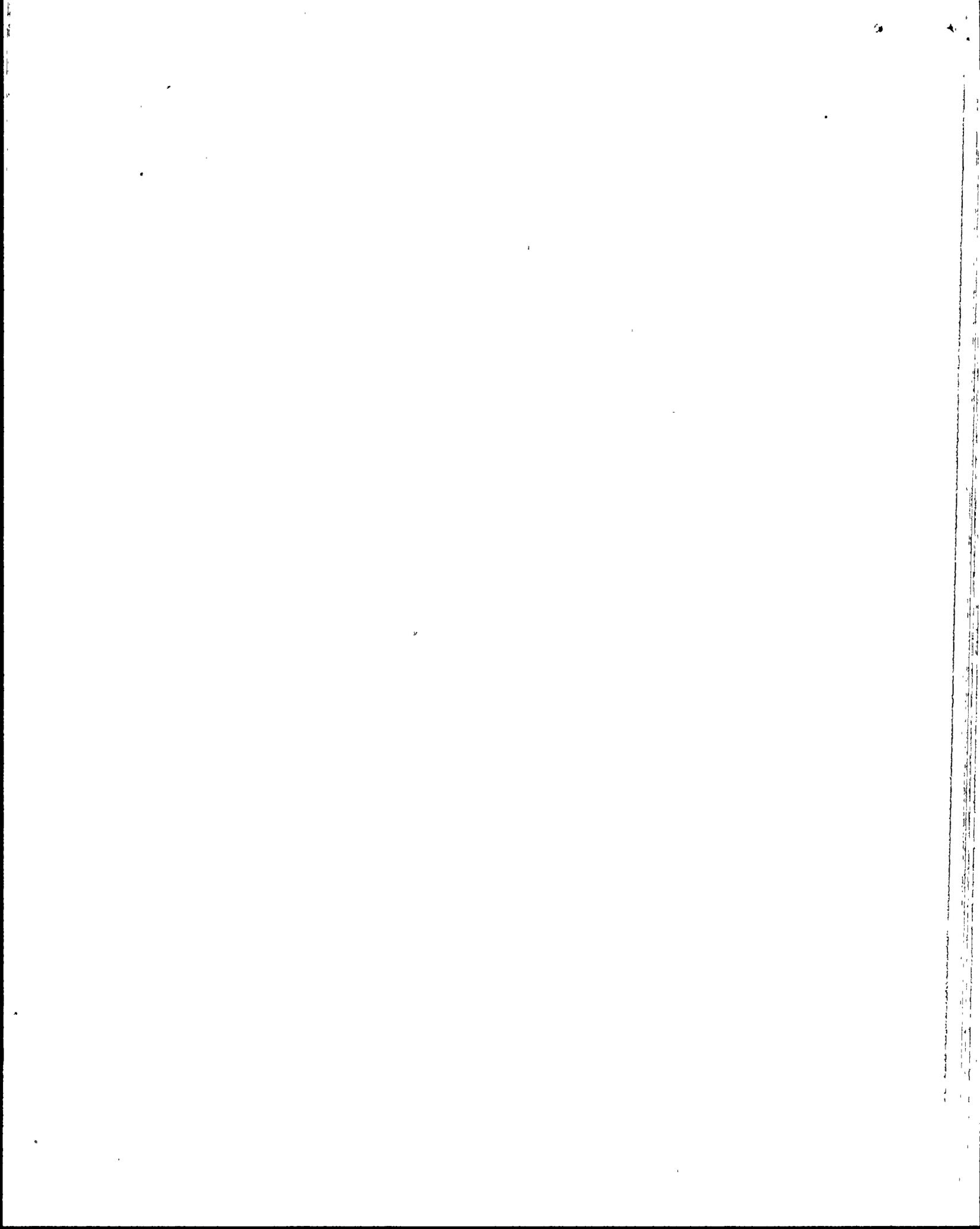
b.

REFERENCE

Heat Transfer LP p. 28, LO E007

(2.9/3.3)

KA 193009K1.07



QUESTION 017

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Given the following:

The plant is in Mode 6

A loss of shutdown cooling is in progress

The mass of water to uncover the reactor is  $4.084E6$  lbm.

The water has just reached 212 degrees F

The fuel is transferring  $6.52E7$  BTU/hr

How long, in hours, will it take to uncover the reactor?

a. 58.78

b. 59.78

c. 60.78

d. 61.78

ANSWER

c.

REFERENCE

$\Delta h = 970.3$  BTU/lbm from steam tables

$Q = 3.96271E9$  BTU required

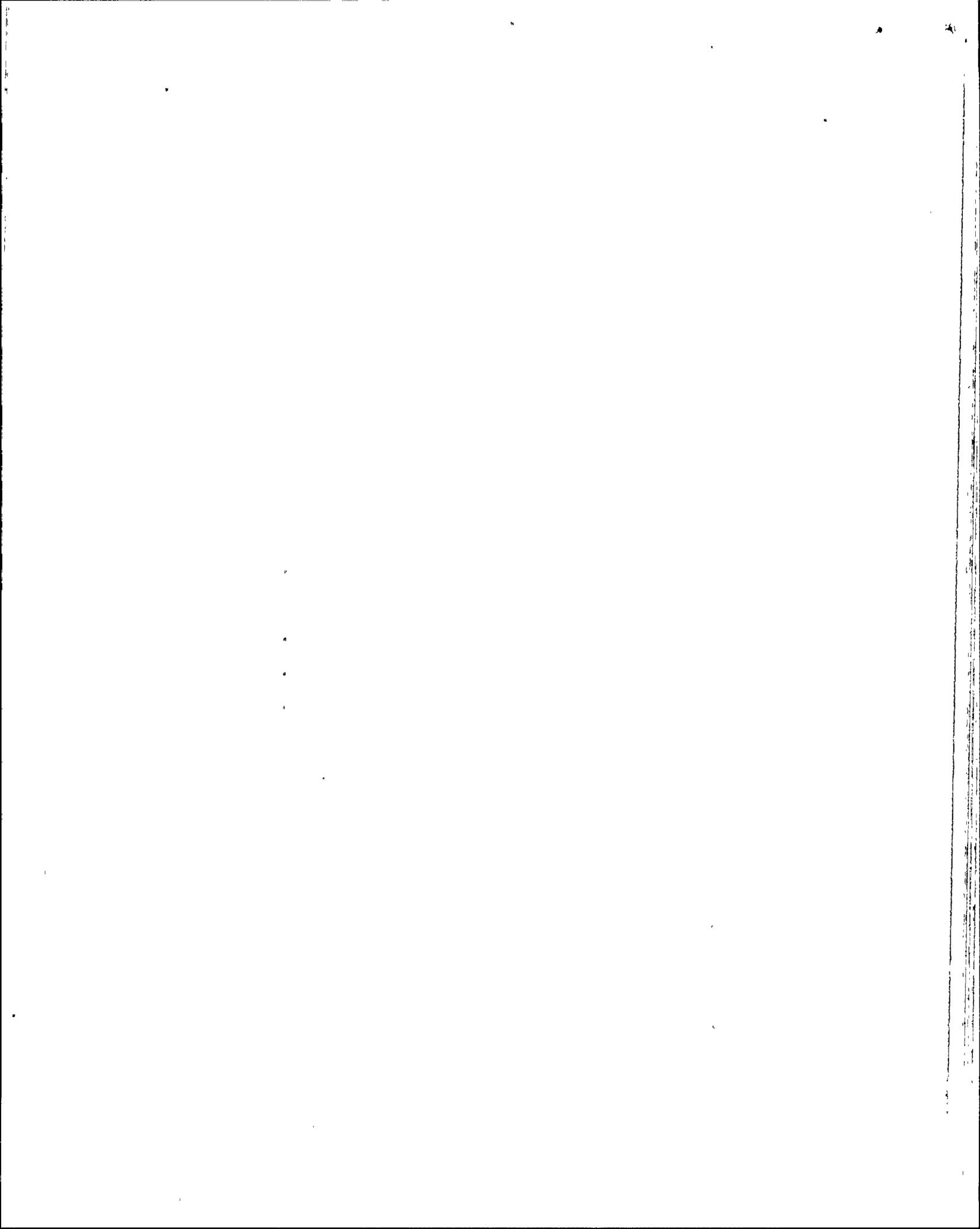
required/ $6.52E7$  BTU/hr= $60.78$  hours

Heat Transfer LP p.34

LO E010

(2.8/3.1)

KA 000026EA2.06



QUESTION 018

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Fill in the blanks.

Heat transfer from the centerline of the pellet to the gas gap is mostly by \_\_\_\_\_ and heat transfer from the clad to the coolant is mostly by \_\_\_\_\_.

- a. Convection, conduction
- b. Conduction, convection.
- c. Convection, convection.
- d. Conduction, conduction..

ANSWER

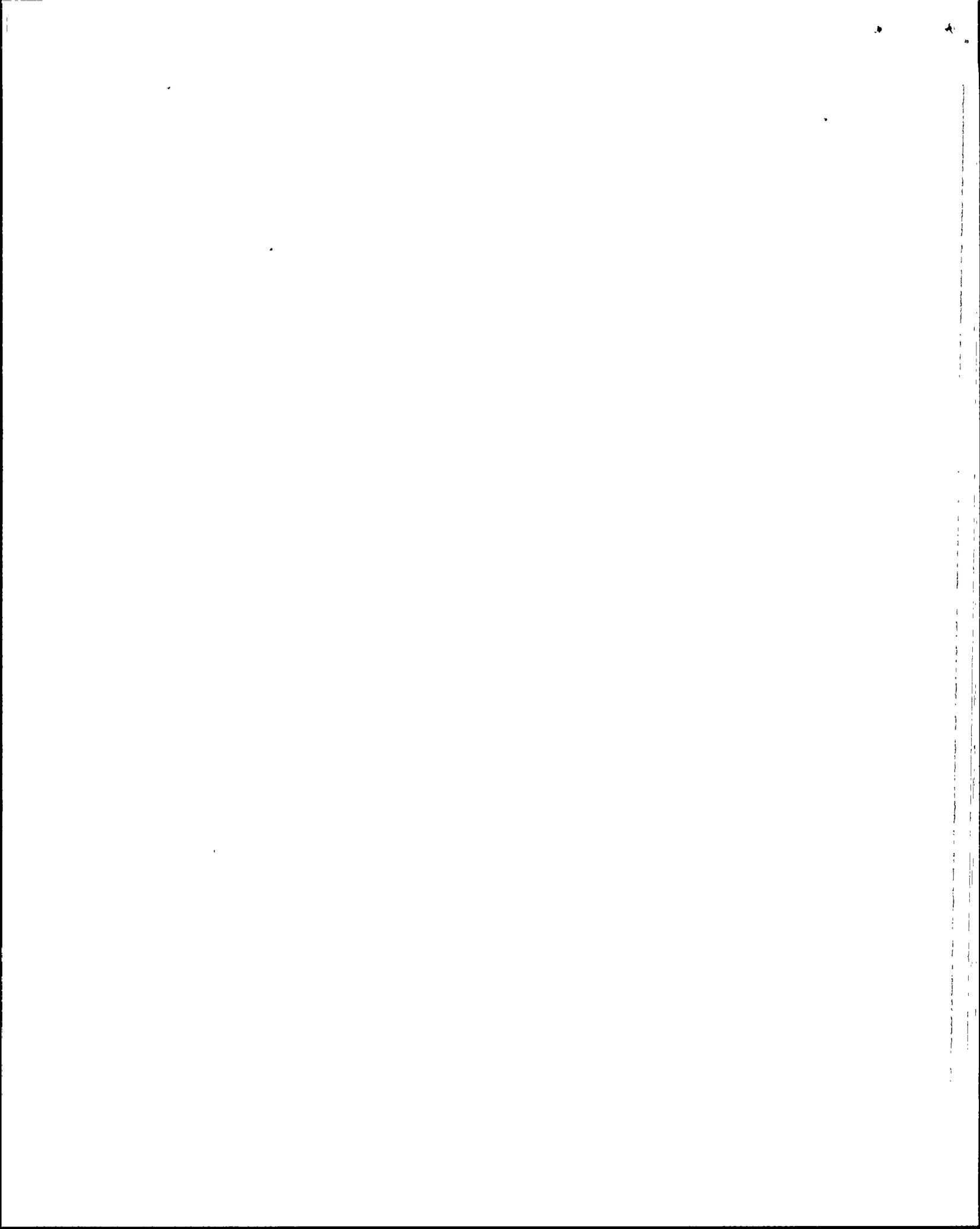
b.

REFERENCE

Heat transfer LP. p.8  
LO E001

(2.5/2.5)

KA 193007K1.01



QUESTION 019

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What supports the weight of the reactor internals with the upper closure head bolted in place?

- a. Reactor vessel closure flange.
- b. Lower core stops.
- c. Vessel snubbers.
- d. Nozzles in the vessel head.

ANSWER

a.

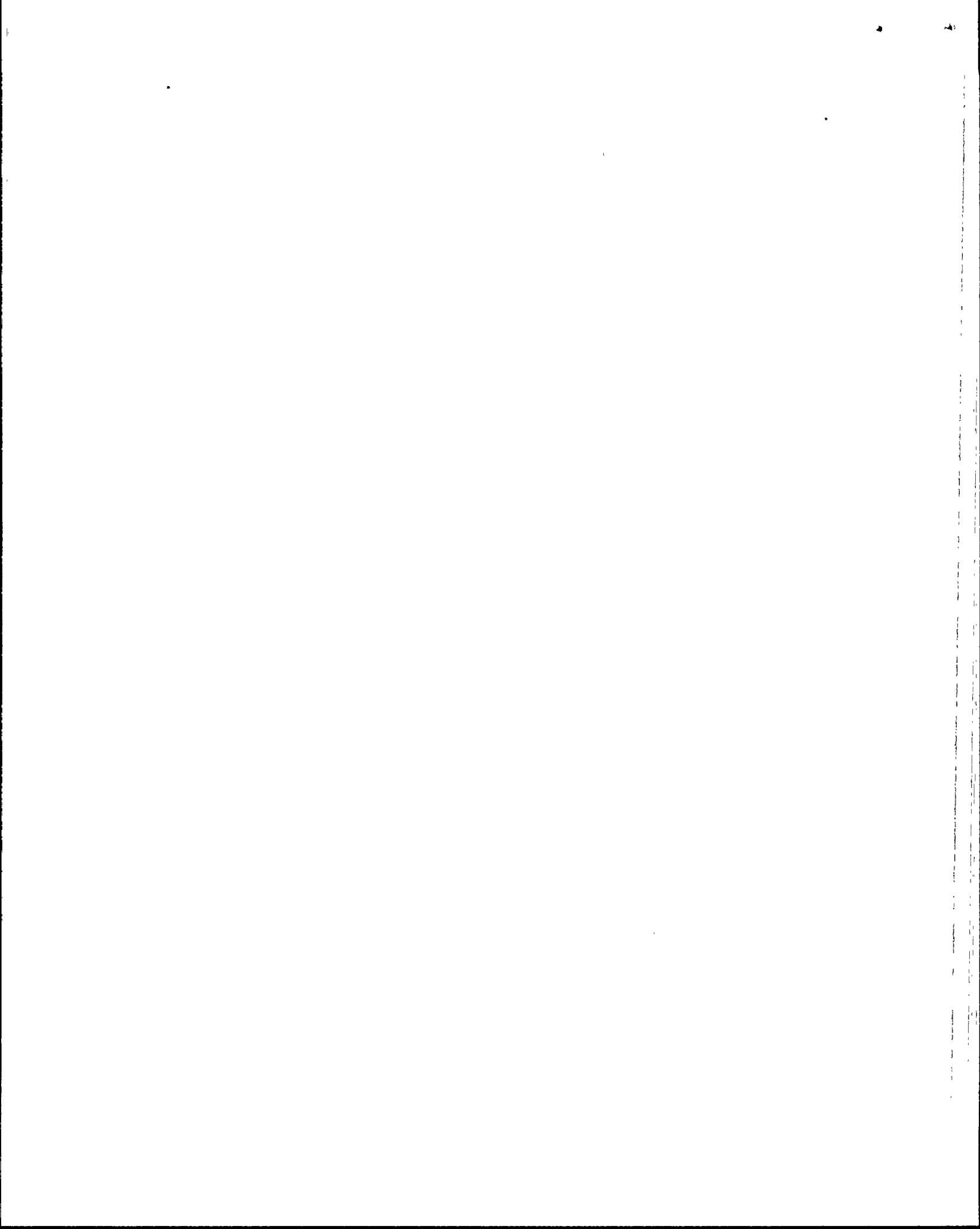
REFERENCE

SD RC-RCS, p.12

Reactor Vessel LP p.20,19, LO E009

(2.3/2.8)

KA 002000K6.13



QUESTION 020

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following accommodates the differential thermal expansion of the Upper Guide Structure assembly flange and the Reactor Vessel Closure Head?

- a. Core shroud assembly
- b. Hold down ring
- c. Closure head alignment pins
- d. Vessel head O rings

ANSWER

b.

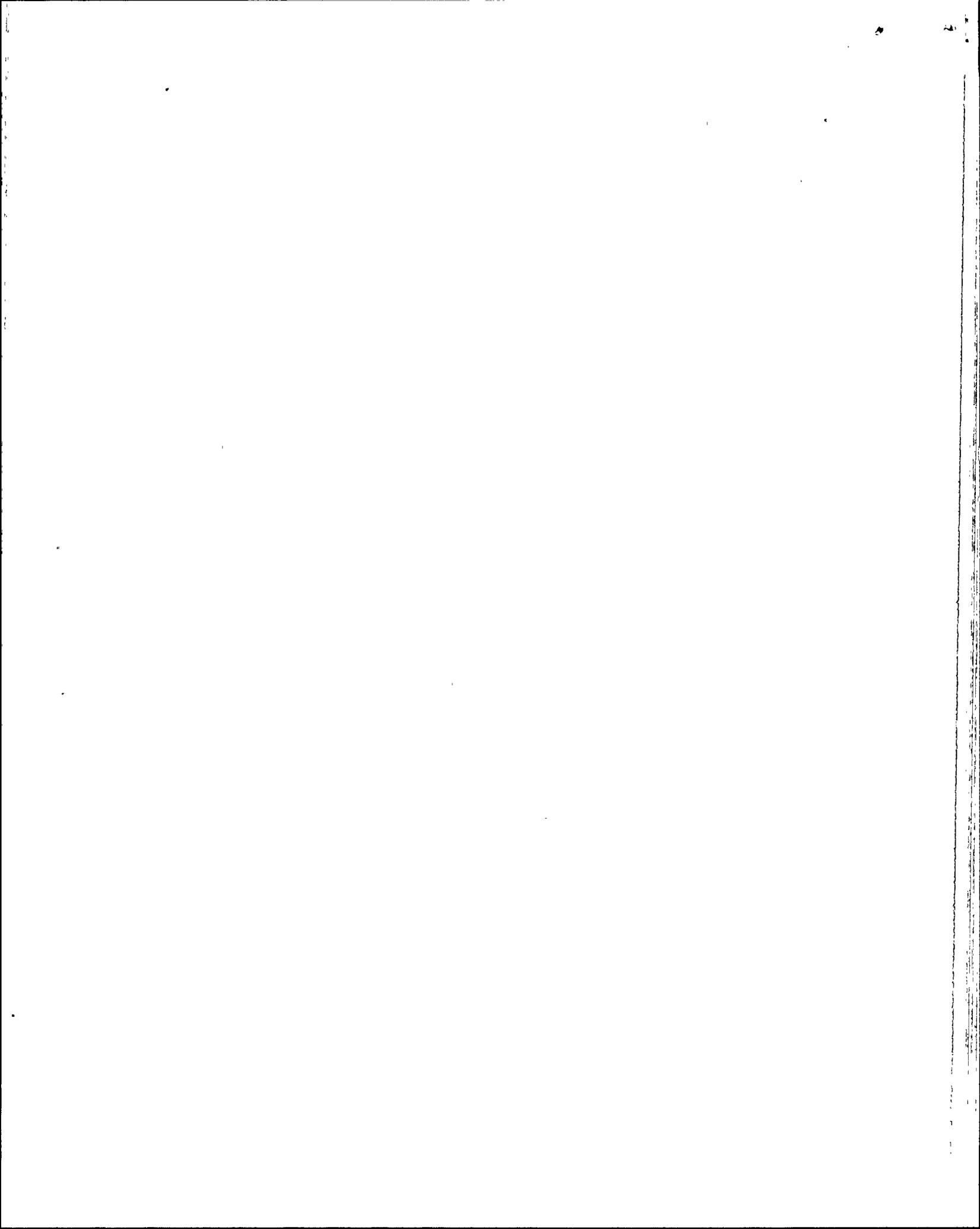
REFERENCE

Reactor Vessel LP, p.28

LO E013

(2.3/2.8)

002000K6.13



QUESTION 021

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What are, in order, the normal, backup, and emergency sources of makeup water for the spent fuel pool?

- a. VCT, RWT, Condensate Tank
- b. RWT, VCT, Condensate Tank
- c. Condensate Tank, RWT, LRS Recycle Water Tank
- d. RWT, LRS Recycle Water Tank, Condensate Tank

ANSWER

d.

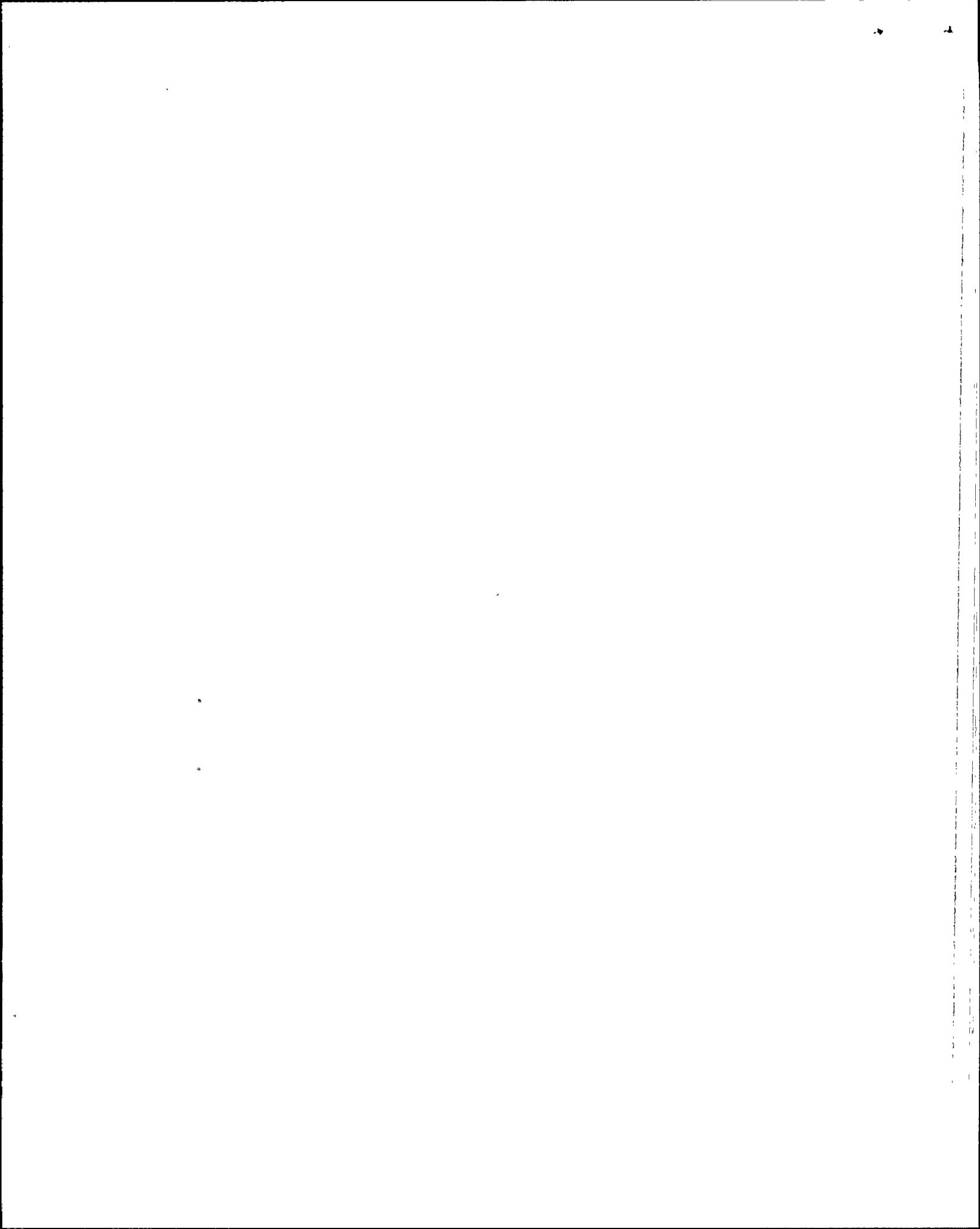
REFERENCE

LP Fuel Pool cooling, p.16

LO E003

(2.9/3.2)

KA 033000K4.01



QUESTION 022

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Why are there siphon breaks in the spent fuel pool cooling and cleanup system piping?

- a. To maintain 8 feet above the fuel for shielding
- b. To maintain 23 feet above the fuel for iodine scrubbing
- c. To maintain NPSH to the fuel pool cooling pumps
- d. To provide for increased circulation during normal operation

ANSWER

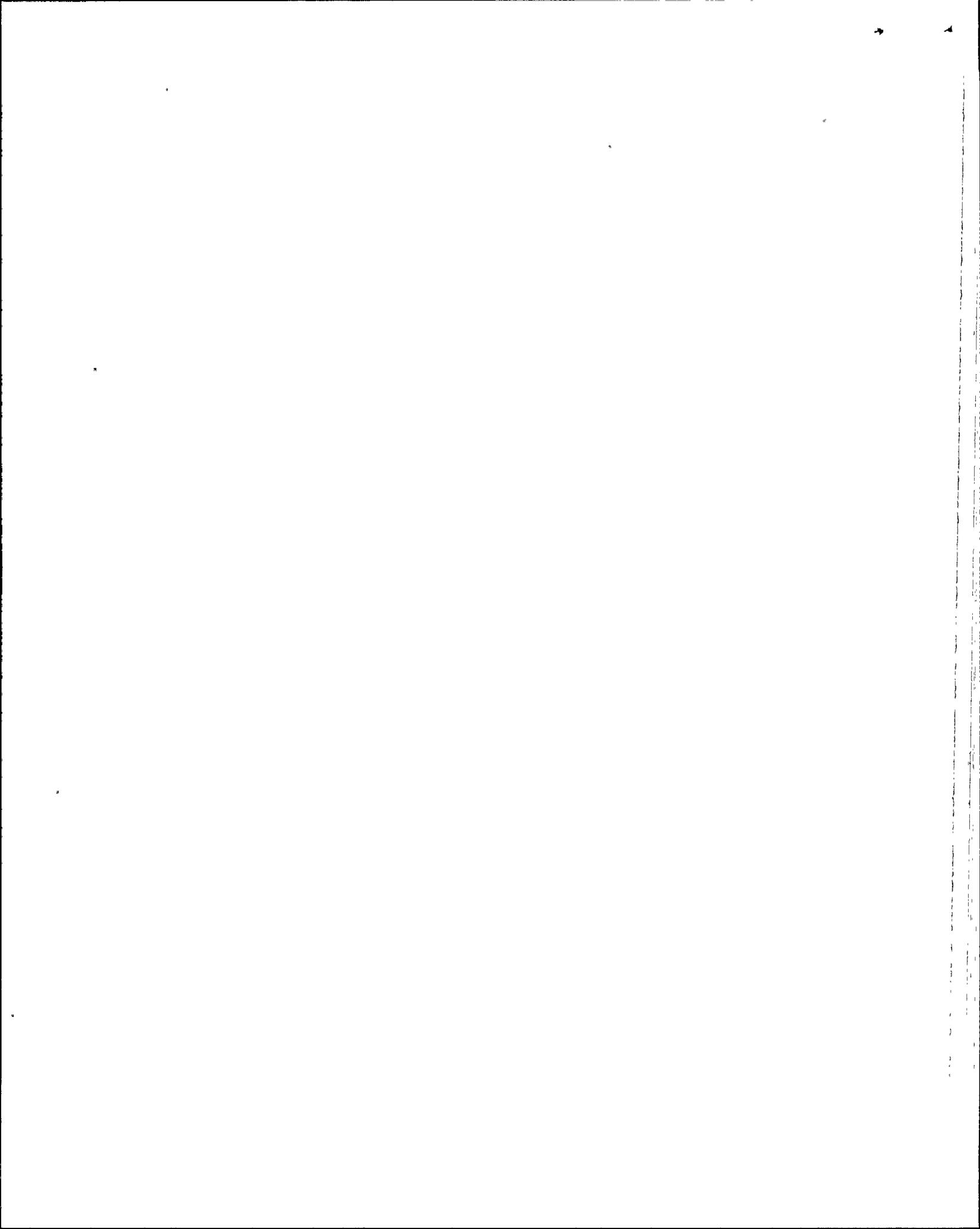
a.

REFERENCE

LP fuel pool cooling, p. 9, LO E001

(2.7/3.3)

KA 033000A1.01



QUESTION 023

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The shutdown cooling cross connect is to be used to augment fuel pool cooling.

What is the preferred pump to be used and why?

- a. LPSI because there is less danger of runout.
- b. CS because there is less danger of runout.
- c. LPSI because flow instrumentation will be bypassed.
- d. CS because miniflow to the RWT will not be a concern.

ANSWER

b.

REFERENCE

LP fuel pool cooling, p. 22, LO E004.b

(2.5/2.7)

KA 033000K1.02



QUESTION 024

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The Reactor Coolant System is at 0 % of rated thermal power with K eff less than 0.99 and Cold Leg Temperature at 220 degrees F. Volume in the spent fuel pool is 133 feet 0 inches. Tech Spec 3.1.2.6 is attached.

What action, if any, is REQUIRED per TS 3.1.2.6?

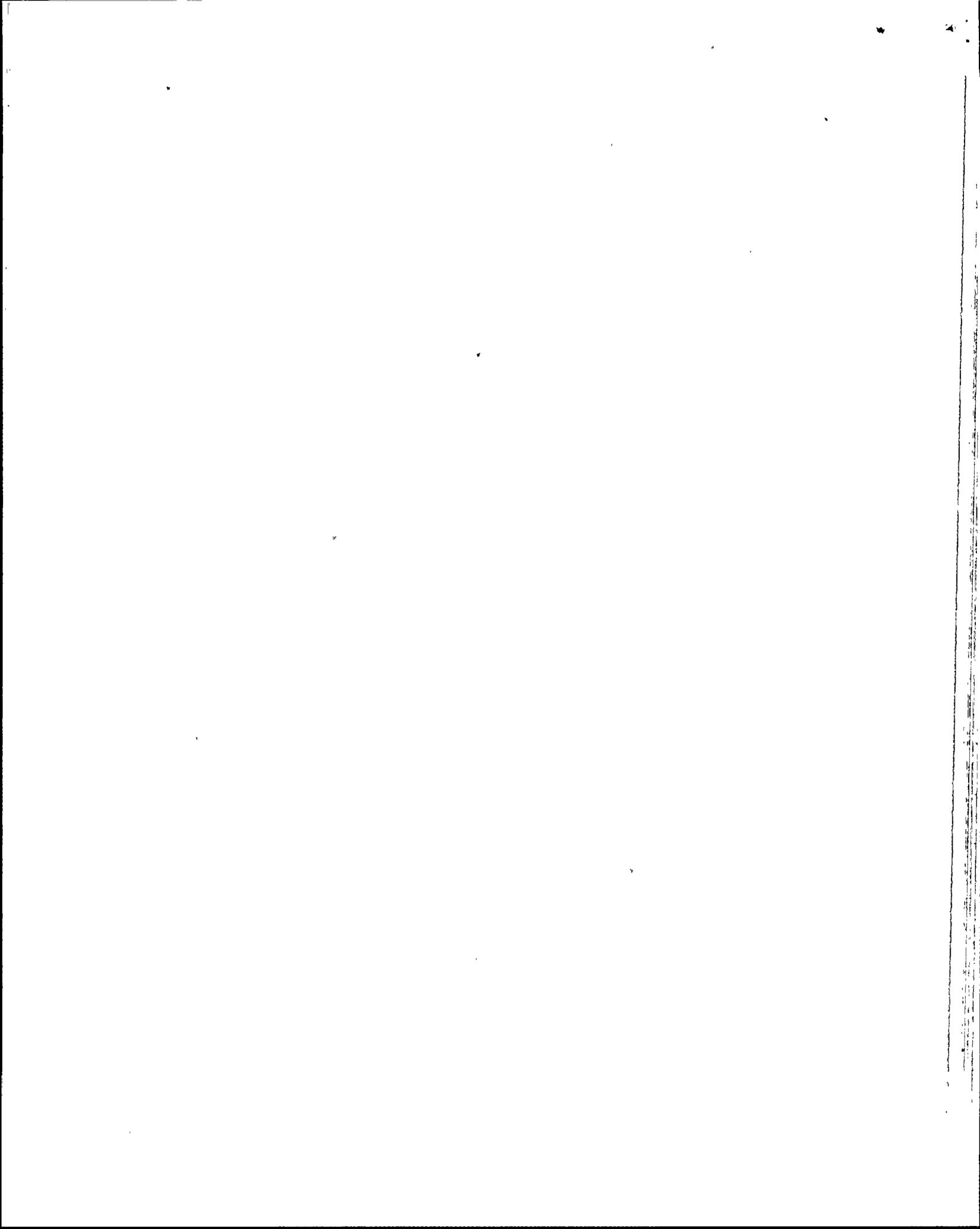
- a. No action is required
- b. Lower Cold Leg Temperature to less than 210 degrees within 78 hours.
- c. Lower Cold Leg Temperature to less than 180 degrees within 276 hours.
- d. Lower Cold Leg Temperature to less than 210 degrees within 198 hours.

ANSWER

d.

REFERENCE  
TS 3.1.2.6

(2.4/3.4)  
KA 033G011



QUESTION 025

(1.0)

MULTIPLE CHOICE (Select the correct answer)

A core reload is in progress. The Bridge Drive is in the AUTO mode. The Bridge control switch is midway between neutral and forward. The Bridge is exactly midway between the core and the fuel transfer carrier with a new fuel assembly being transported.

What would you expect bridge speed to be?

- a. 0 FPM
- b. 15 FPM
- c. 30 FPM
- d. 40 FPM

ANSWER

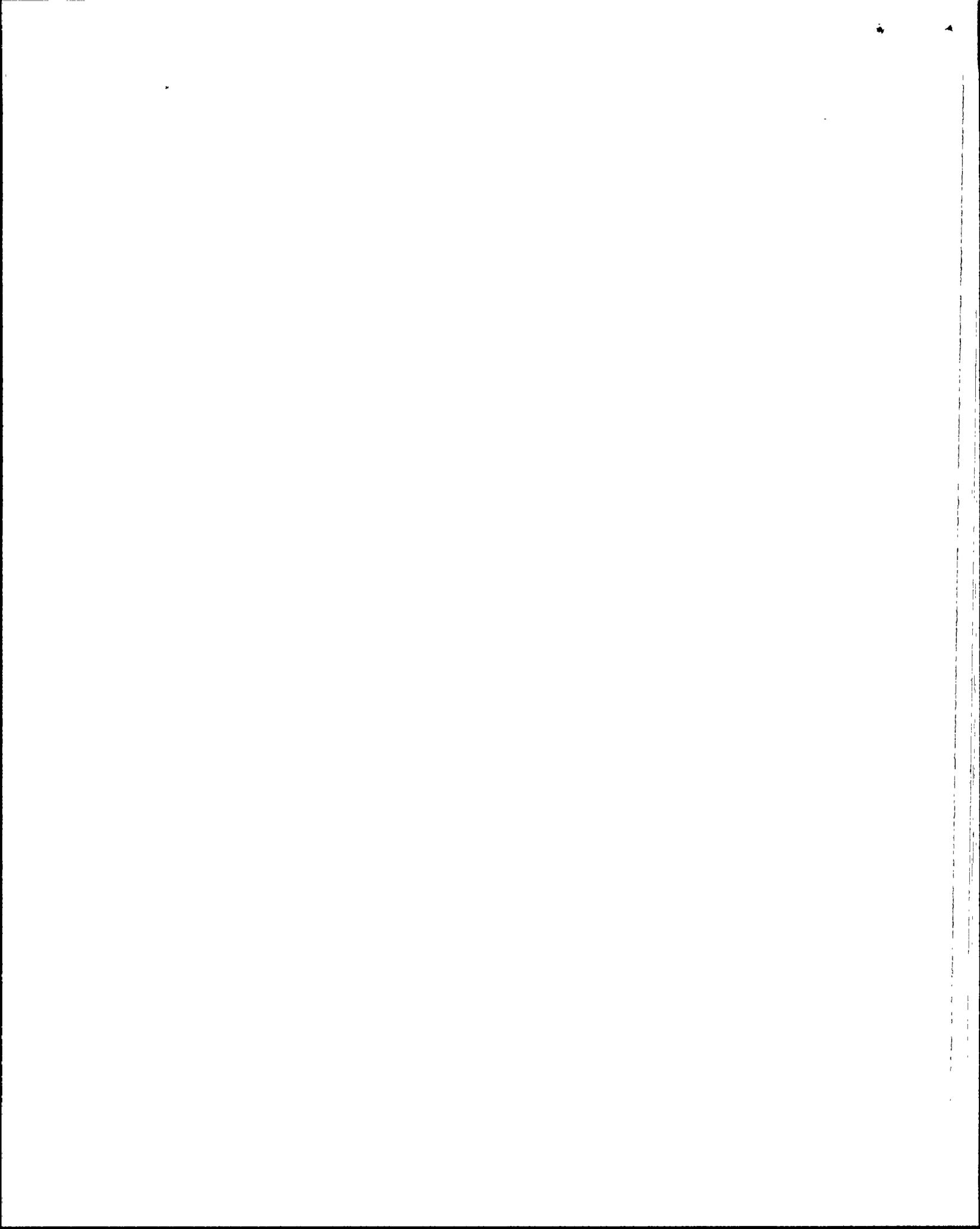
c.

REFERENCE

LP Refuel Mach, p. 11, LO E007

(2.1/3.0)

KA 034000K6.01



QUESTION 026

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The Refueling Machine enters the Reactor Tilt Machine Zone during a normal core offload. The operator notes that the upender is horizontal when he or she enters the zone.

Is this a problem and why or why not?

- a. No, because the interlock that should prevent this is normally overridden.
- b. No, because there is no interlock to prevent this.
- c. Yes, because this should not be possible because of an interlock.
- d. Yes, because the mast bumper interlock may be overridden.

ANSWER

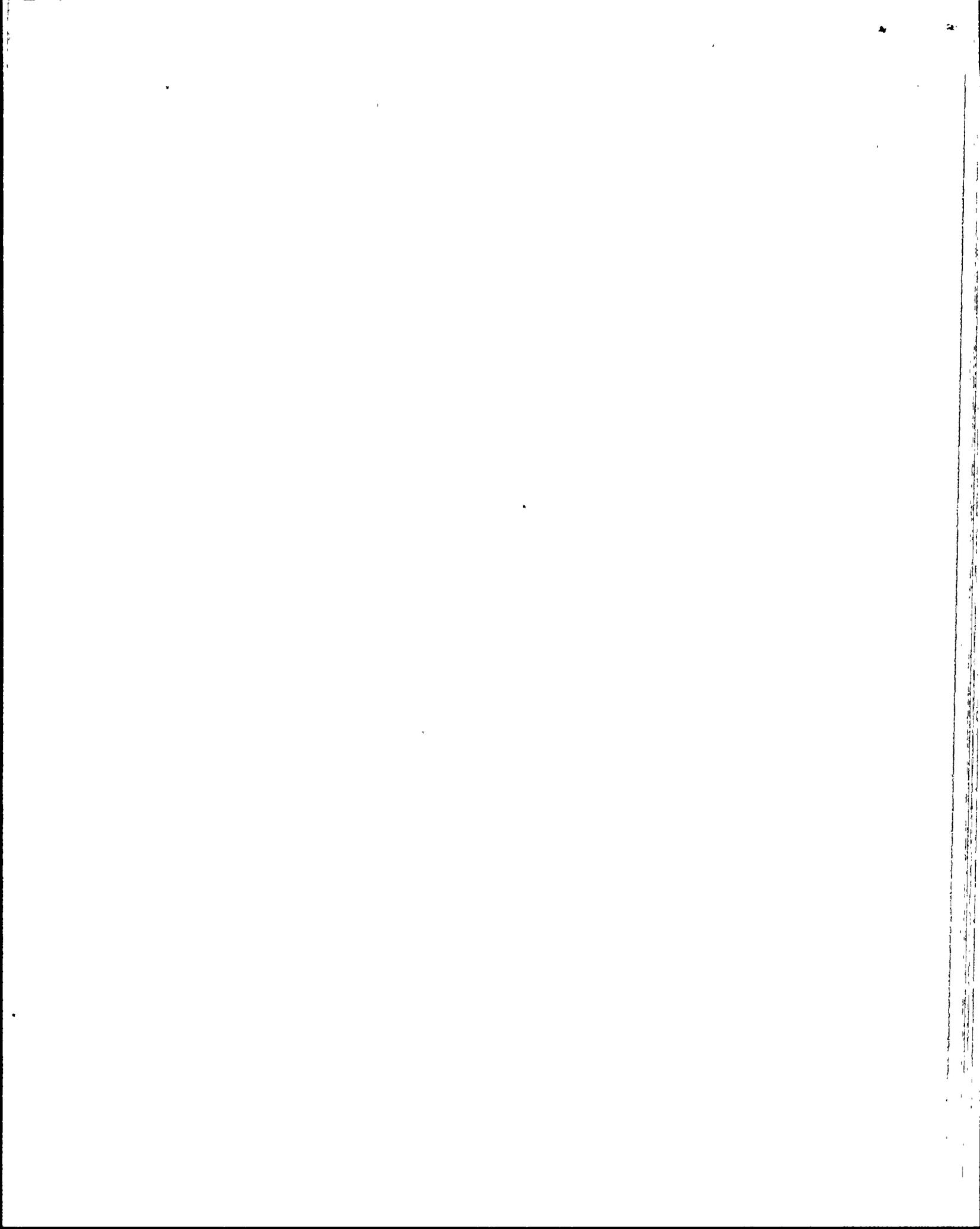
c.

REFERENCE

LP Refuel Mach, p.32, LO E012

(2.5/3.1)

KA 034000A3.01



QUESTION 027

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following should stop downward movement of the hoist?

- a. The hoist is at an overload condition.
- b. The hoist is at an underload condition.
- c. The mast bumper is actuated.
- d. The upender is not vertical.

ANSWER

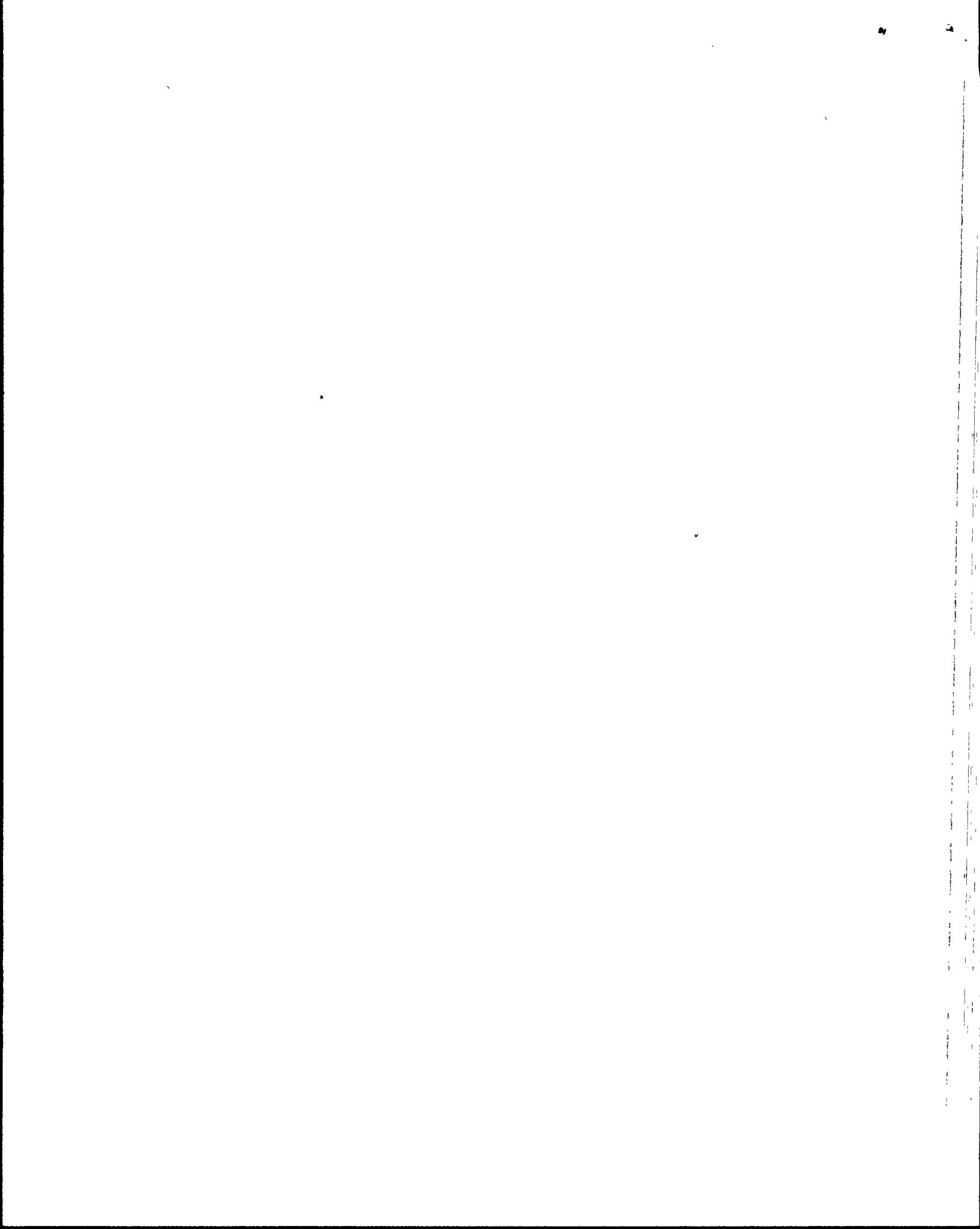
b.

REFERENCE

LP Study Guide Refuel Mach, p.16, LO LTO

(2.5/3.1)

KA 034000A3.02



QUESTION 028

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the source of motive power for vertical motion of the HOIST BOX?

- a. Synchronous motor.
- b. Air pressure.
- c. Induction motor.
- d. Fluid hydraulics.

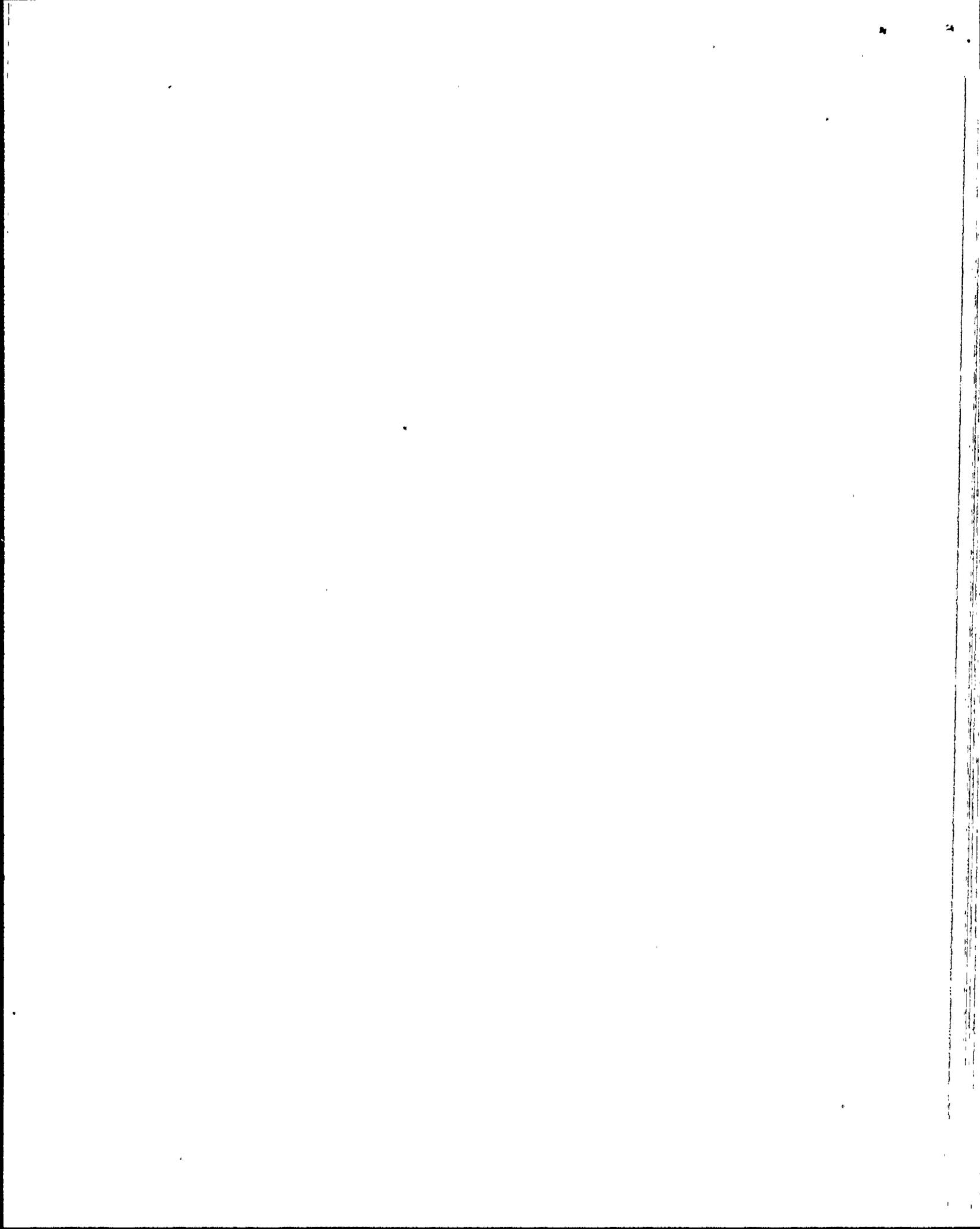
ANSWER

c.

REFERENCE

LP Refuel Mach, self study, p. 7  
LP Motors, p. 23

(2.5/3.3)  
034000K4.02



QUESTION 029

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Attached is an unlabeled diagram of the Fuel Hoist Assembly. As indicated in the diagram a fuel assembly is grappled. A normal core offload is in progress.

In which ZONE of the REFUELING POOL would you expect the Fuel Hoist Assembly to be as indicated in the diagram?

- a. Core Clear Zone.
- b. Intermediate Storage Rack Zone.
- c. Reactor Tilt Machine Zone.
- d. Alignment Pin Zone.

ANSWER

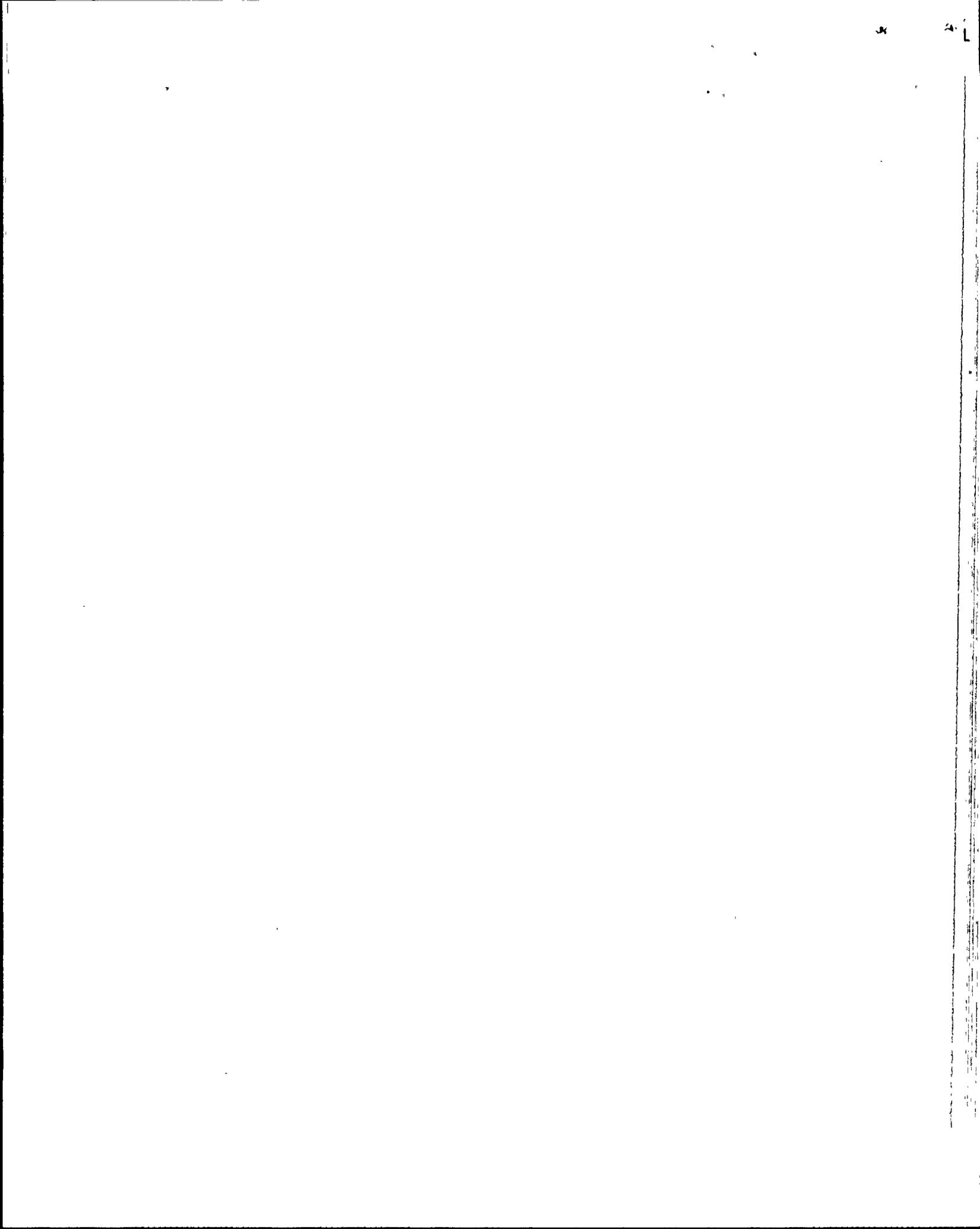
a.

REFERENCE

LP Refuel Mach, p.17, LO E004

(2.3/2.9)

KA 034G001



QUESTION 030

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What does the LATCHED indication, on the vertical control panel of the refueling machine, directly indicate?

- a. The hoist box is on the uplatch.
- b. The hoist is fully up.
- c. Engagement of the fuel assembly is allowable.
- d. An empty grapple may be closed.

ANSWER

a.

REFERENCE

LP Refuel Mach. p. 23

(2.6/2.9)

KA 034G08

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice.

2. The second part of the document outlines the procedures for handling discrepancies. It states that any variance between the recorded amounts and the actual amounts must be investigated immediately.

3. The third part of the document describes the process of reconciling accounts. It requires that all accounts be reconciled at the end of each month to ensure that the books are balanced.

4. The fourth part of the document discusses the role of the auditor. It states that the auditor's primary responsibility is to verify the accuracy and completeness of the financial records.

5. The fifth part of the document outlines the requirements for the annual financial statement. It states that the statement must be prepared in accordance with the applicable accounting standards.

6. The sixth part of the document discusses the importance of transparency. It states that all financial transactions should be recorded in a clear and concise manner.

7. The seventh part of the document outlines the consequences of non-compliance. It states that failure to maintain accurate records may result in penalties and legal action.

8. The eighth part of the document discusses the role of the management. It states that management is responsible for ensuring that the financial records are accurate and complete.

9. The ninth part of the document outlines the requirements for the internal control system. It states that the system should be designed to prevent and detect errors and fraud.

10. The tenth part of the document discusses the importance of regular audits. It states that regular audits are essential for ensuring the accuracy and reliability of the financial records.

QUESTION 031 (1.0)

MULTIPLE CHOICE (Select the correct answer)

What is the power supply for LPSI pump "B"?

- a. NBN-S01
- b. NBN-S02
- c. PBA-S03
- d. PBB-S04

ANSWER

d.

REFERENCE

LP Shutdown cooling, p. 9, LO E003

(3.0/3.2)

KA 005000K2.01



QUESTION 032

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is refueling. Core offload is in progress. The Control Room reports a loss of shutdown cooling to the LSRO.

Which one of the following conditions, in the refueling pool, indicates a loss of shutdown cooling?

- a. Surging in the water and decreased thermal gradient.
- b. Water level change and changes in flow bubbles.
- c. Changes in flow bubbles and the reactivity approaching zero.
- d. Decreased thermal gradient and water level change.

ANSWER

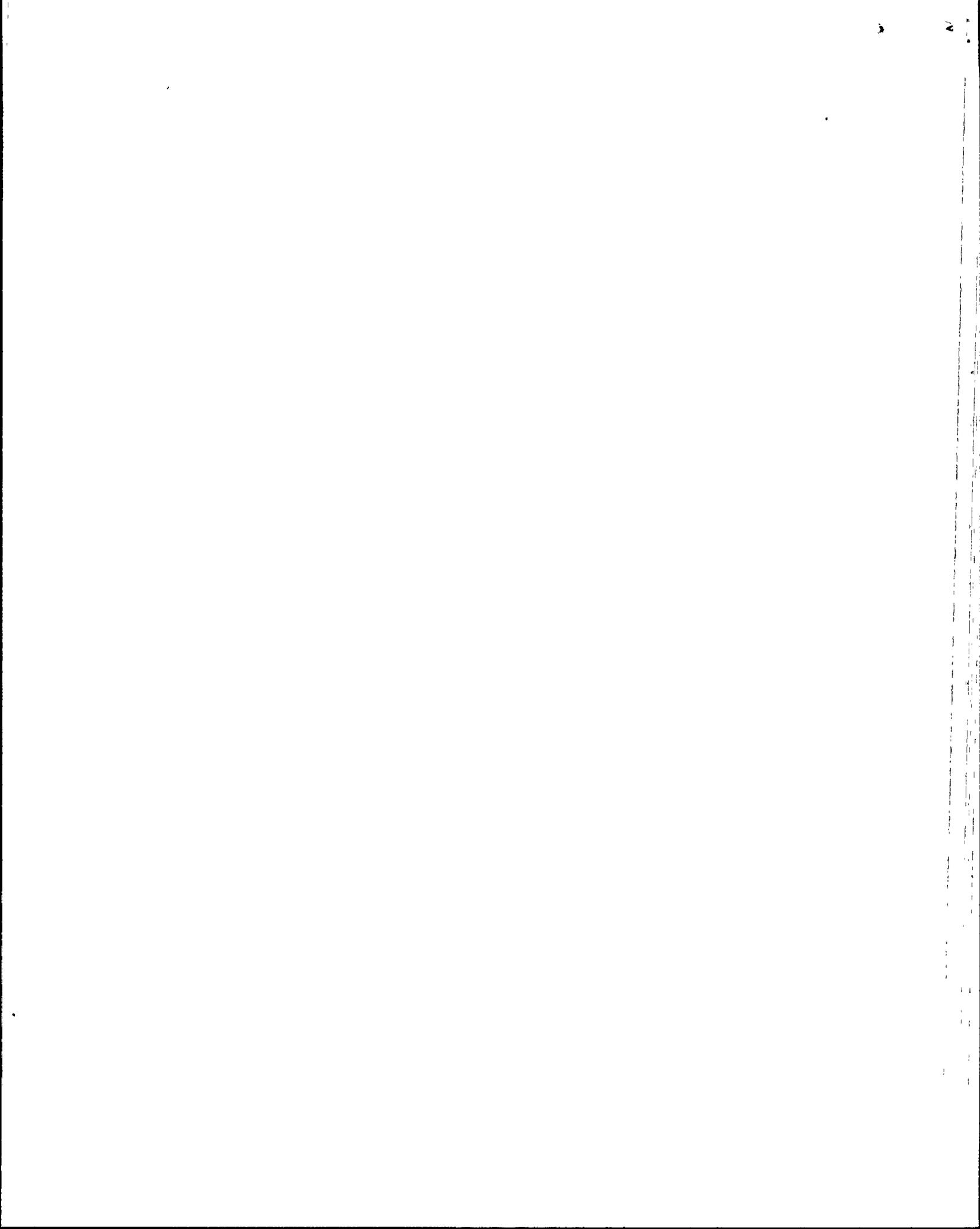
b.

REFERENCE

LP shutdown cooling, p.22, LO E006

(3.2/3.6)

KA 005000K3.07



QUESTION 033

(1.0)

MULTIPLE CHOICE (Select the correct answer)

A plant cooldown is in progress with substantial core decay heat generation. The shutdown cooling system is in service.

In order to maintain the same cooldown rate, what should happen to reactor coolant flow through the shutdown cooling heat exchanger and to reactor coolant flow bypassing the heat exchanger? (cooling water flow and cooling water inlet temperature to the heat exchanger are constant)

- |    | Heat Exchanger Flow | Bypass Flow |
|----|---------------------|-------------|
| a. | Decrease            | Increase    |
| b. | Constant            | Constant    |
| c. | Increase            | Constant    |
| d. | Increase            | Decrease    |

ANSWER

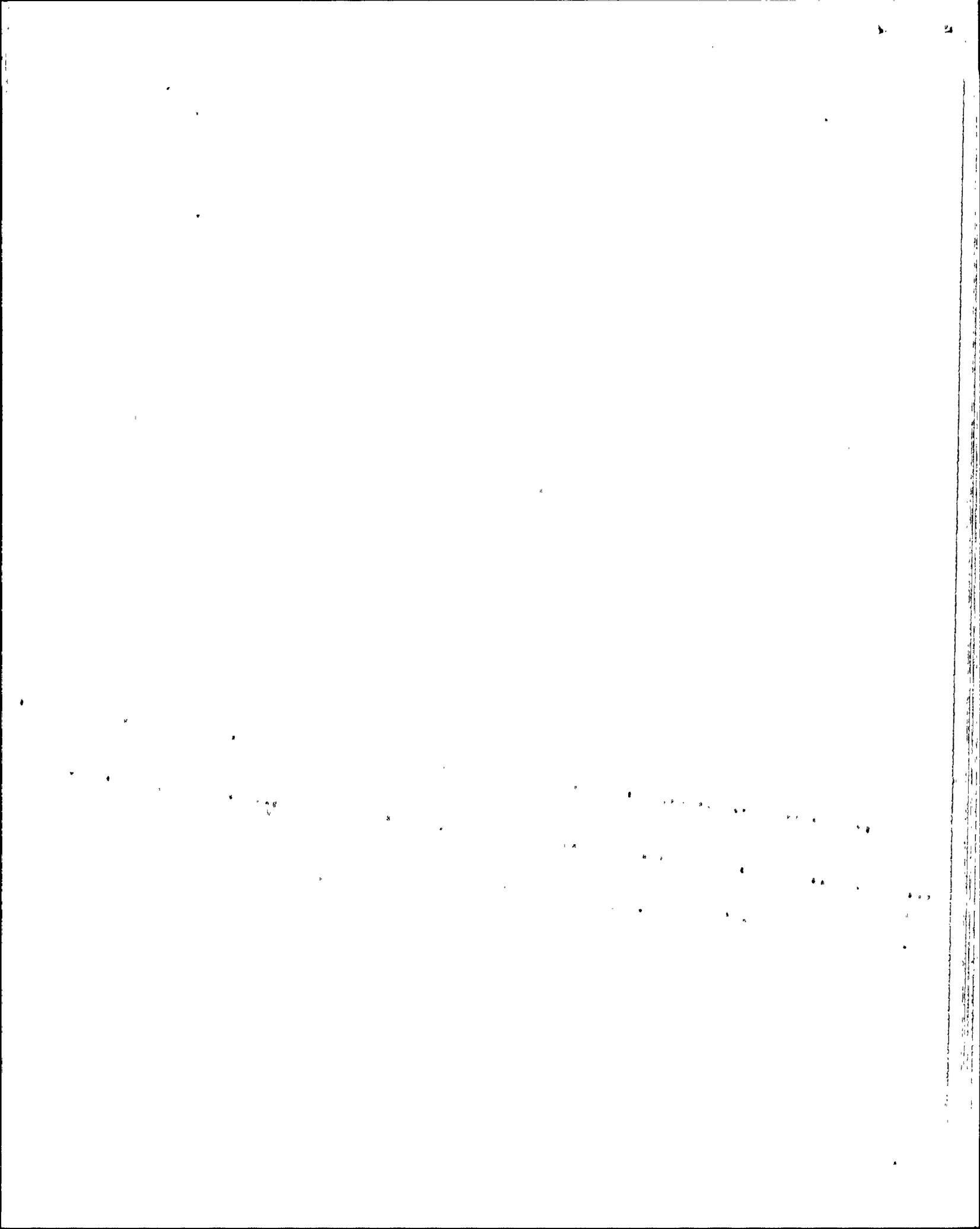
d.

REFERENCE

LP Study Guide, p.17 LO E004

(3.4/3.1)

KA 005000A4.02



QUESTION 034 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Essential Cooling Water (EW) pumps will auto start on which one of the following? (Assume no other signals present)

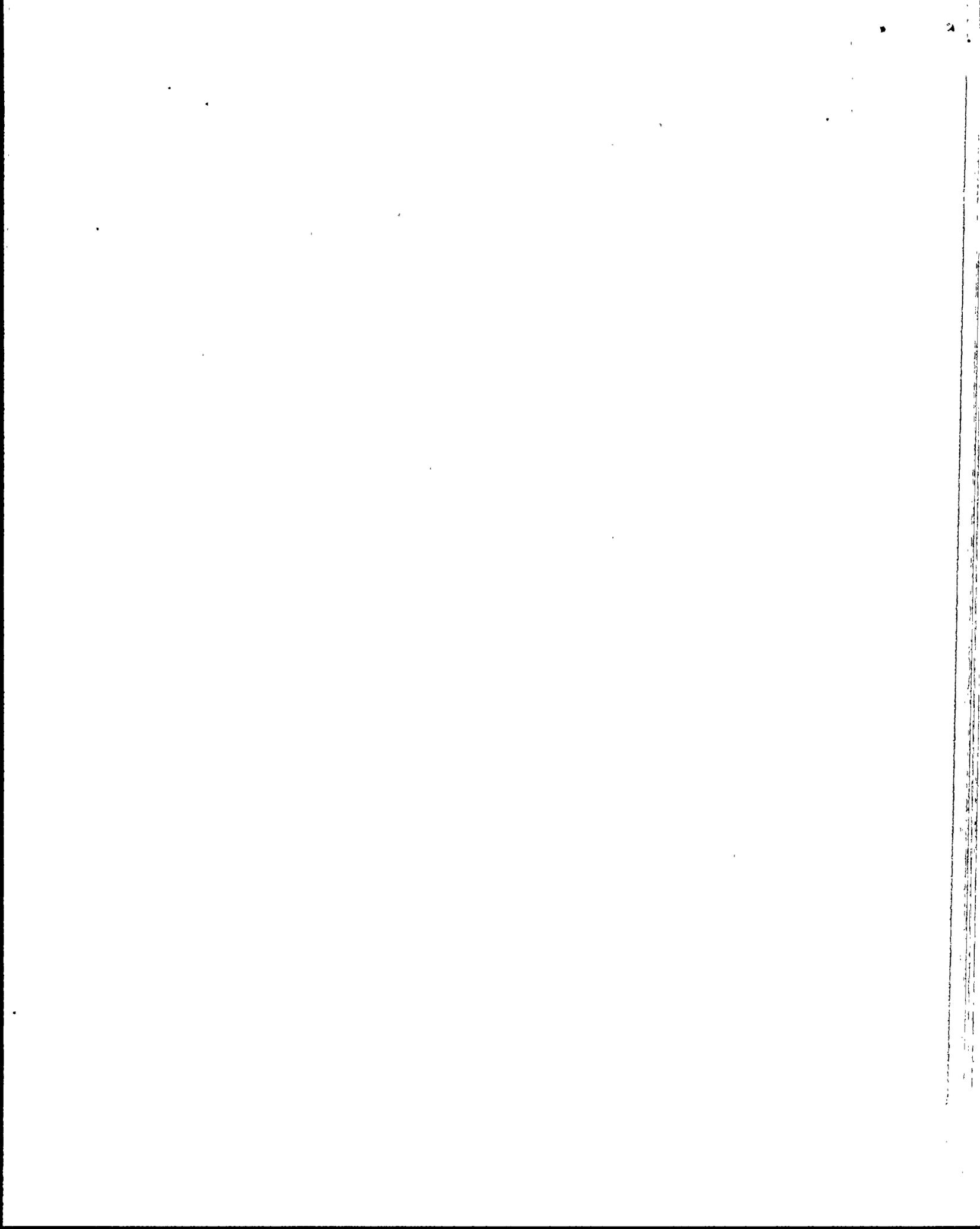
- a. CSAS
- b. Reactor Trip
- c. Reactor Cutback
- d. LOP

ANSWER

d.

REFERENCE  
LP EW/NC Self study guide p. 5, LO E004

(3.3/3.6)  
KA 008000A2.01



QUESTION 035 (1.0)

MULTIPLE CHOICE (Select the correct answer)

The following communication takes place between the LSRO on the refueling floor and the Control Room Shift Supervisor in the control room :

Shift Supervisor: "LSRO this is the shift supervisor, Close PCN-V118, the fuel transfer tube isolation."

LSRO: "I understand and will comply."

Is this MINIMALLY proper communication per guidelines and why?

- a. Yes, because it was acknowledged sufficiently.
- b. Yes, because originator and recipient were identified.
- c. No, because the shift supervisor used TWO names for the valve and it is not brief.
- d. No, because the LSRO didn't repeat back the valve AND intended position.

ANSWER

d. .

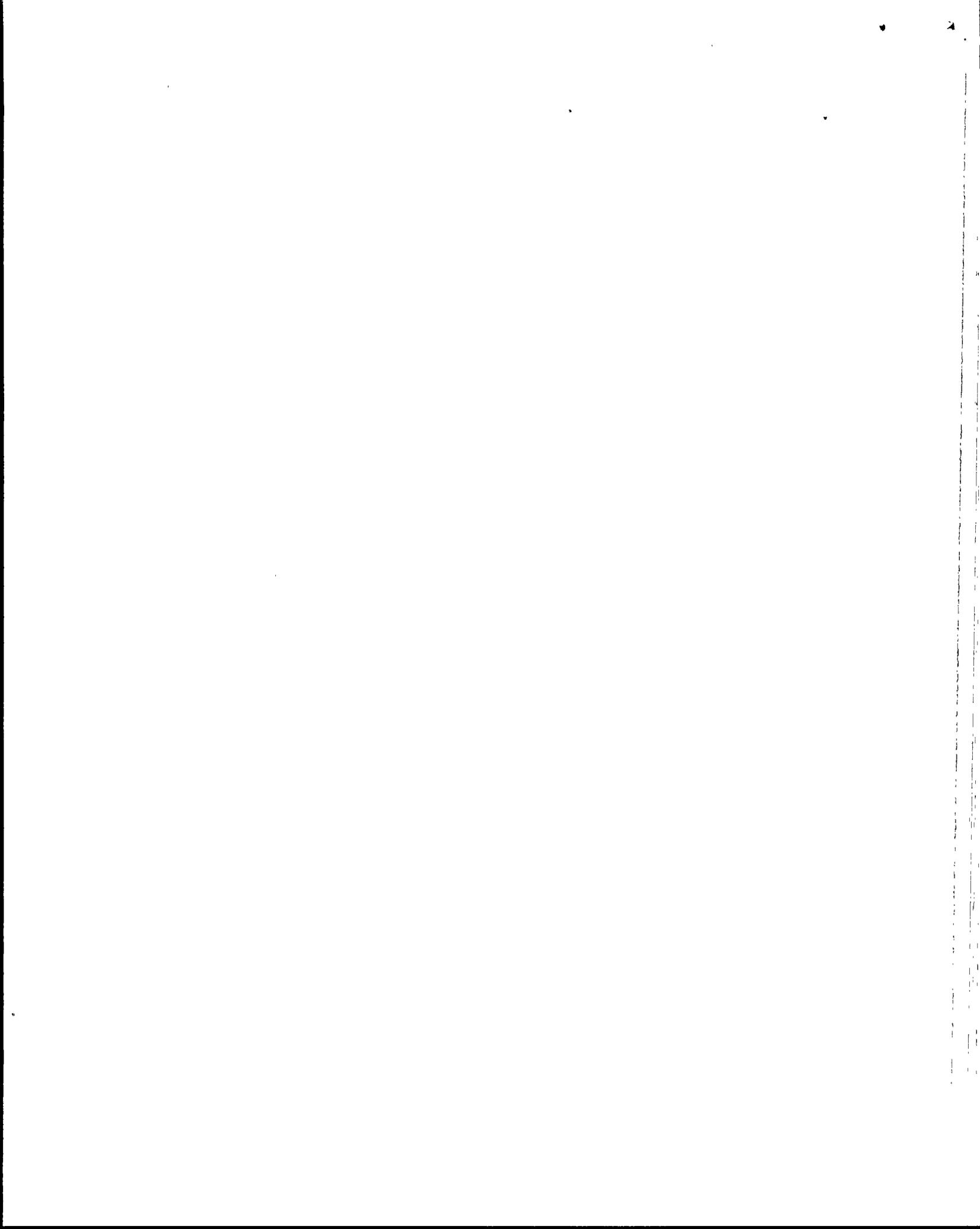
REFERENCE

40AC90P02, 3.2.5

LO E001, LP Mode 6 OPs,p.22

(3.6/3.8)

KA 194001A1.05



QUESTION 036

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core onload is in progress. A fuel assembly is grappled and the refueling machine is in place preparing to lower the assembly into the core. The LSRO is on the refueling machine. Two Startup Channel Nuclear Instruments are in service.

The LSRO receives a report from the control room that one of the Startup Channel Nuclear Instruments is now reading zero.

What action should the LSRO take first?

- a. Complete placing the assembly into the core.
- b. Place the assembly in an intermediate position in the core.
- c. Maintain the fuel assembly in its present position.
- d. Place the fuel assembly in a safe position outside the core.

ANSWER

d.

REFERENCE

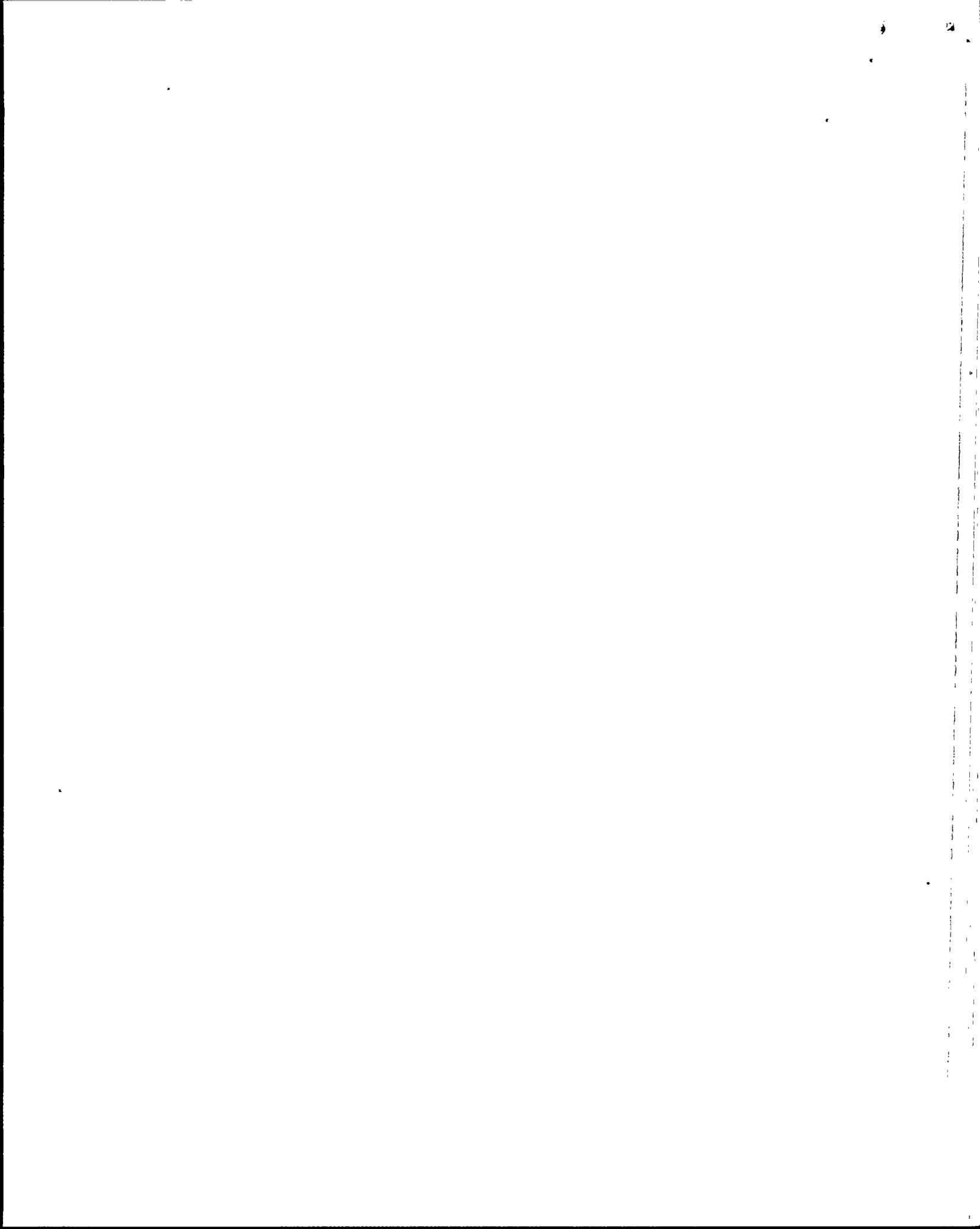
TS LCO 3.9.2, Action a.

TS def. 1-9

41A0-1ZZ26, Caution p. 6

(2.6/3.3)

KA 000032G03



QUESTION 037

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core offload is in progress. Approximately half of the fuel assemblies have been offloaded. You are the LSRO on the refueling machine. You are over the core and have just grappled your next fuel assembly, retracted the spreader, and are raising the hoist to the up limit.

You note bubbles emerging from the fuel assembly you are raising and it appears twisted.

What should you do FIRST?

- a. Open the grapple and evacuate the area.
- b. Hoist down to auto stop and open the grapple.
- c. Continue to raise hoist to the up limit and position machine mast at a location away from other fuel assemblies but still in the core.
- d. Continue to raise hoist to the up limit and position machine mast at the upender.

ANSWER

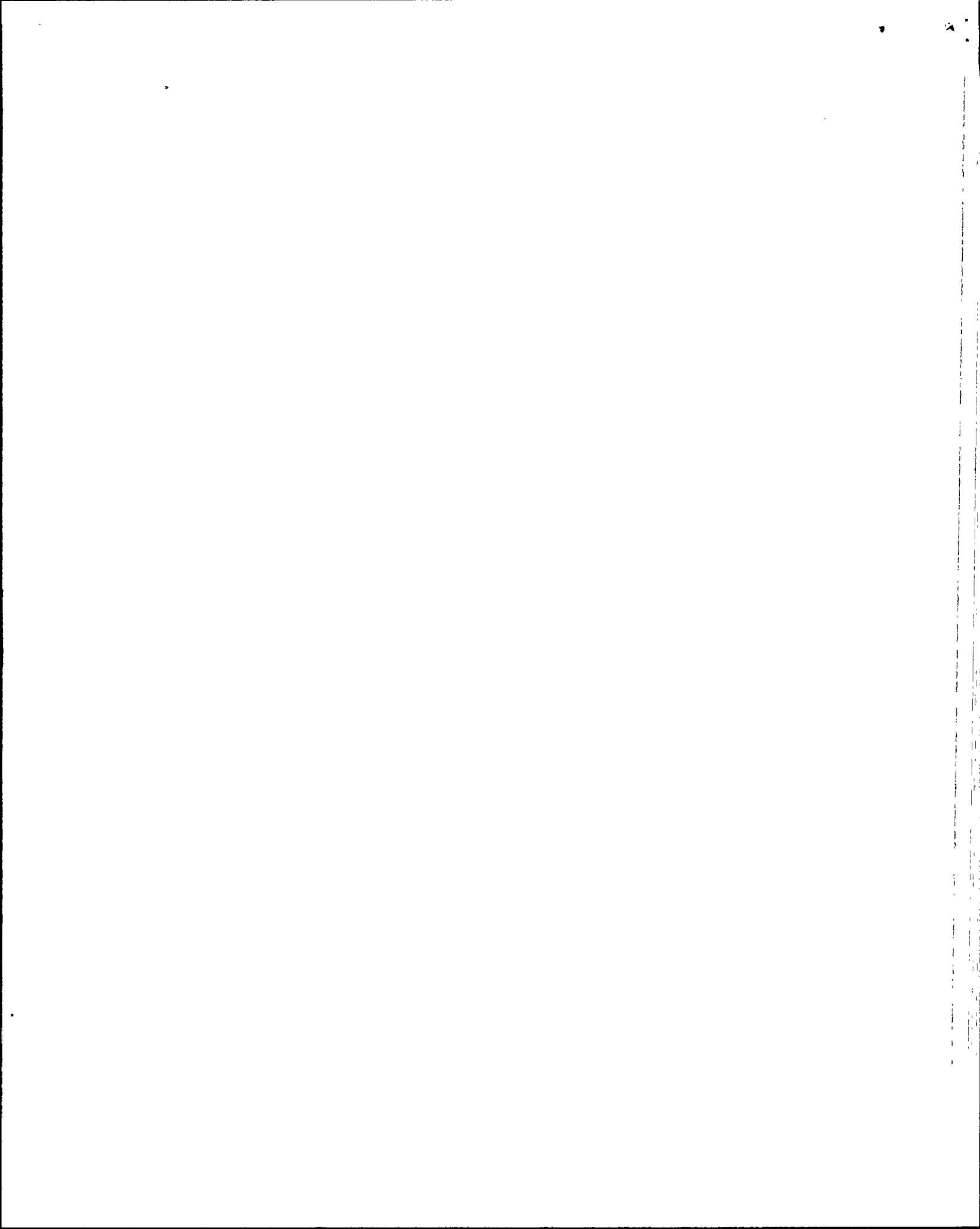
b.

REFERENCE

41A0-1ZZ26, step 3.1 and Caution  
LO E003, E002 LP Refuel Proc

(3.1/3.7)

KA 000036EA1.04



QUESTION 038

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core offload is in progress. Approximately half of the fuel assemblies have been offloaded. You are the LSRO on the refueling machine. You are over the core and have just grappled your next fuel assembly, retracted the spreader, and are raising the hoist to the up limit.

J-SQA-RU-33, "Refueling Machine Area Monitor," alarms and it is a valid alarm.

What should you do FIRST?

- a. Evacuate the area.
- b. Notify RP to perform surveys.
- c. Ensure a FBEVAS is actuated.
- d. Position the fuel assembly in a stable configuration.

ANSWER

d.

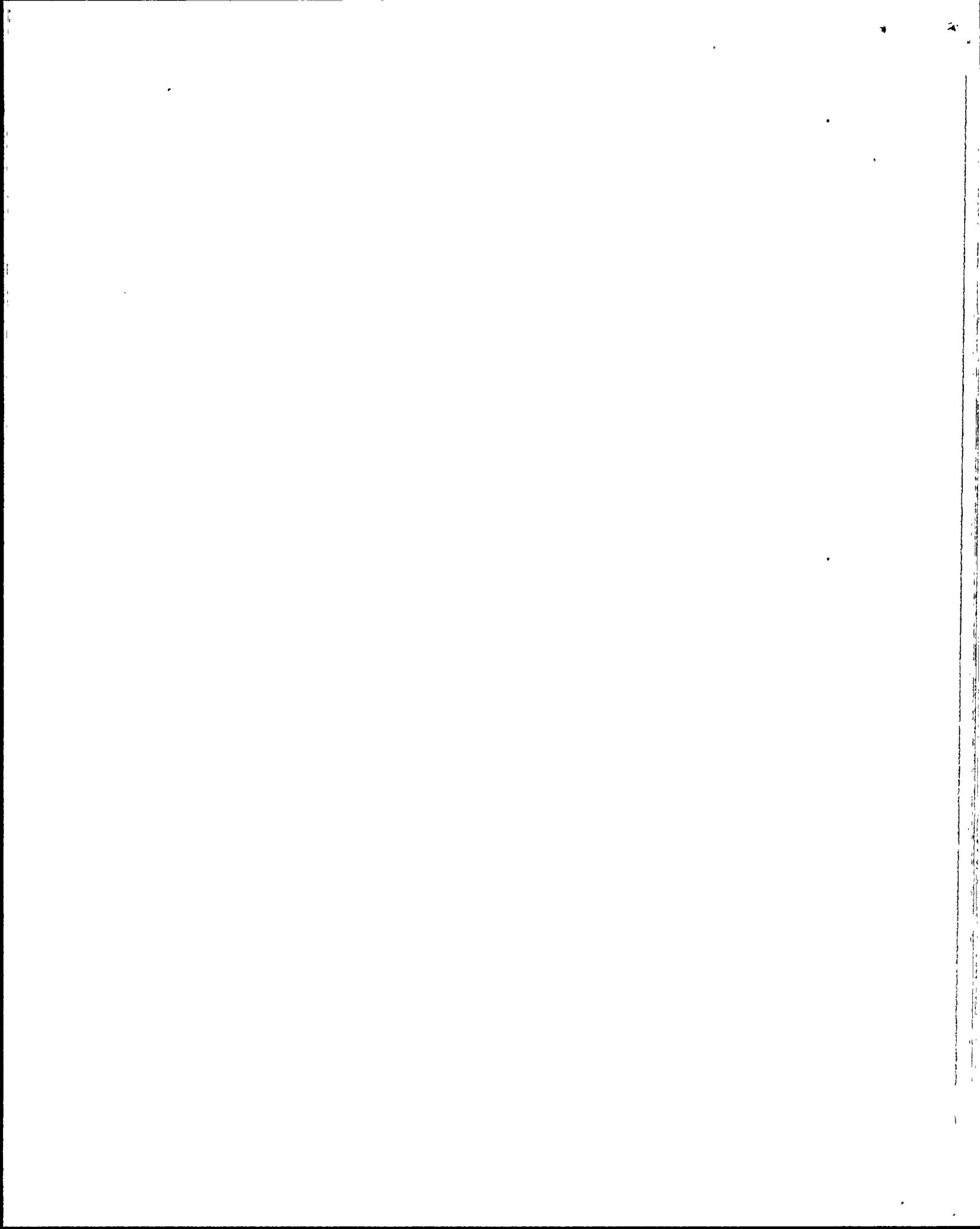
REFERENCE

41A0-1ZZ26, step 2.1

LO E002, E003

(3.5/4.2)

KA 000061EA2.05



QUESTION 039

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in mode 6 and a core offload is in progress. The refueling machine has an irradiated fuel assembly grappled, is positioned over the upender, and the spreader is retracted.

Given the following actions, select the correct sequence to place the fuel assembly in the upender.

- 1) Move hoist up to grapple load weight only and open the grapple.
- 2) Hoist control down, observe hoist box latched.
- 3) Hoist up to UGOZ and close the grapple, then hoist up to up limit.
- 4) Observe cable load change, hoist down to auto stop.
  - a. 4, 2, 1, 3.
  - b. 4, 2, 3, 1.
  - c. 2, 4, 1, 3.
  - d. 2, 4, 3, 1.

ANSWER

c.

REFERENCE

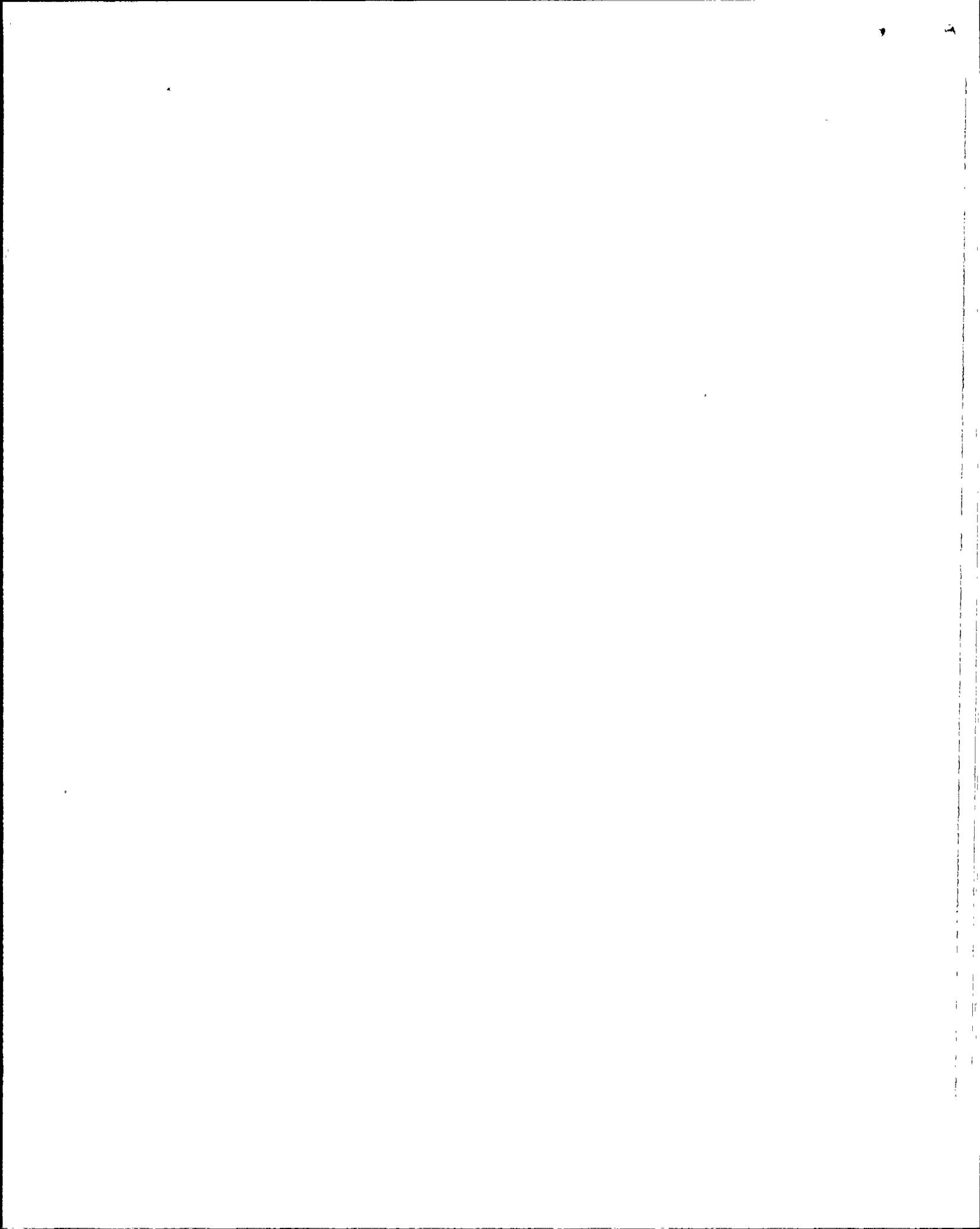
780P-9FX01

LP Self Study Refuel Proced p. 4

LO E003

(3.0/3.0)

KA 034G09



QUESTION 040

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Unit III has specific instructions for operation of the Fuel Transfer Machine.

What is broken in the Unit III Transfer Machine and what precaution is used?

- a. The winch overload is broken so cable stress must be monitored manually.
- b. The horizontal limit switch is broken so upender position must be visually verified.
- c. The vertical limit switch is broken so upender position must be visually verified.
- d. The seismic restraints are broken so temporary restraints are used.

ANSWER

b.

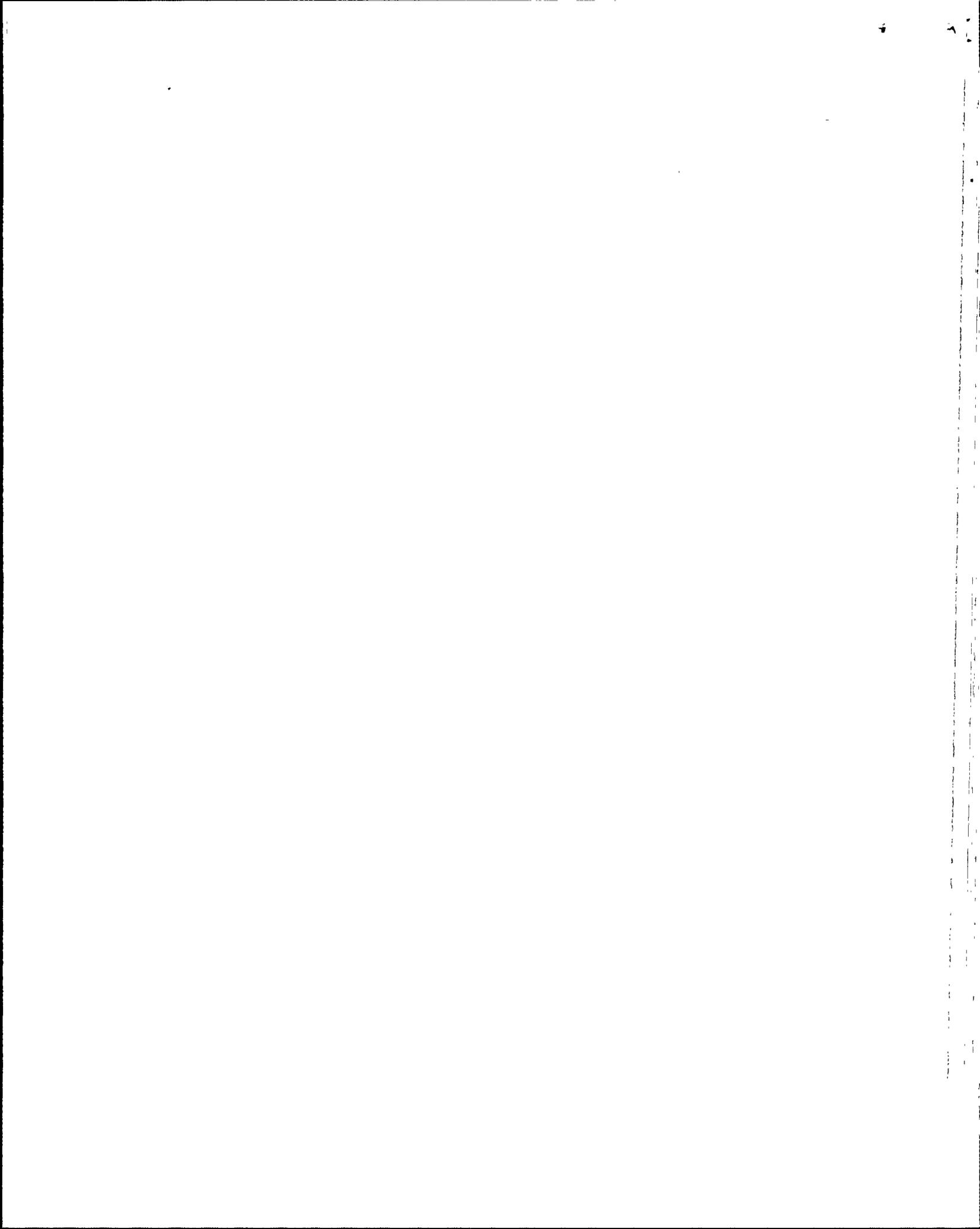
REFERENCE

780P-9FX02

Refuel Pro LP p. 23., LO E003

(2.7/2.9)

034G10



QUESTION 041

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Concerning the Spent Fuel Handling Machine, manual hoist operations are permitted only to place a fuel assembly in a safe position.

What is the basis for this restriction?

- a. There is no variable speed feature in manual.
- b. Manual operations require additional personnel.
- c. Manual operations do allow use of precluded storage cells.
- d. Limit switch protection is not effective in manual.

ANSWER

d.

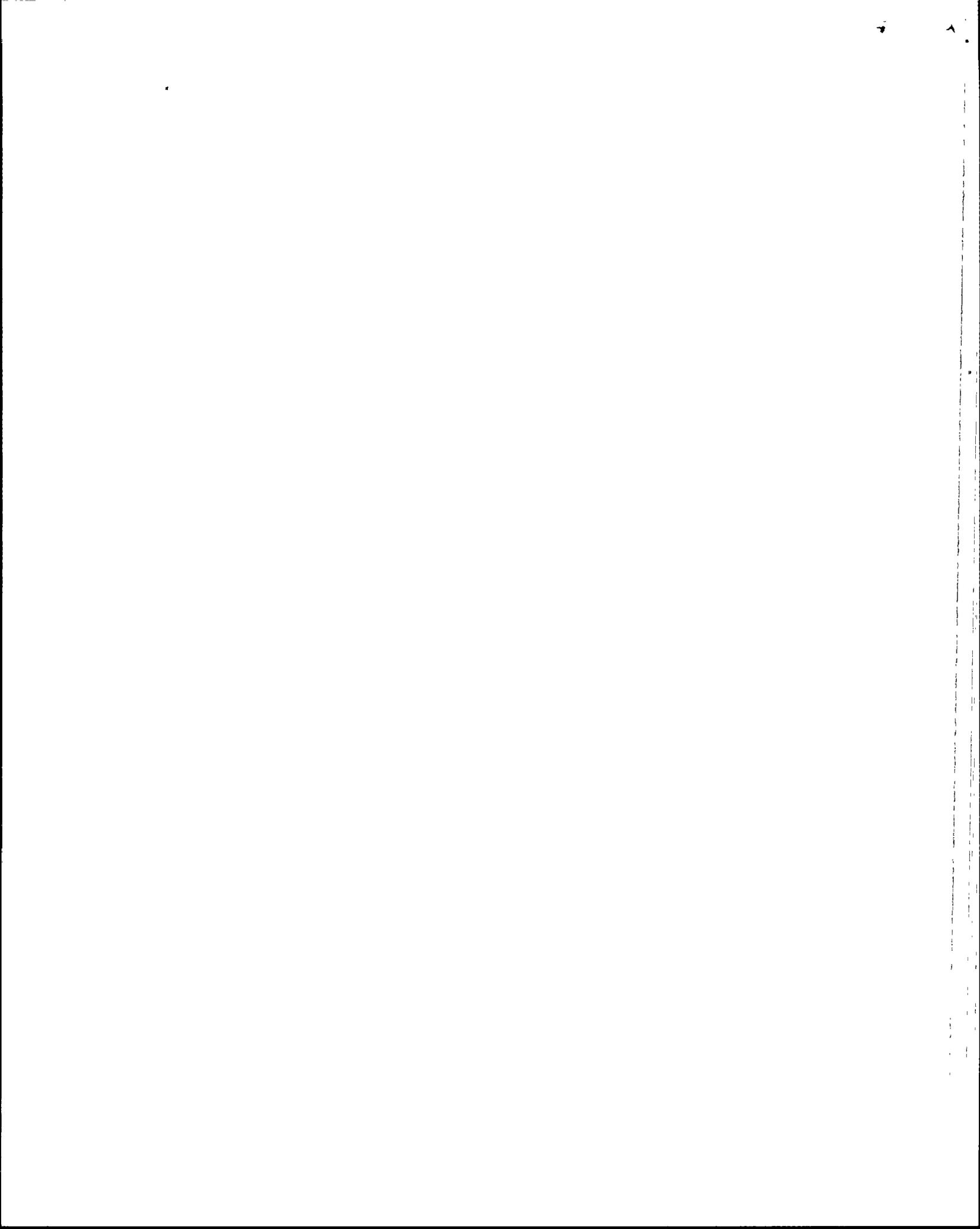
REFERENCE

780P-9FX03, p.4

LO E003, LP refuel proc

(2.5/3.3)

KA 034000K4.02



QUESTION 042

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Technical Specification 6.2 states that all core alterations shall be observed and directly supervised by a Senior Reactor Operator Limited to Fuel Handling.

Which of the following is a core alteration?

- a. Raising Fuel Pool level.
- b. Moving an irradiated assembly from the upender to the spent fuel pool.
- c. Removing the Reactor Vessel Head.
- d. Core load verification check.

ANSWER

d.

REFERENCE

TS Definitions

LP Tech Spec Def p. 10, LP React Eng, p. 41

LO E002, TS

78DP-9FH05, p.6

(2.9/3.0)

KA 002000K1.02



QUESTION 043

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 with core offload in progress. Plant conditions prevent performing a procedure as written.

What should the operators involved in the performance of the procedure do at this point?

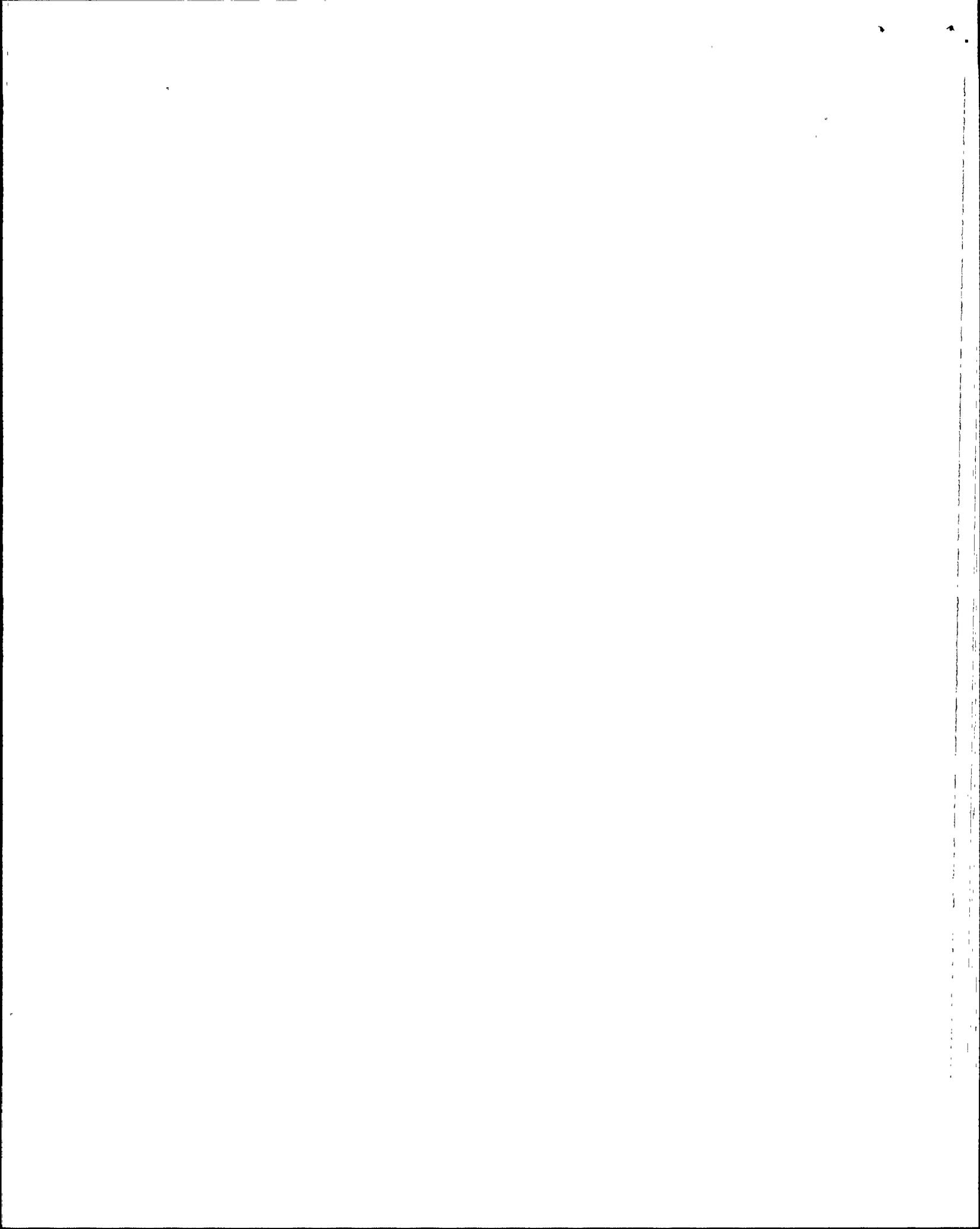
- a. Stop and place the system in a safe configuration.
- b. Stop and comply with the procedure as much as possible.
- c. Attempt to continue and inform supervision.
- d. Attempt to continue in order to complete the task as safely as possible.

ANSWER

a.

REFERENCE  
78DP-9FH05, p.9

(3.1/4.1)  
KA 194001A1.12



QUESTION 044

(1.0)

MULTIPLE CHOICE (Select the correct answer)

This concerns the new fuel storage racks in the fuel building. The new fuel storage racks are designed to be completely dry.

What is the PRINCIPAL reason for the new fuel storage racks to be completely dry?

- a. To minimize corrosion.
- b. To minimize contamination of new fuel.
- c. To minimize (stop) criticality of new fuel.
- d. To minimize (stop) new fuel from slipping in the rack.

ANSWER

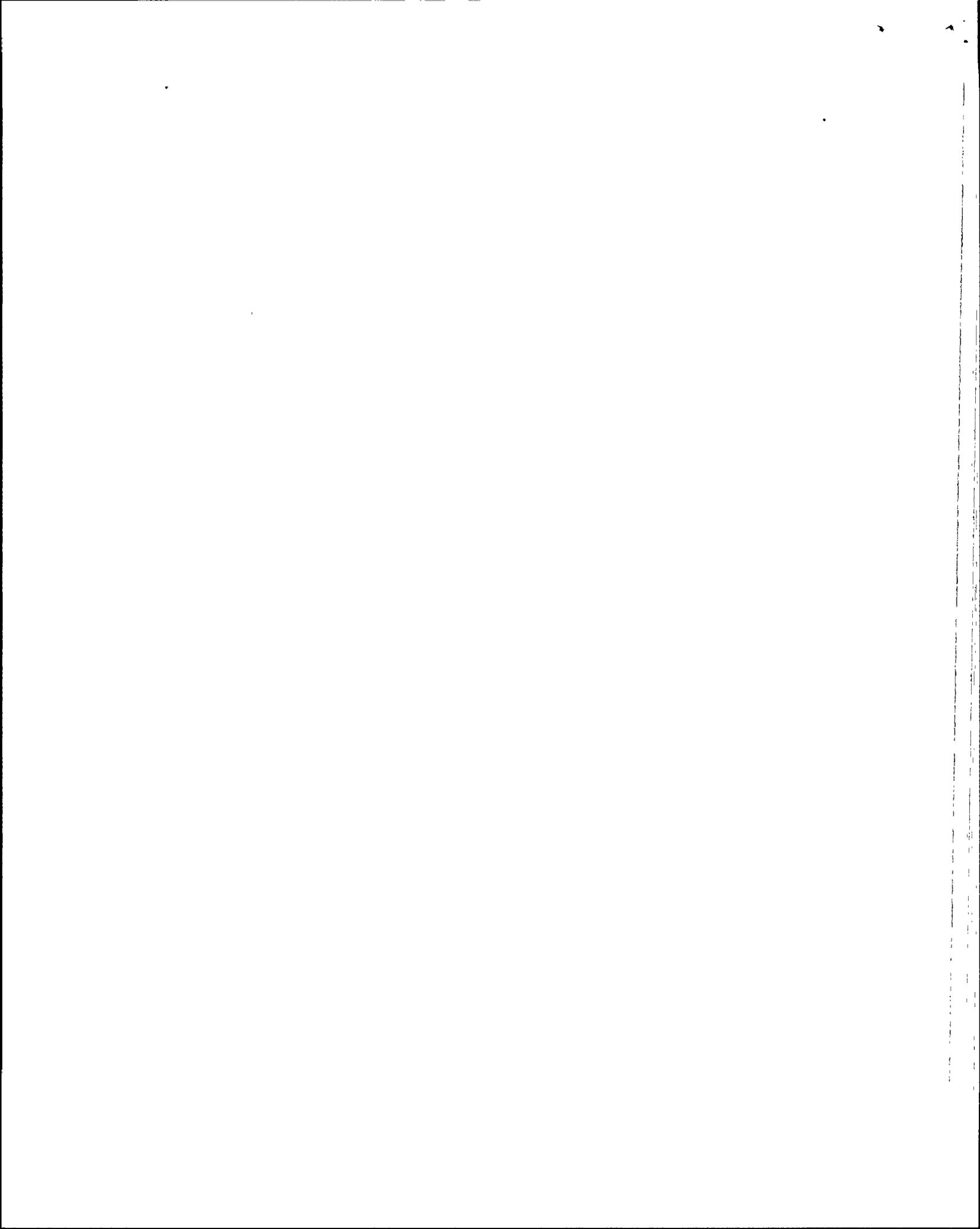
c.

REFERENCE

LP Maint Proc, p. 27, LO E004  
78MT-9FH01

(4.0/4.3)

KA 000036EK1.03



QUESTION 045 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Attached is a diagram showing locations of RU-148 and RU-16.

Which of the following radiation levels do these instruments measure?

- | RU-148                         | RU-16                       |
|--------------------------------|-----------------------------|
| a. Operating Level Area        | Primary Coolant Activity    |
| b. Incore Instrumentation Area | Operating Level Area        |
| c. Containment Area High Range | Operating Level Area        |
| d. Steam Generator Blowdown    | Containment Area High Range |

ANSWER

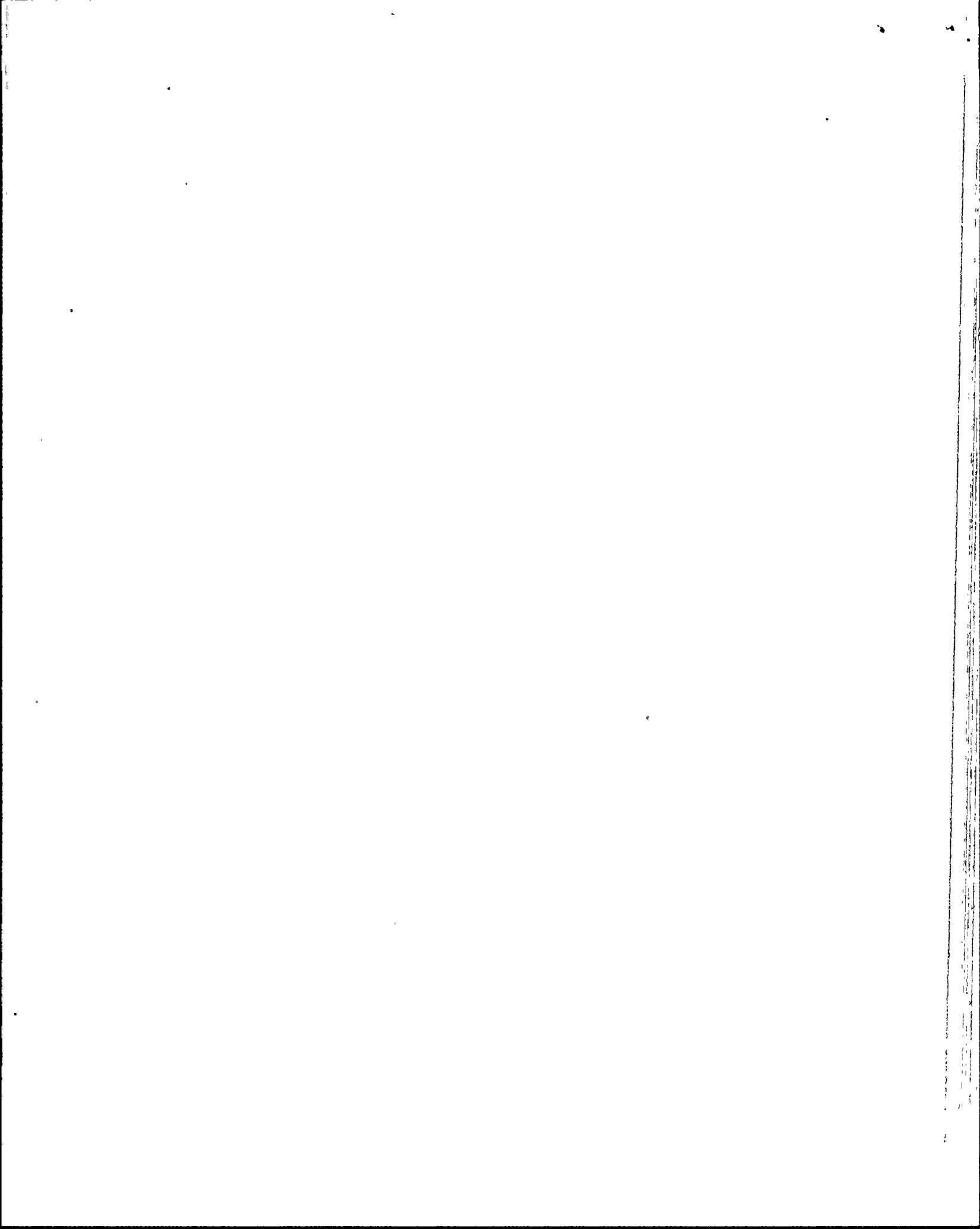
c.

REFERENCE

SD Rad Monitor(SQ), p. 22,34

(3.4/3.9)

KA 000036EK2.02



QUESTION 046

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following is Special Nuclear Material (SNM) as defined in Federal Regulations?

- a. The Cs-137 check source for a radiation monitor.
- b. An irradiated Pressure Vessel sample.
- c. A fuel pin which is not part of a fuel assembly.
- d. A Control Element Assembly.

ANSWER

c.

REFERENCE

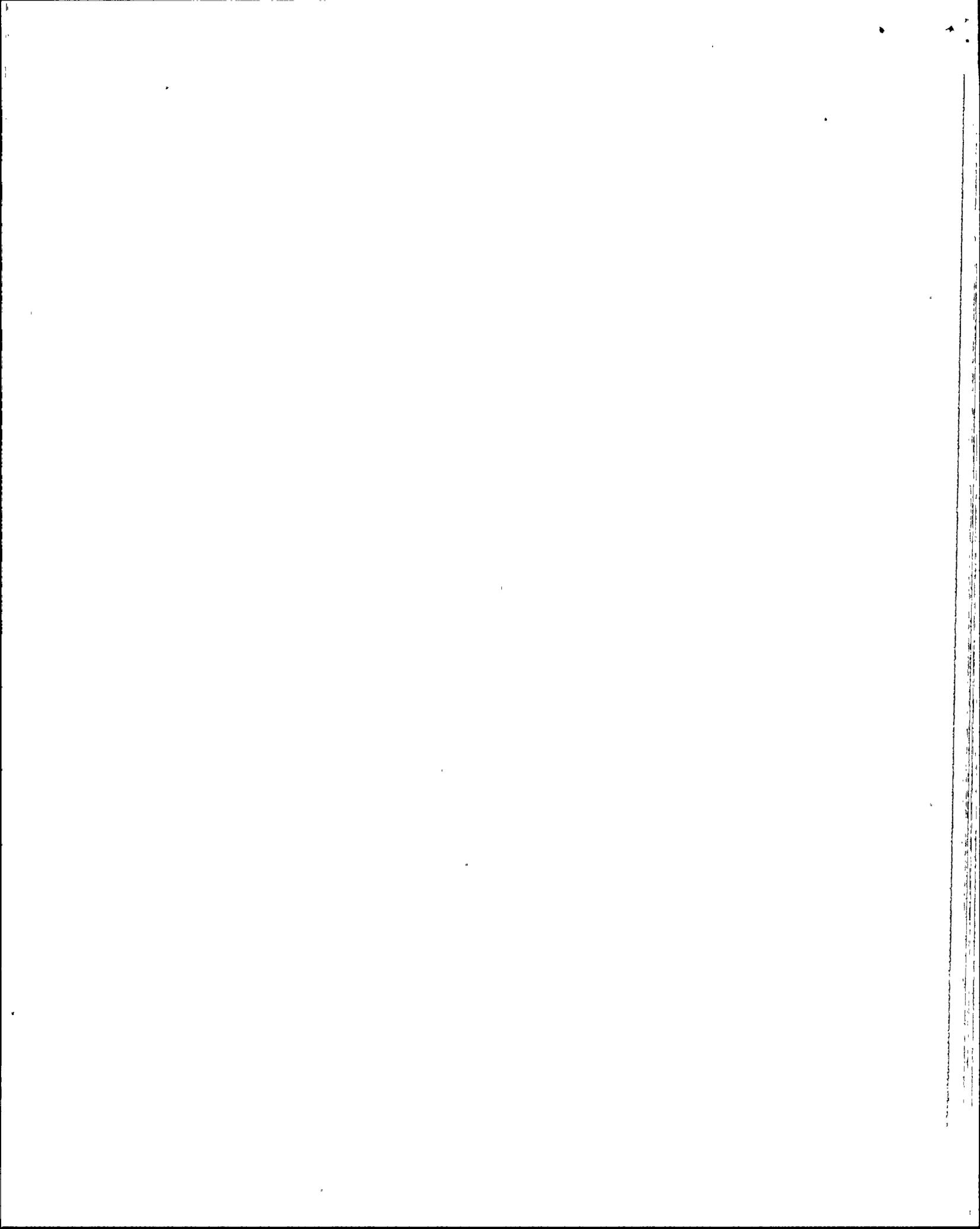
10 CFR 70

LP Reactor Eng, p. 2

LO E002, E001

(3.1/4.4)

KA 194001A1.16



QUESTION 047

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What are the locations, in order of preference, for irradiated fuel to be INTERMEDIATELY stored?

- a. Storage racks, vessel, upender (horizontal).
- b. Upender (horizontal), storage racks, vessel.
- c. Upender (horizontal), vessel, storage racks.
- d. Storage racks, upender (horizontal), vessel.

ANSWER

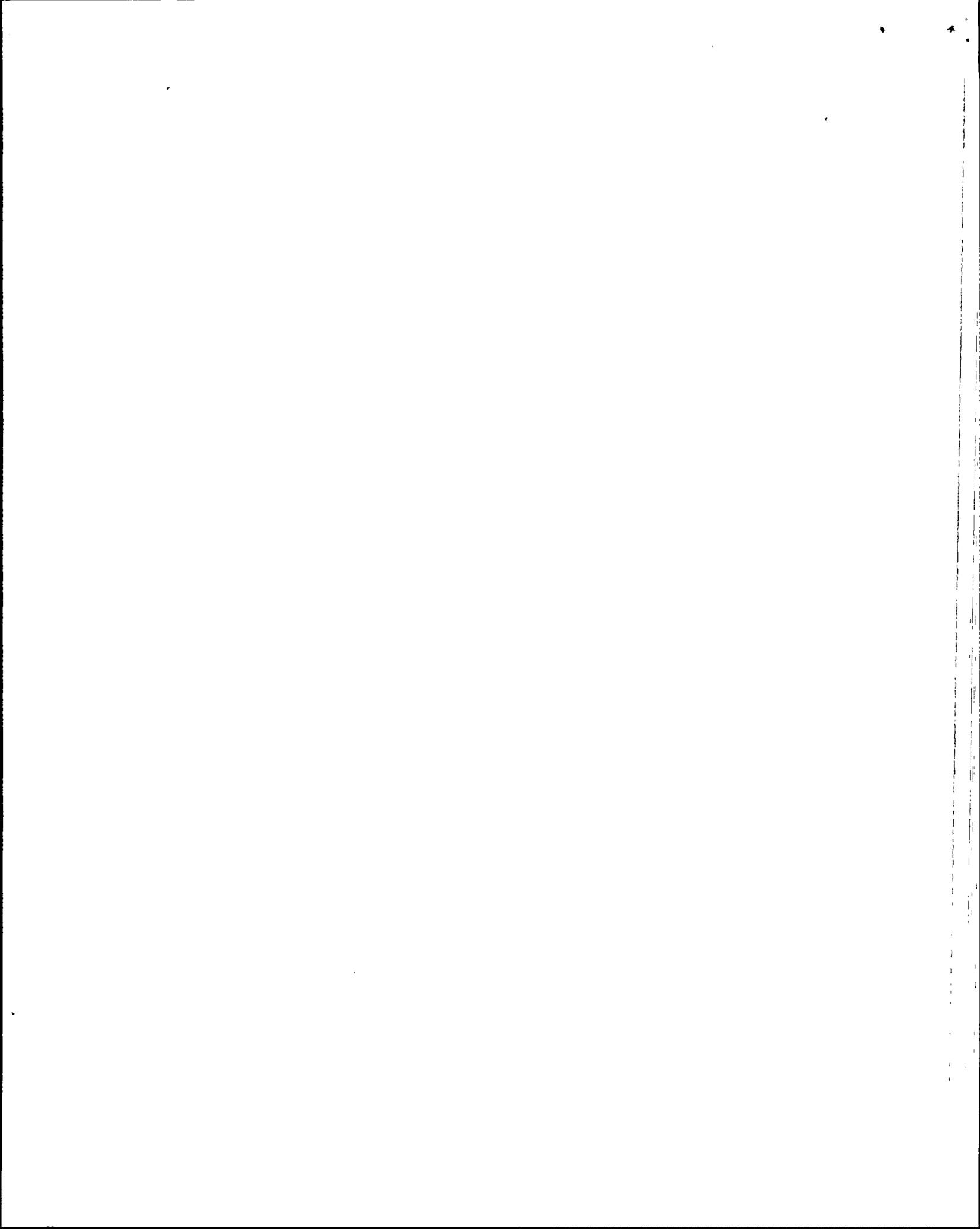
c.

REFERENCE

LP Reactor Eng, p. 11 LO E013  
72IC-1RX03

(3.7/3.8)

KA 000036G10



QUESTION 048

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core onload is in progress. Channel 1 Startup Nuclear Channel count rate is 10 CPS, Channel 2 is 10 CPS. A fuel assembly is lowered into the core.

Channel 1 now reads 60 CPS, Channel 2 still reads 10 CPS. No spatial effects were anticipated.

You are the LSRO. What INITIAL action, if any, should you take?

- a. Have I and C check Channel 1.
- b. Check the I/M plot.
- c. Withdraw the fuel assembly just inserted.
- d. Evacuate containment.

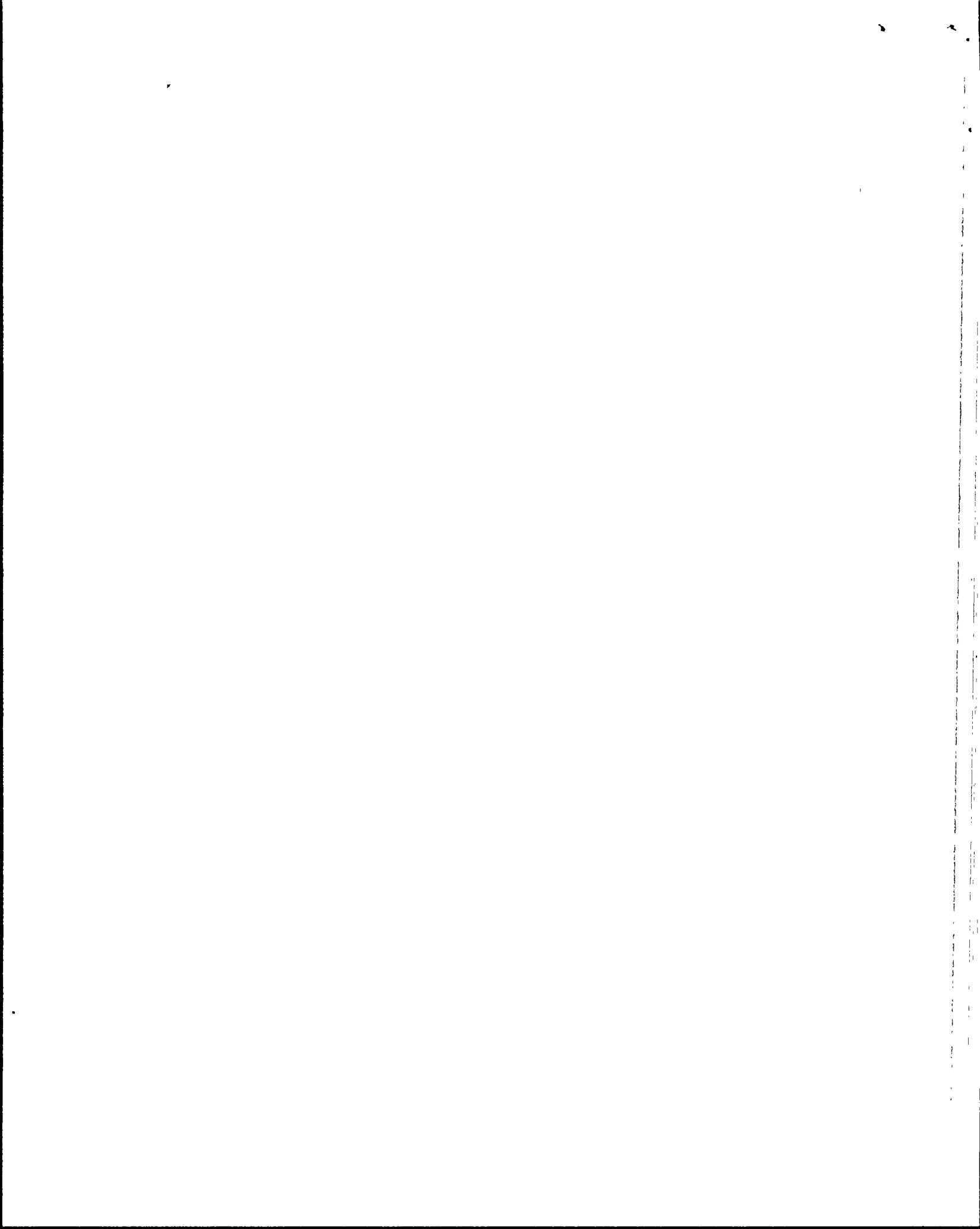
ANSWER

c.

REFERENCE

LP Self Study p.9, Reactor Eng Proc, LO E011  
72IC-1RX03

(3.7/4.1)  
KA 000034EK3.03



QUESTION 049

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 doing a core reload. Refueling is interrupted due to an abnormal event. You are the LSRO. You MUST place the assembly that you have grappled in a location in the reactor vessel other than its final, analyzed core location.

Refer to the attached core reload map. An "X" indicates the position has a fuel assembly in it.

Of the following positions, which would be the proper position to place the fuel assembly you have grappled?

- a. F-1
- b. G-12
- c. T-12
- d. S-9

ANSWER

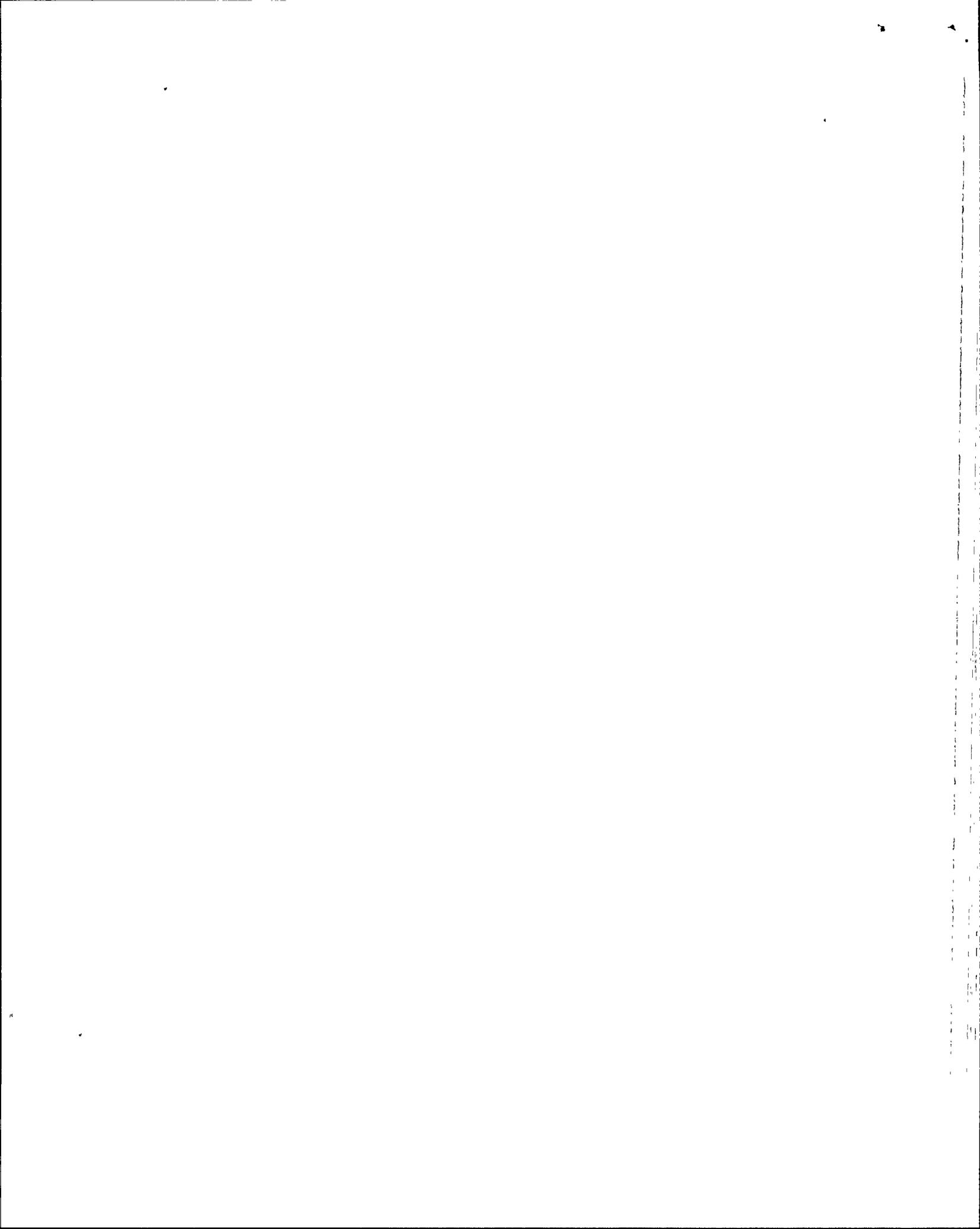
c. .

REFERENCE

72IC-3RX03, p. 17, 7.14  
LO E006, LP Pot Refuel Acc

(2.5/3.2)

KA 034000K1.01



QUESTION 050

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The plant is in Mode 6 and refueling is in progress. A Loss of Shutdown Cooling occurs. You are the LSRO and the Shift Supervisor orders you to evacuate containment with all personnel not required to close containment.

What is the PRINCIPLE reason for this evacuation?

- a. To ensure core alterations cease.
- b. To minimize radiation exposure.
- c. To man facilities per the Emergency Plan.
- d. To minimize temperature rise in containment.

ANSWER

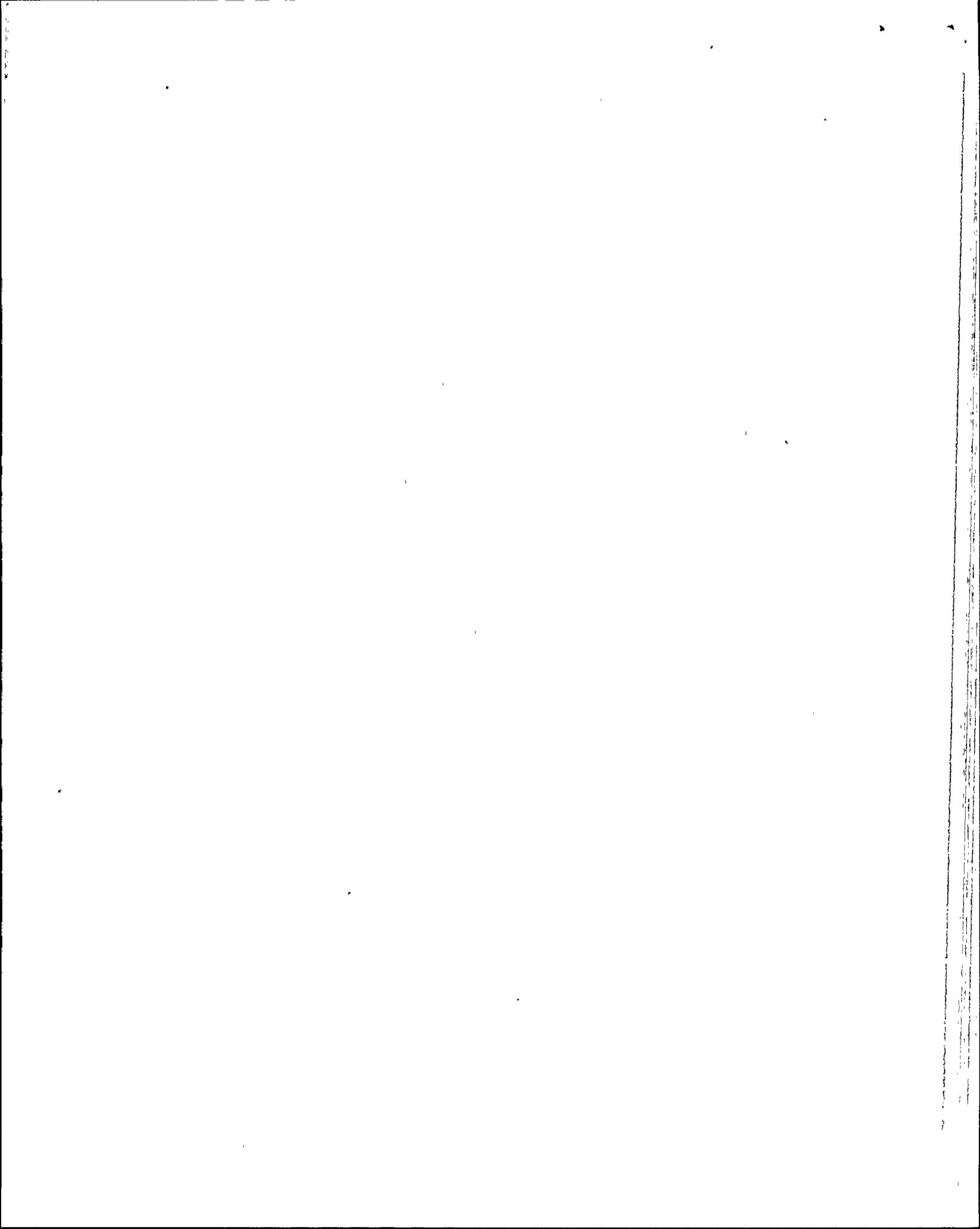
b.

REFERENCE

LP Pot Refuel Acc, p. 15, LO E006  
72IC-1RX03

(3.5/4.1)

KA 000036EK1.01



QUESTION 051

(1.0)

MULTIPLE CHOICE (Select the correct answer)

If boron concentration in the RCS and the fuel transfer canal falls below the minimum value, while in core reload (Mode 6), the operators are directed to initiate emergency boration.

One method utilized, to emergency borate, is a gravity feed from the Refueling Water Tank (RWT) through CH-HV-536 to the charging pumps. The operator is instructed that the RWT level is required to be above 73 %.

What is the DIRECT reason for this level requirement?

- a. The suction line for CH-HV-536 enters the RWT at 73 % level.
- b. When RWT level is below 73 % a charging pump low suction trip may occur.
- c. Boric Acid Makeup (BAM) pumps trip at 73 %.
- d. When RWT level is below 73 % a charging pump low suction trip from 3 pump operations may occur.

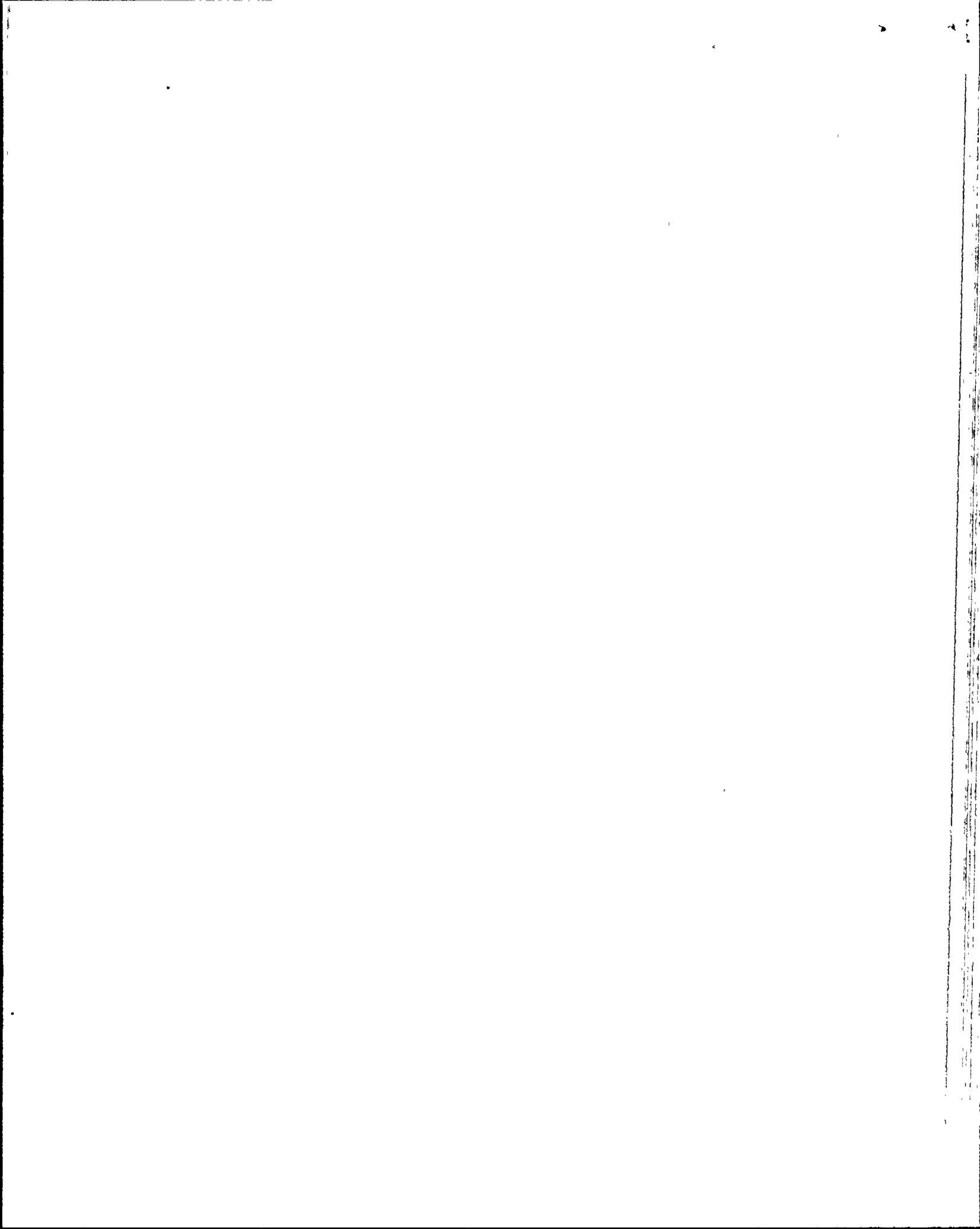
ANSWER

a.

REFERENCE

41AO-1ZZ01, p. 7, Caution  
72IC-3RX03, p.15, 7.4

(4.2/4.4)  
KA 000024EK3.02



QUESTION 052

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core reload is in progress. You are the LSRO and have just lowered a new fuel assembly into its core position. You receive a slack cable indication.

How do you perform Z-coordinate verification of the fuel assembly?

- a. Your refueling machine operator computes the difference between actual and expected hoist positions.
- b. Control Room personnel compute the difference between actual and expected hoist positions.
- c. The fuel assembly is ungrappled and visual verification made.
- d. Two independent verifications of core position are made.

ANSWER

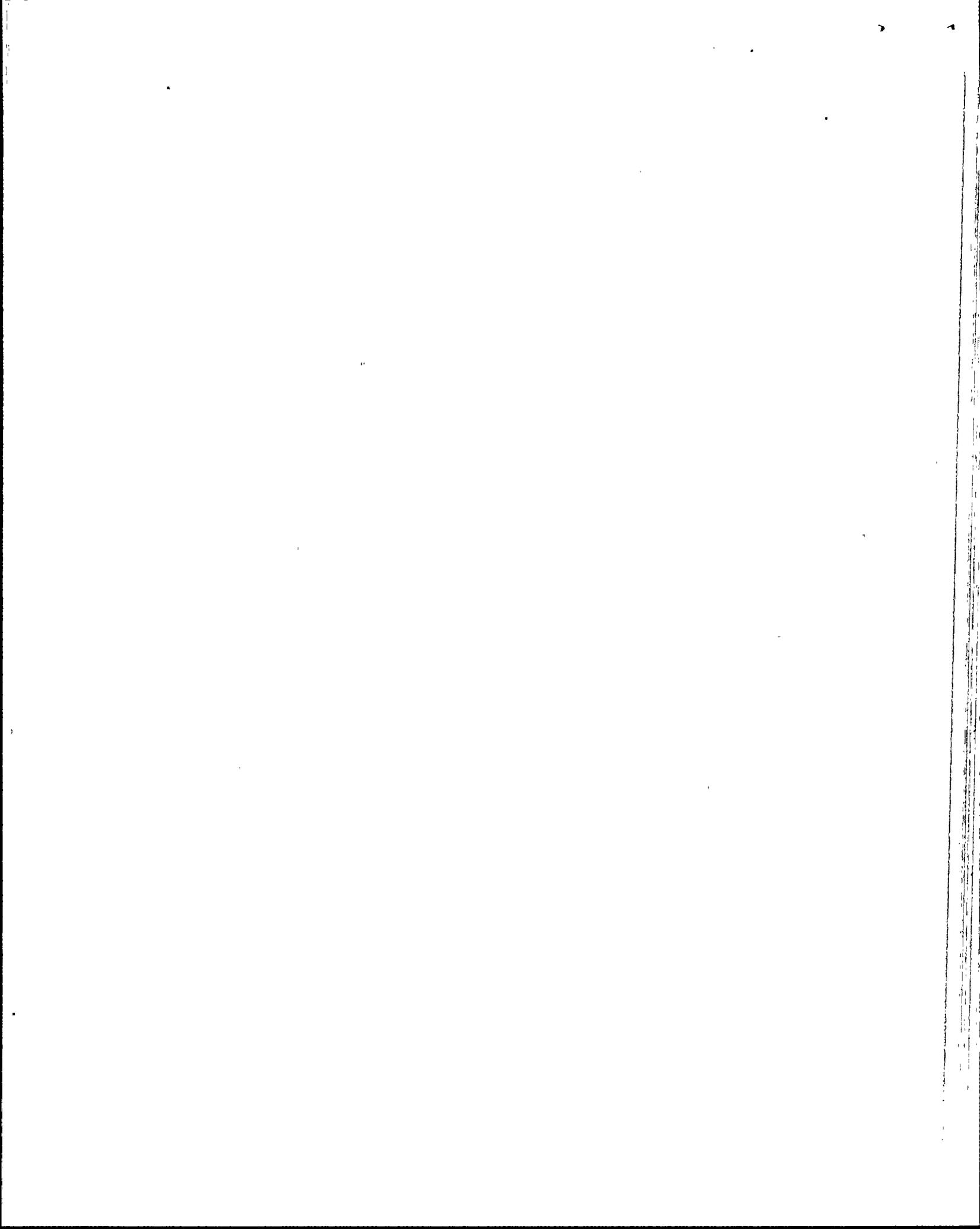
b.

REFERENCE

72IC-3RX03, p. 138, GI

(2.3/2.9)

KA 034000G01



QUESTION 053

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the outer CEA guide tube arrangement?

- a. 6 outer guide tubes, rewidened at the top.
- b. 4 outer guide tubes, rewidened at the top.
- c. 4 outer guide tubes, rewidened at the bottom.
- d. 6 outer guide tubes, rewidened at the bottom.

ANSWER

b.

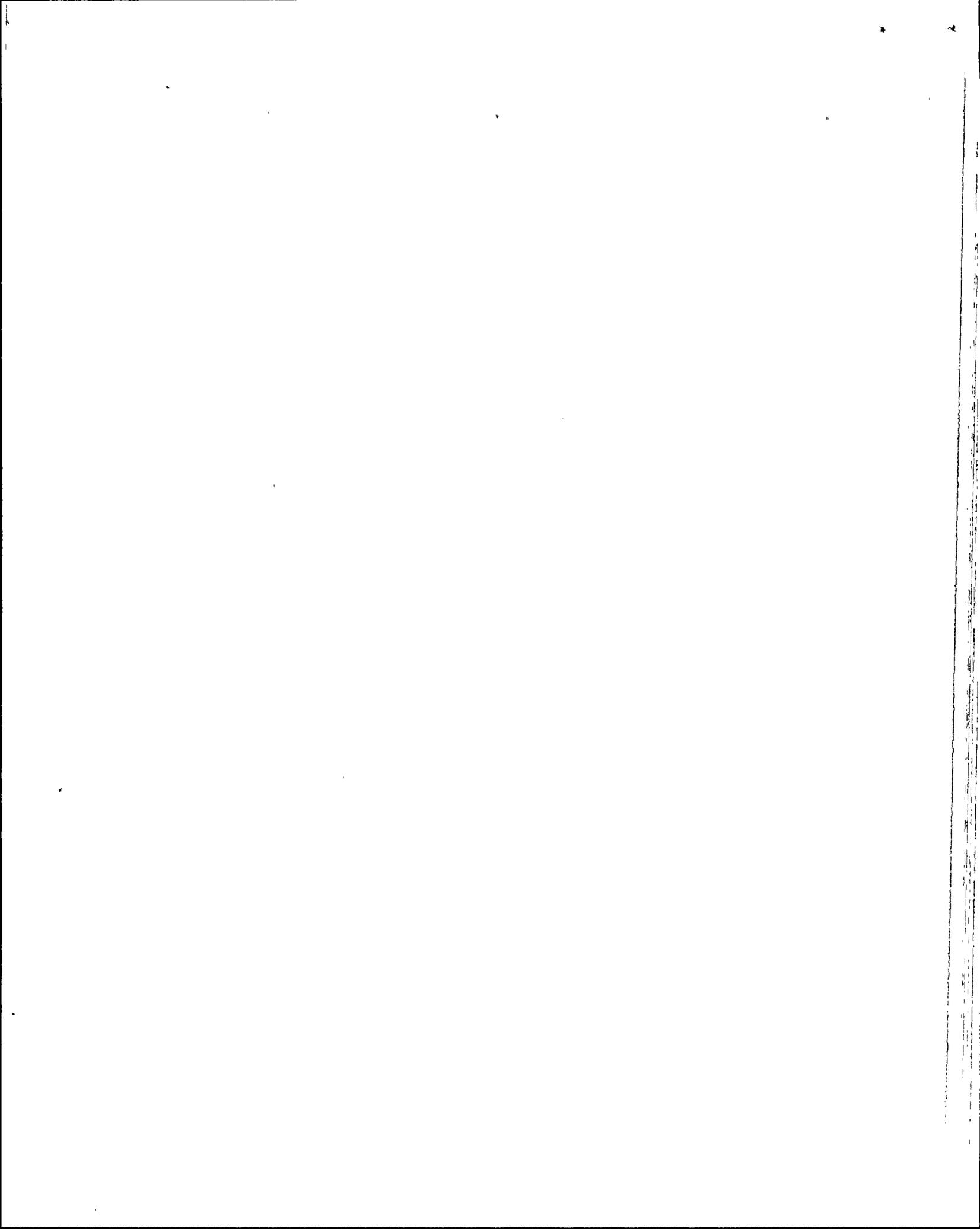
REFERENCE

Exam Bank # 496

NSD04 LO E005, LP Fuel Cont Rods, p. 9

(2.2/2.8)

KA 002000K6.14



QUESTION 054 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the number of fingers that part length and full length CEAs have?

| Part Length | Full Length |
|-------------|-------------|
| a. 4        | 12 or 4     |
| b. 12       | 12 or 4     |
| c. 12       | 12 or 6     |
| d. 4        | 12 or 6     |

ANSWER

a.

REFERENCE

LP NSD04. p. 12, LO E010

(2.2/2.5)

KA 001000K6.01



QUESTION 055 (1.0)

MULTIPLE CHOICE (Select the correct answer)

The normal containment cooling is provided by Containment HVAC. Which of the following describes the normal containment cooling equipment?

- a. Two 100 % capacity ACUs on 120 foot level of containment.
- b. Four 50 % capacity ACUs on 120 foot level of containment.
- c. Two 100 % capacity ACUs on 140 foot level of containment.
- d. Four 50 % capacity ACUs on 140 foot level of containment.

ANSWER

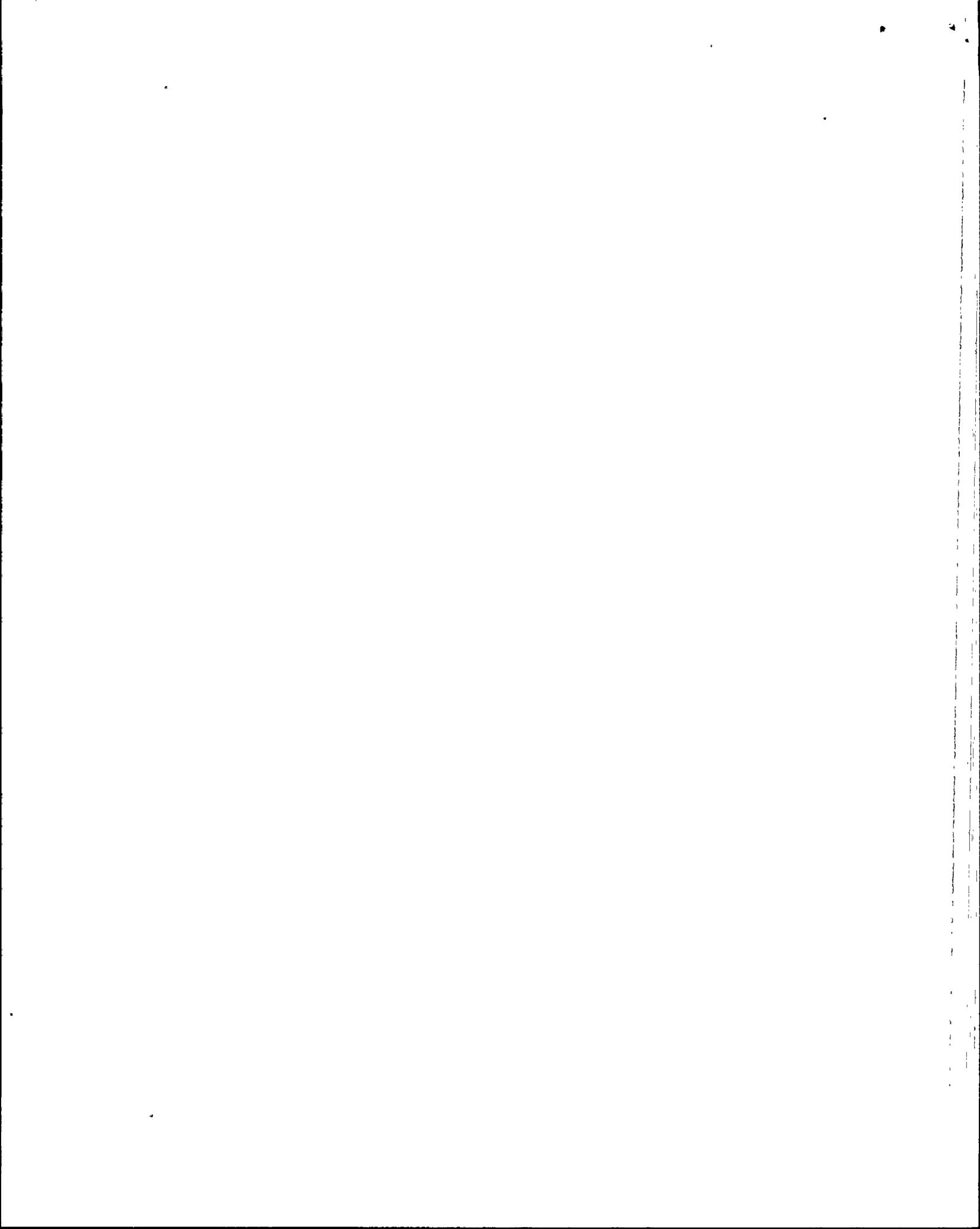
b.

REFERENCE

Exam Bank # 548, LP NSD07 LO E003, p. 10

(3.3/3.3)

KA 022000G09



QUESTION 056

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the flow path for Containment Vent with high (greater than 14 inches water) Containment pressure?

- a. Through the Power Access Purge exhaust components with no fans and through flow orifice CP-F044.
- b. Through the Refueling Purge exhaust components with no fans and through flow orifice CP-F044.
- c. Through the Power Access Purge exhaust components with no fans and Power Access Purge vent valve CP-PV-43.
- d. Through the Refueling Purge exhaust components with no fans and Refueling Purge exhaust valve CP-UV-2B.

ANSWER

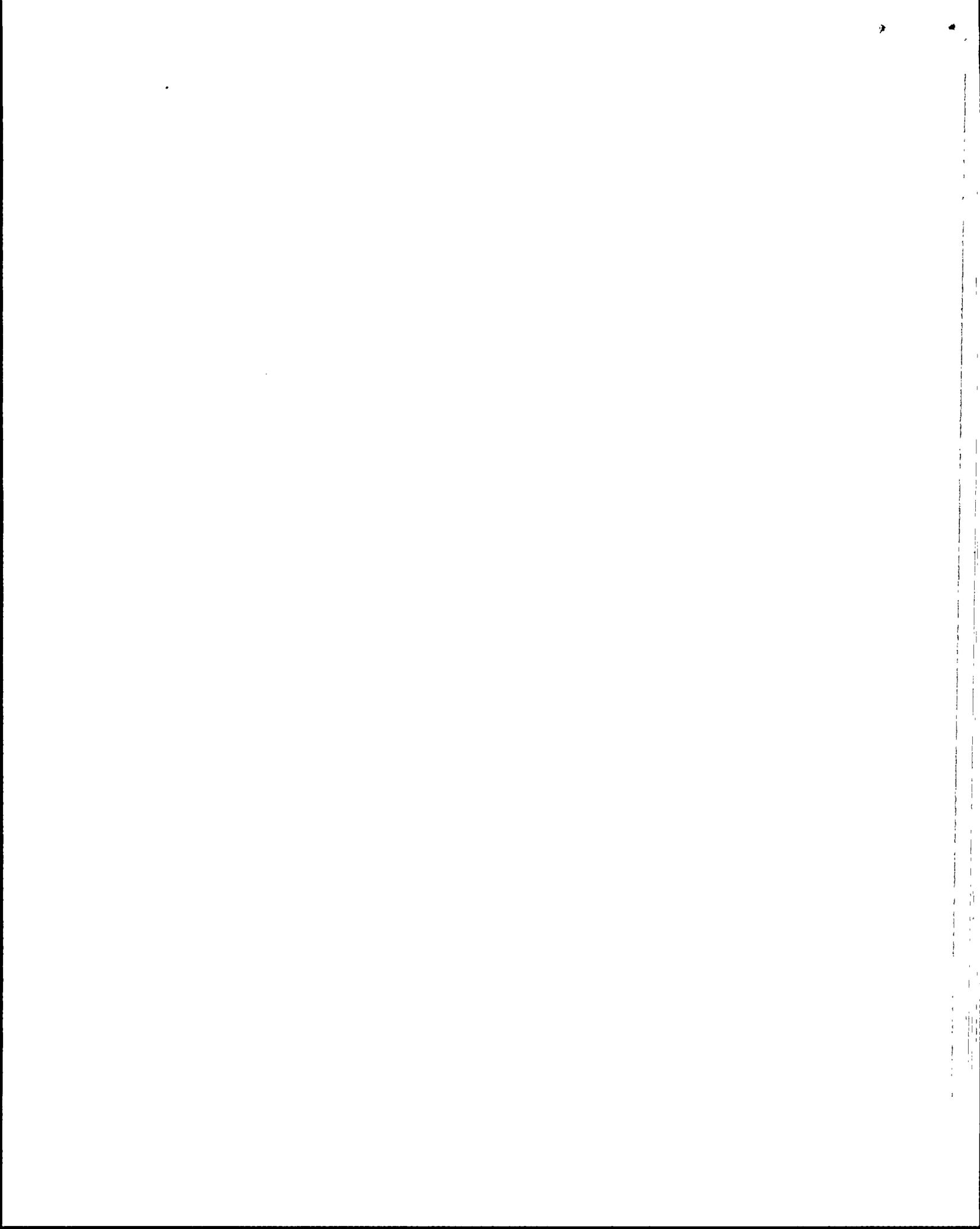
a.

REFERENCE

LP NSD07, self study p. 29, LO E004

(3.6/3.9)

KA 103000K1.01



QUESTION 057

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Containment pressure is normally provided to the Control Room for indication and to the Plant Protection System.

If a Containment Isolation Actuation Signal (CIAS) is received, is this pressure signal still reliable and why?

- a. Yes, because the pressure transmitters are inside containment.
- b. Yes, because the pressure sensing lines do not isolate.
- c. No, because the pressure transmitters are not Environmentally Qualified.
- d. No, because the pressure sensing lines isolate.

ANSWER

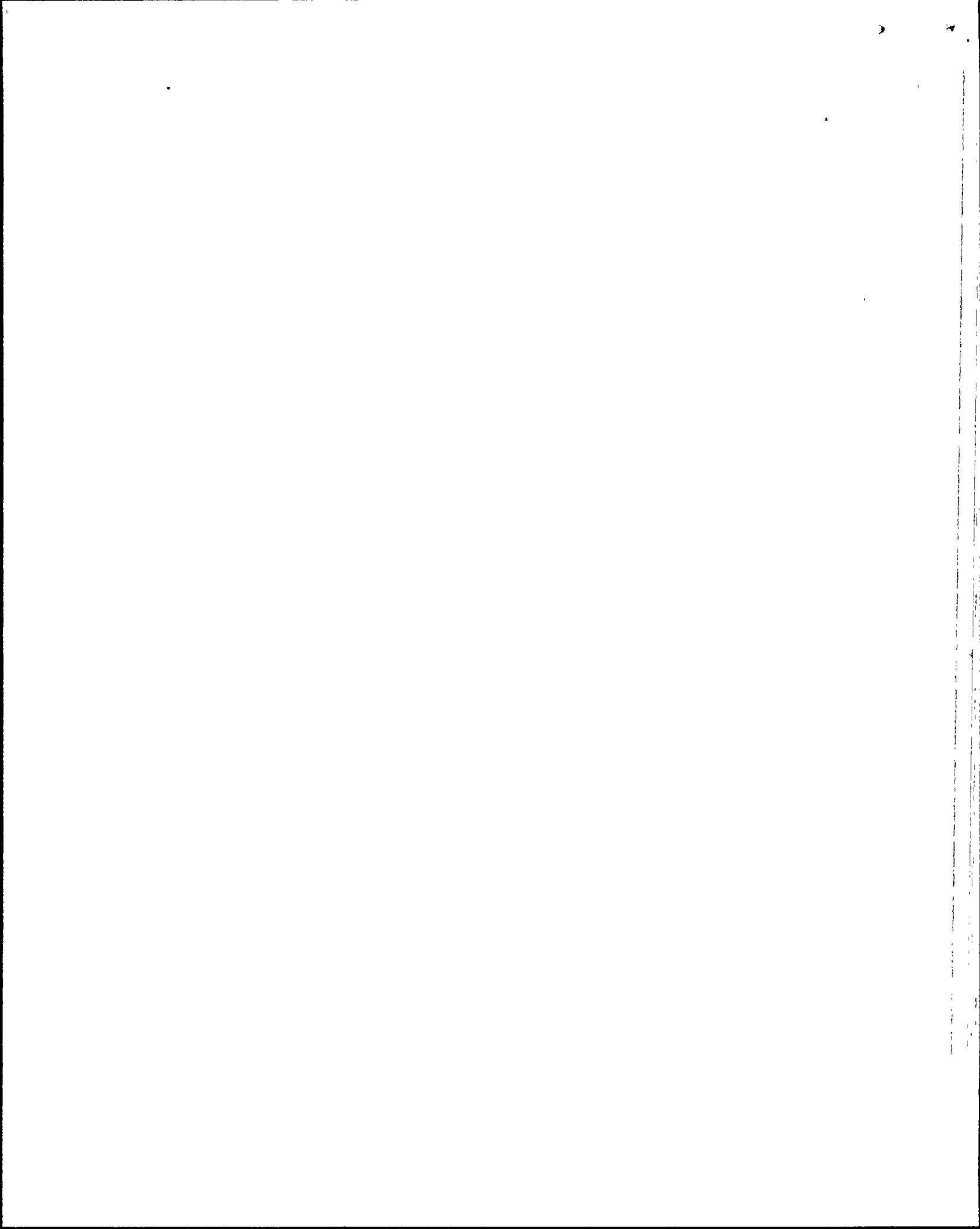
b.

REFERENCE

LP NSD07, p. 18 of Self Study. LO E007

(3.9/4.1)

KA 103000K1.02



QUESTION 058

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 with a core offload in progress. You are the LSRO. You have an irradiated fuel assembly grappled and are in the transfer canal area. Spent fuel pool level is decreasing rapidly. The Shift Supervisor directs you to place the assembly in a water trap area.

In which of the following areas should you place the fuel assembly?

- a. Reinsert the assembly in its designated core location.
- b. Place the assembly in a storage rack.
- c. Place the assembly in the upender and lower to horizontal.
- d. Place the assembly in a deep area of the pool and lower to just above the floor.

ANSWER

c.

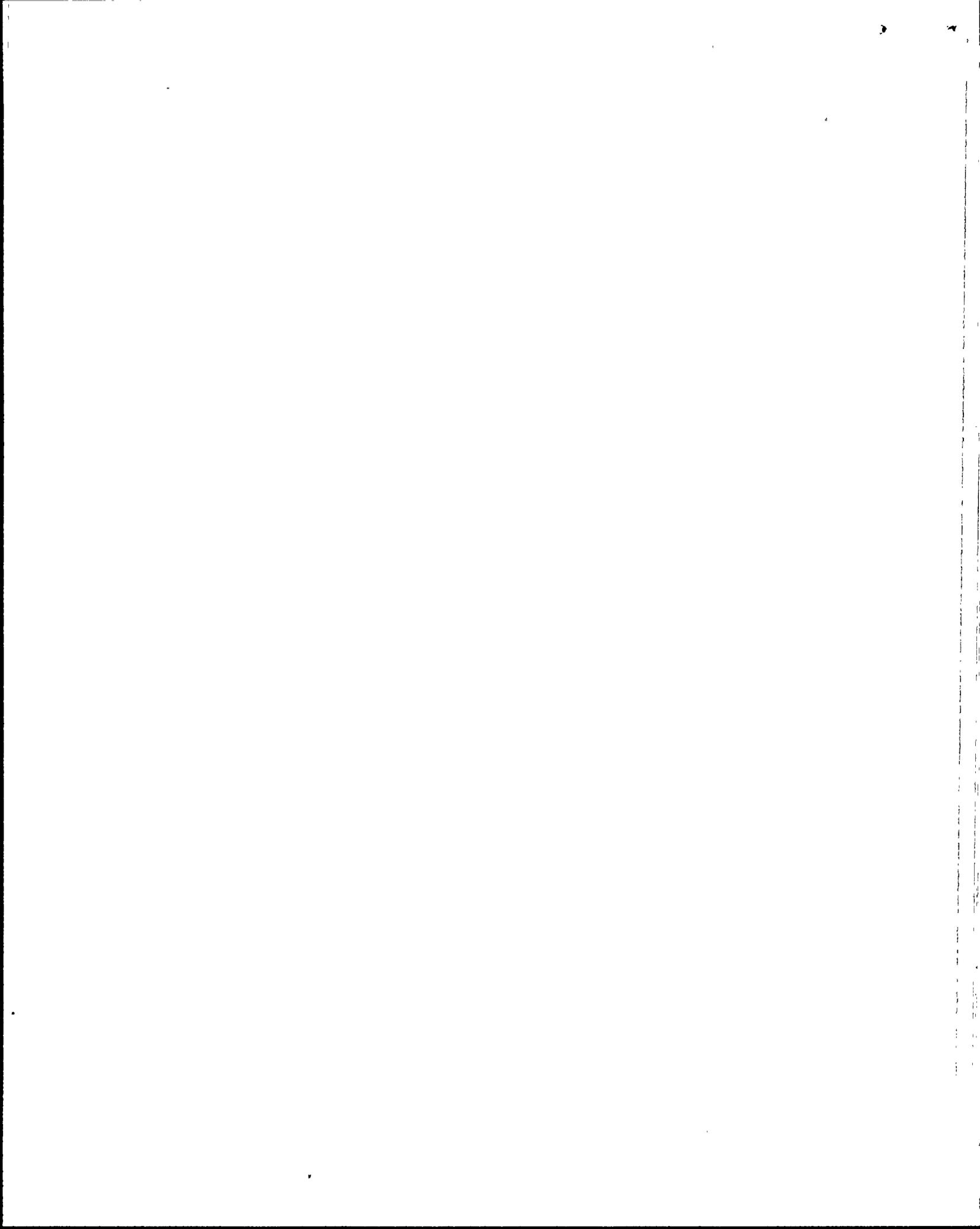
REFERENCE

41A0-1ZZ53, p. 26a

LP NSD02, LO E003

(2.9/3.2)

KA 033000K4.01)



QUESTION 059 (1.0)

MULTIPLE CHOICE (Select the correct answer)

Complete the following with the answers provided.

The site fire team is a minimum of \_\_\_\_\_ members, NOT to include \_\_\_\_\_.

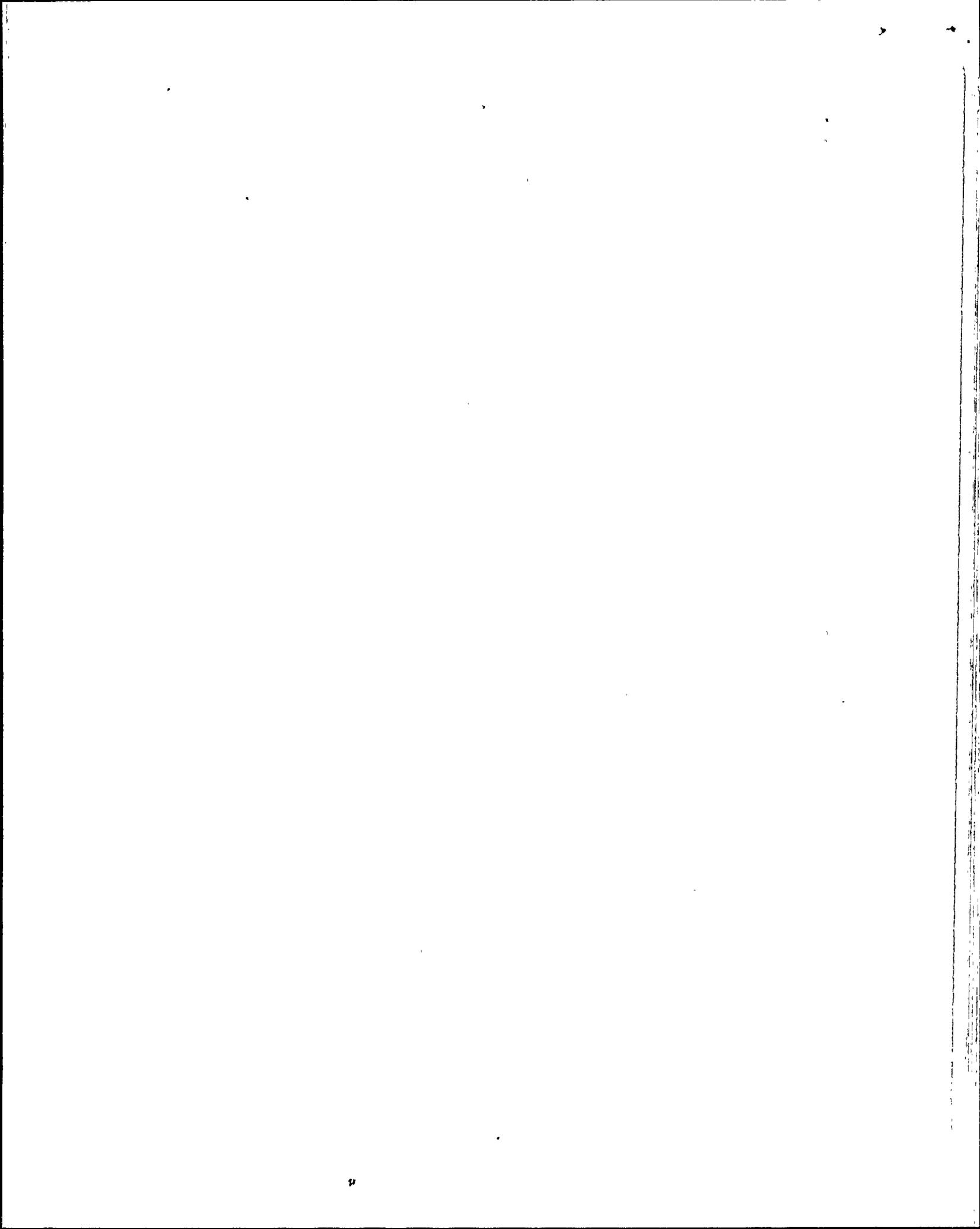
- a. Five; Shift Supervisor, STA, nor three crew members necessary for safe shutdown.
- b. Seven; Shift Supervisor nor STA.
- c. Three; Shift Supervisor, STA, nor three crew members necessary for safe shutdown.
- d. Three; Shift Supervisor nor STA.

ANSWER

a.

REFERENCE  
Exam Bank # 791  
LP NSE09, LO E001c

(3.5/4.2)  
KA 194001K1.16



QUESTION 060

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The following question concerns the Fuel Transfer System.

Which of the following describes how to complete a stopped auto transfer sequence and why? (The sequence was stopped before completing the transfer)

- a. Complete through individual manual commands because auto cannot be restarted.
- b. Complete through individual manual commands because carriage location will be reset in the auto mode.
- c. Complete by restarting in auto to preserve interlocks.
- d. Complete by restarting in auto to preserve proper sequence.

ANSWER

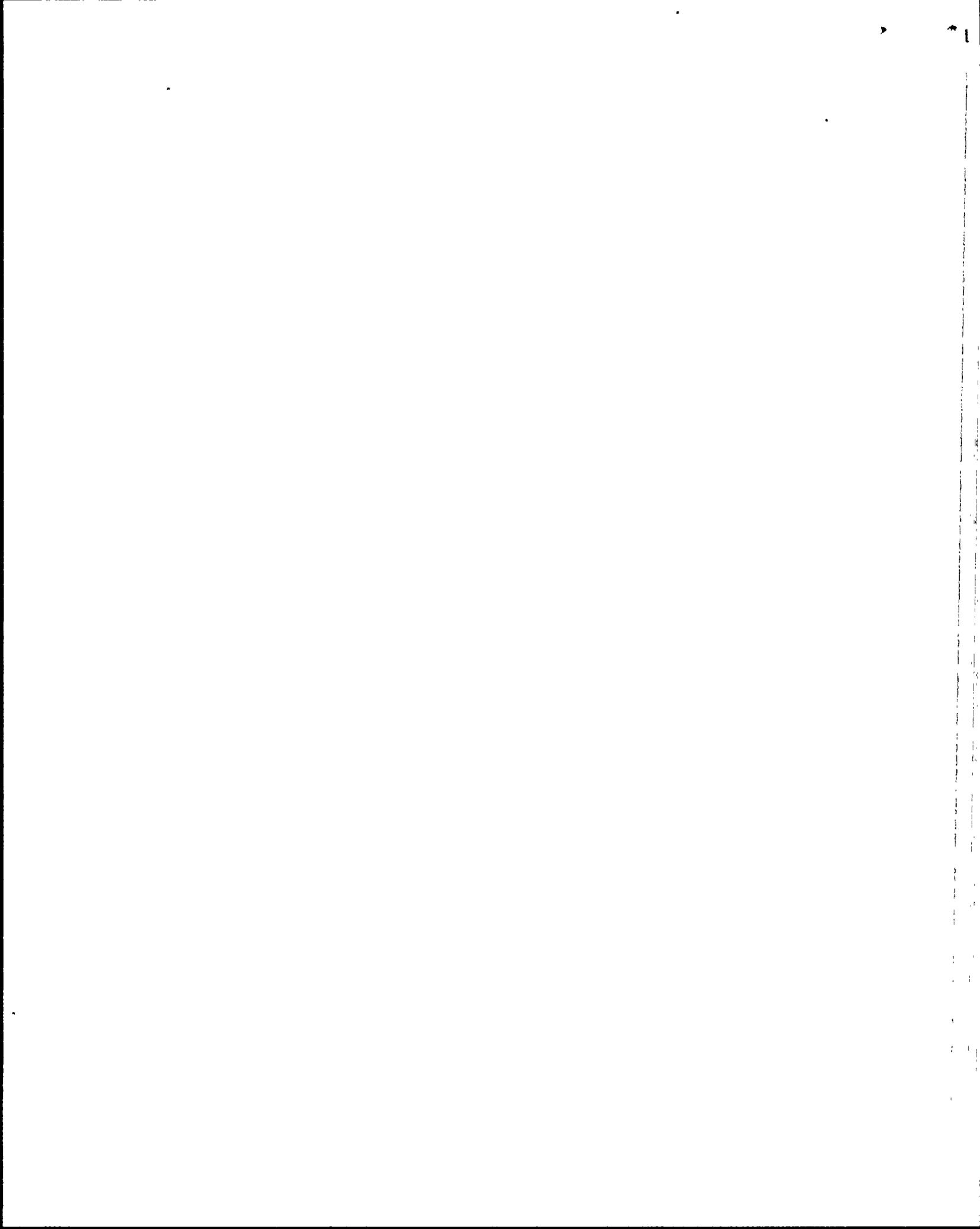
a.

REFERENCE

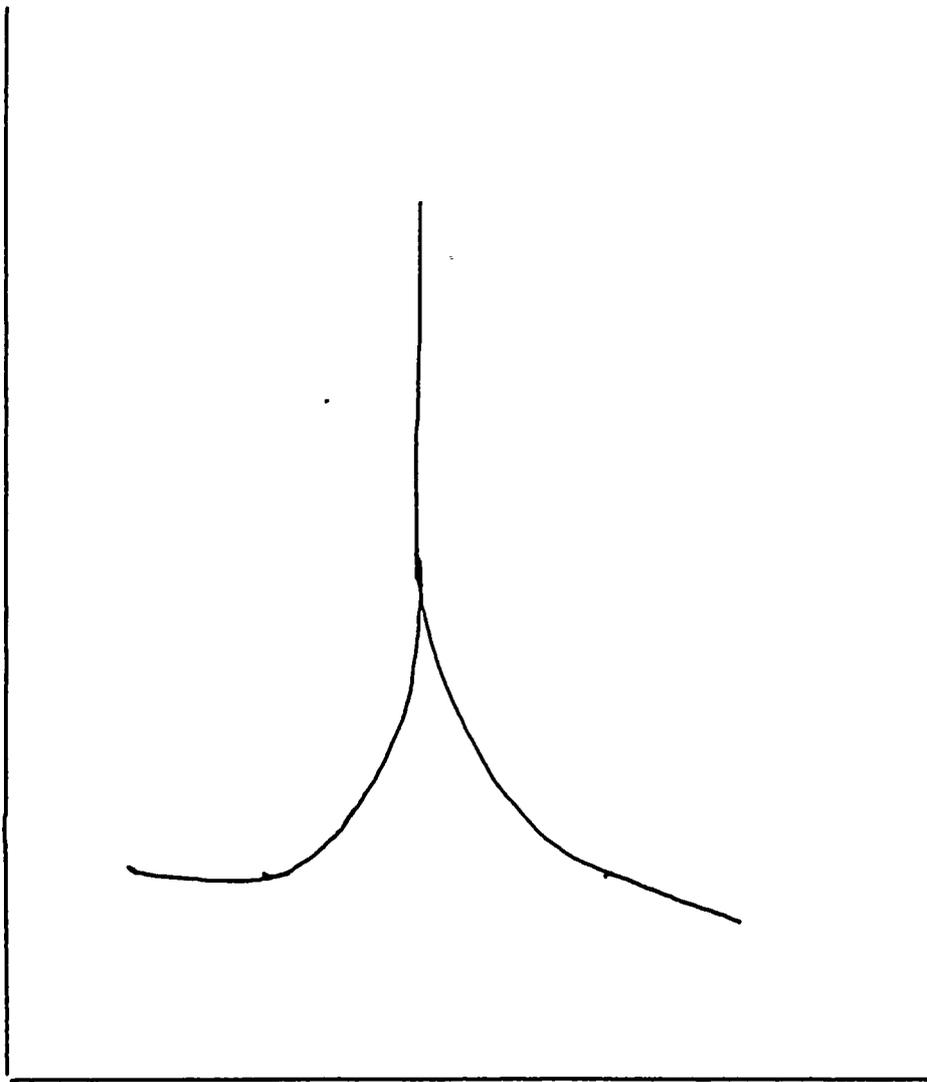
LP NSD11, p. 15, LO E007  
780P-9FX02

(2.9/3.5)

KA 000036EK2.01

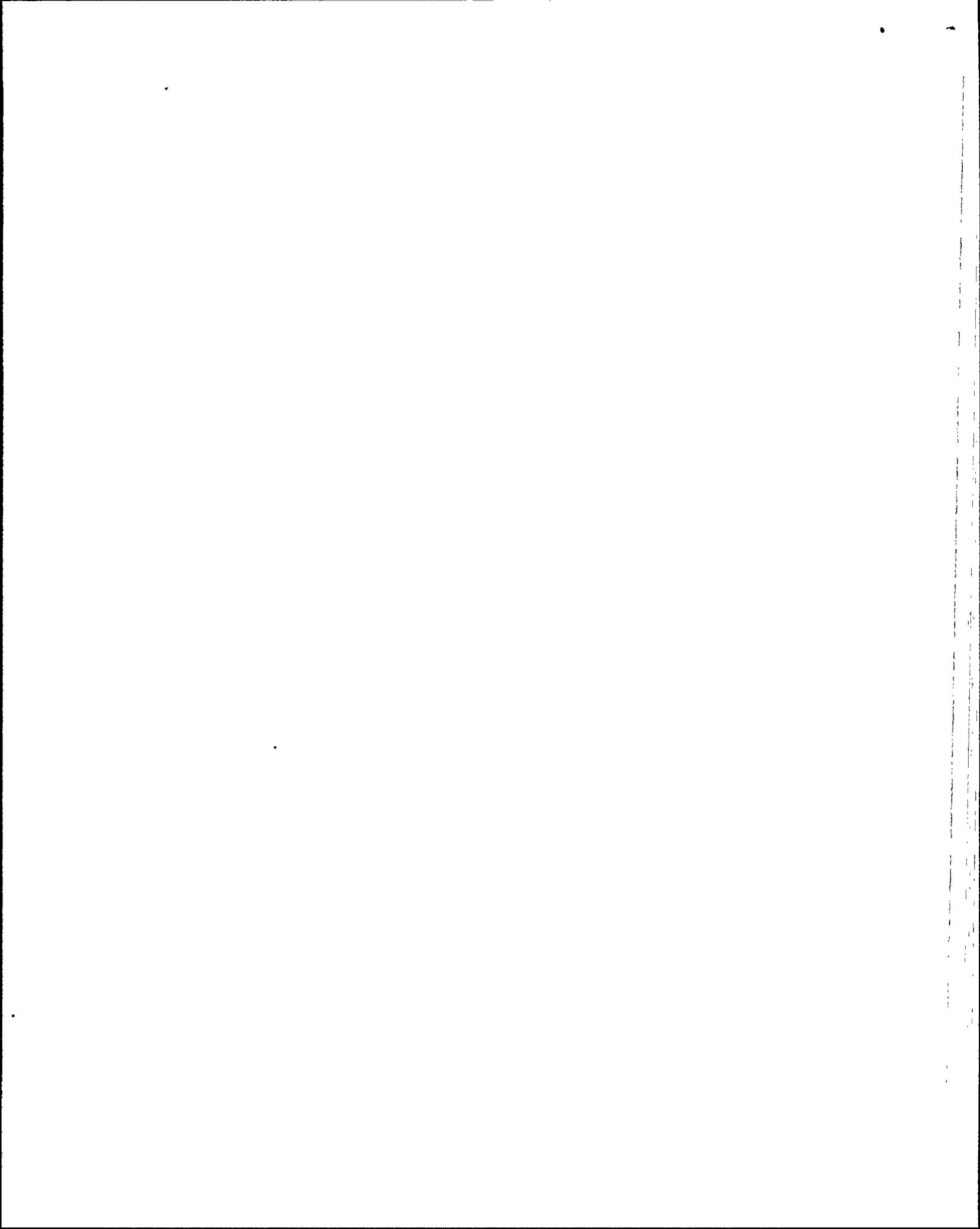


$\sigma_a$



Neutron Kinetic Energy

QUESTION 14



REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 Each of the following borated water sources shall be OPERABLE:

- a. The spent fuel pool with:
  1. A minimum borated water volume as specified in Figure 3.1-2, and
  2. A boron concentration of between 4000 ppm and 4400 ppm boron, and
  3. A solution temperature between 60°F and 180°F.
- b. The refueling water tank with:
  1. A minimum contained borated water volume as specified in Figure 3.1-2, and
  2. A boron concentration of between 4000 and 4400 ppm of boron, and
  3. A solution temperature between 60°F and 120°F.

APPLICABILITY: MODES 1, 2,\* 3,\* and 4\*.

ACTION:

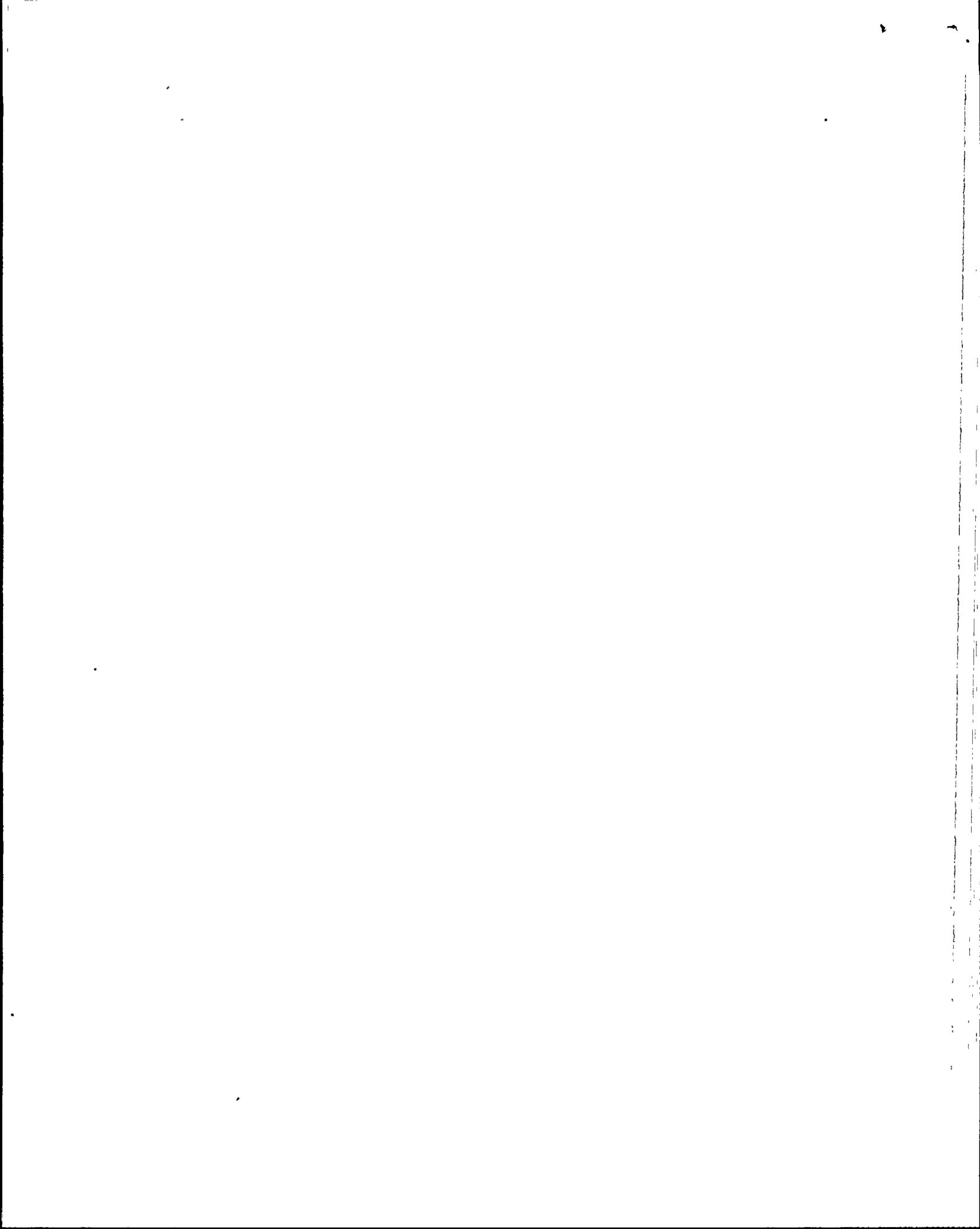
- a. With the above required spent fuel pool inoperable, restore the pool to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the above required spent fuel pool to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.
- b. With the refueling water tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

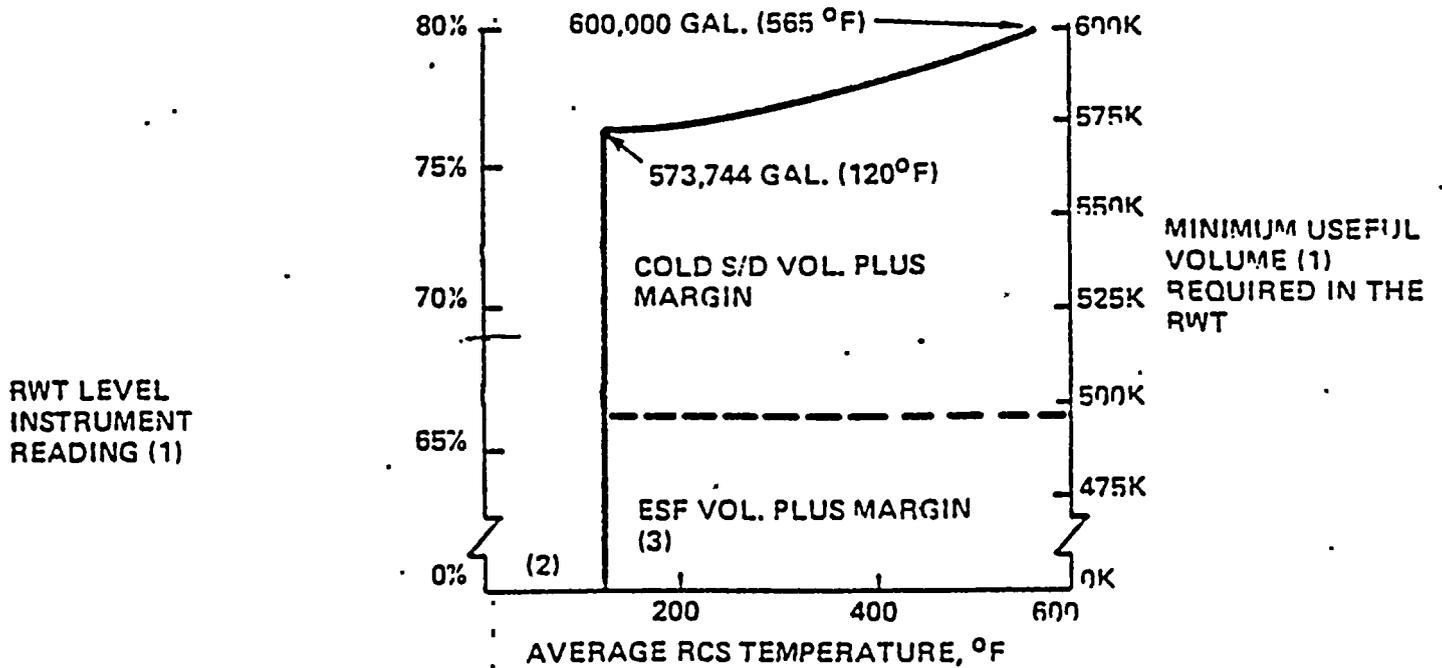
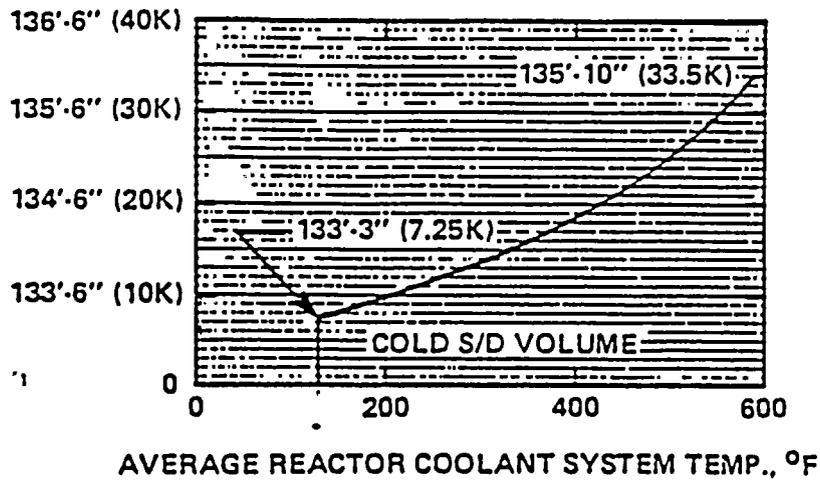
4.1.2.6 Each of the above required borated water sources shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
  1. Verifying the boron concentration in the water, and
  2. Verifying the contained borated water volume of the water source.
- b. At least once per 24 hours by verifying the refueling water tank temperature when the outside air temperature is outside the 60°F to 120°F range.
- c. At least once per 24 hours by verifying the spent fuel pool temperature when irradiated fuel is present in the pool.

\* See Special Test Exception 3.10.7.



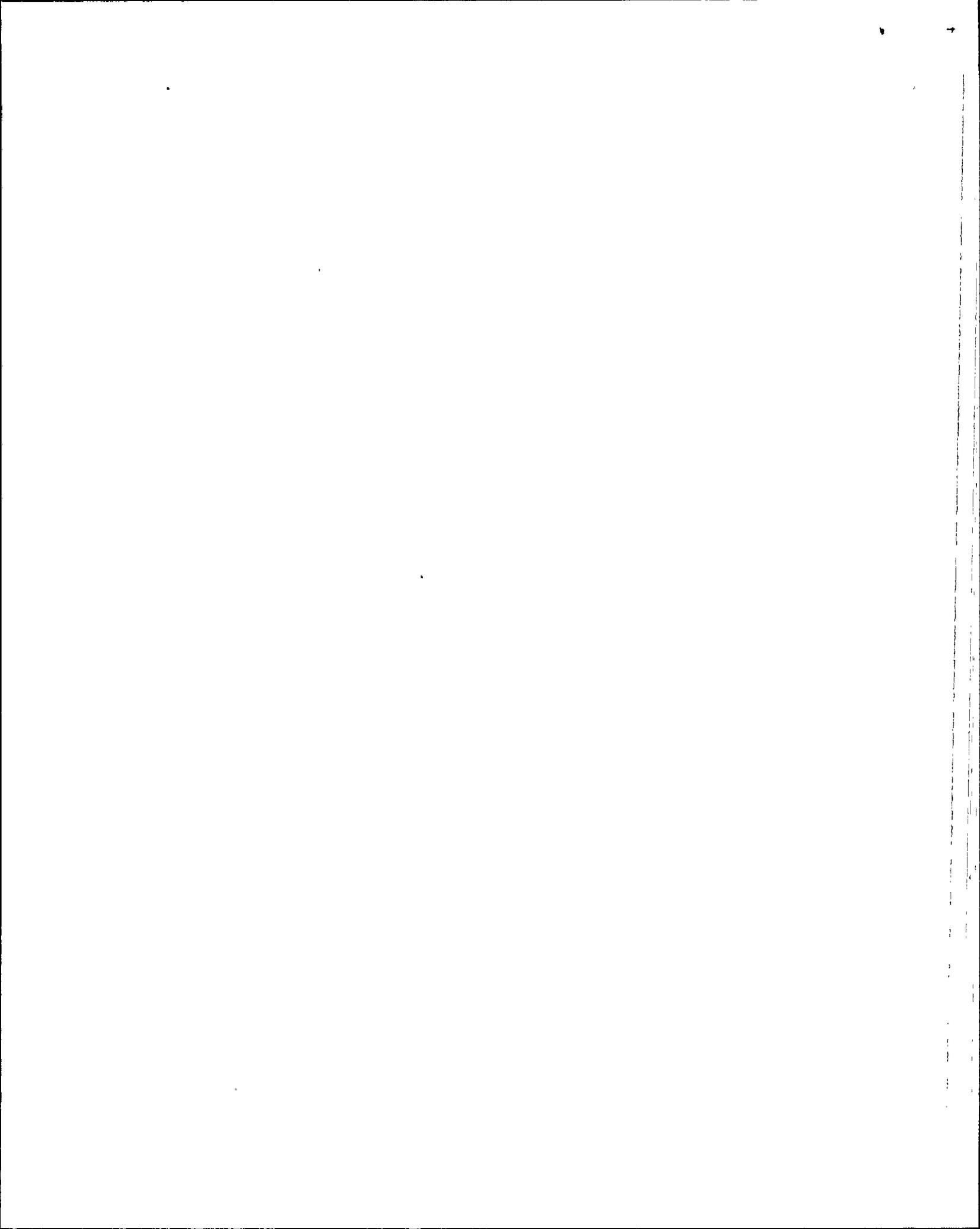
FOR INFORMATION ONLY

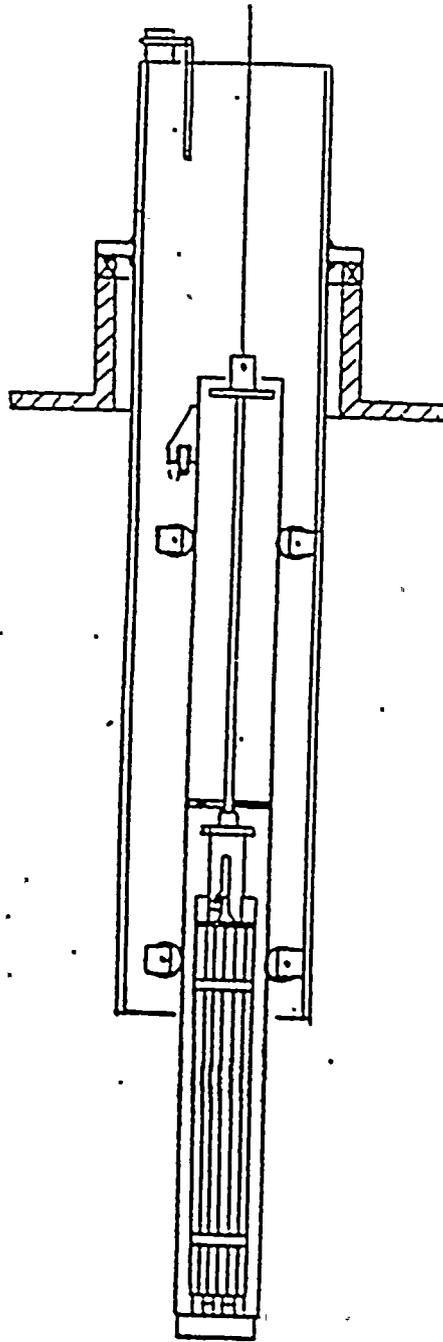


- (1) THE TANK LEVEL AND VOLUME SHOWN ARE THE USEFUL LEVEL AND VOLUME ABOVE THAT IN THE TANK WHICH IS REQUIRED FOR VORTEX CONSIDERATIONS
- (2) DURING MODE 5 AND 6 ONE OF THESE BORATED SOURCES SHALL CONTAIN A MINIMUM OF 33,500 GALLONS
- (3) THIS VOLUME IS NOT REQUIRED DURING MODE 6

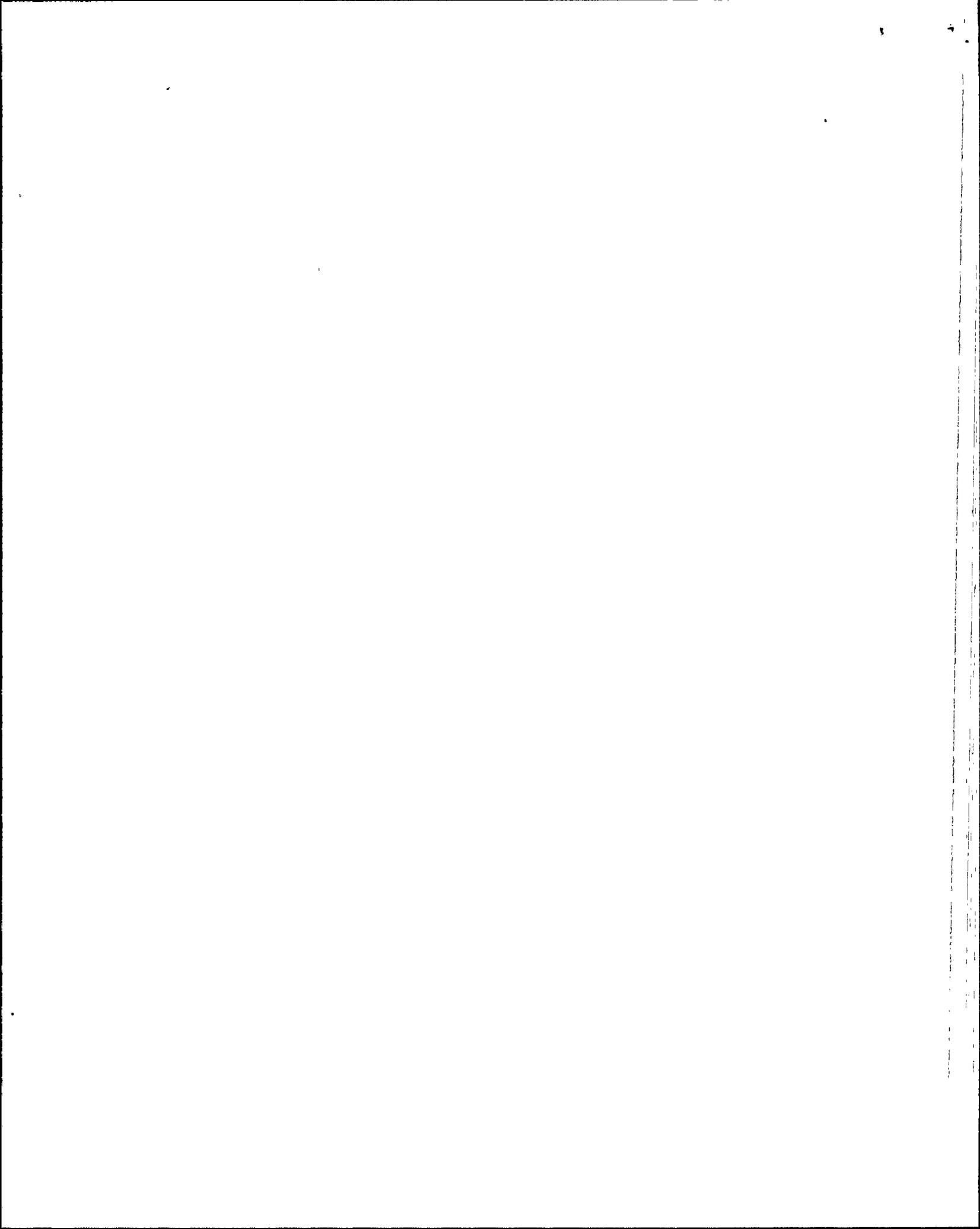
FIGURE 3.1-2  
MINIMUM BORATED WATER VOLUMES

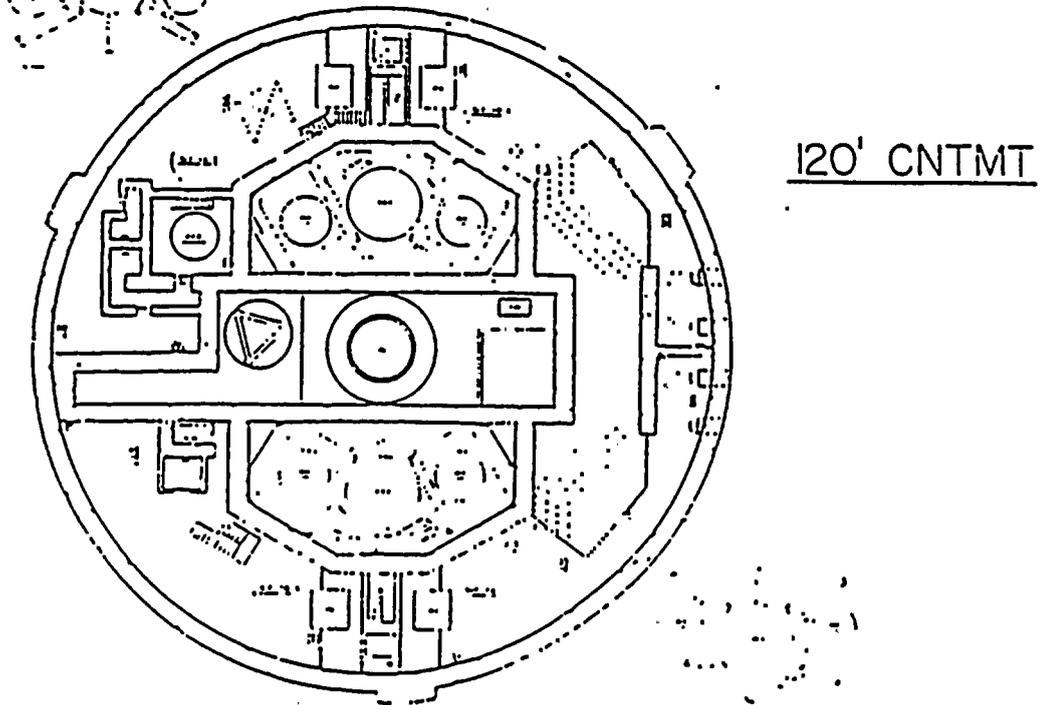
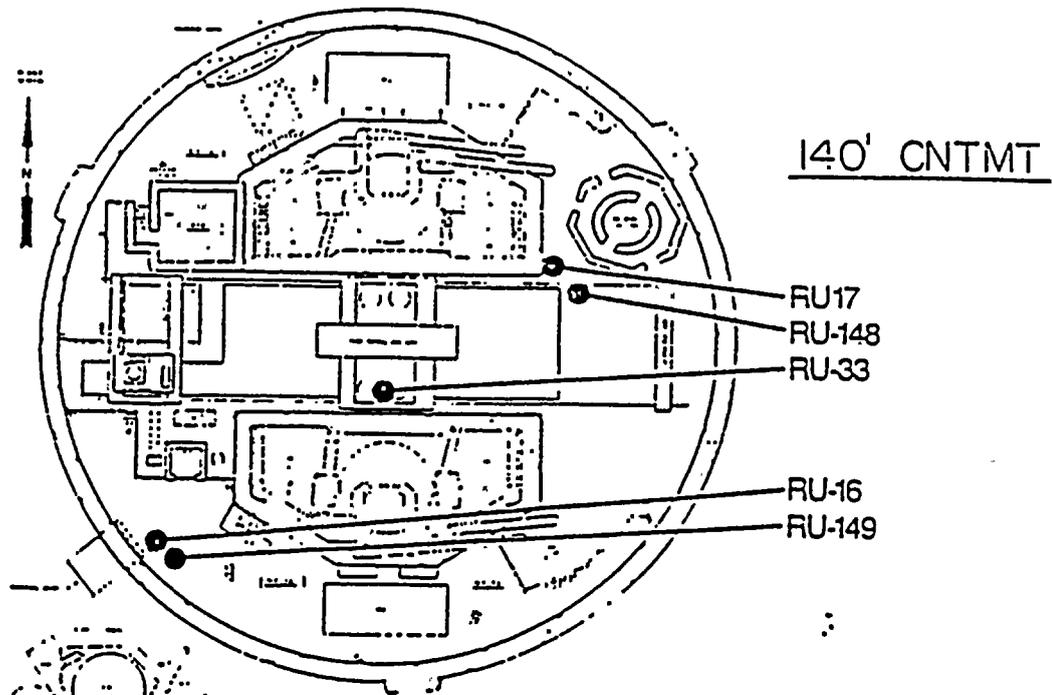
QUESTION 24



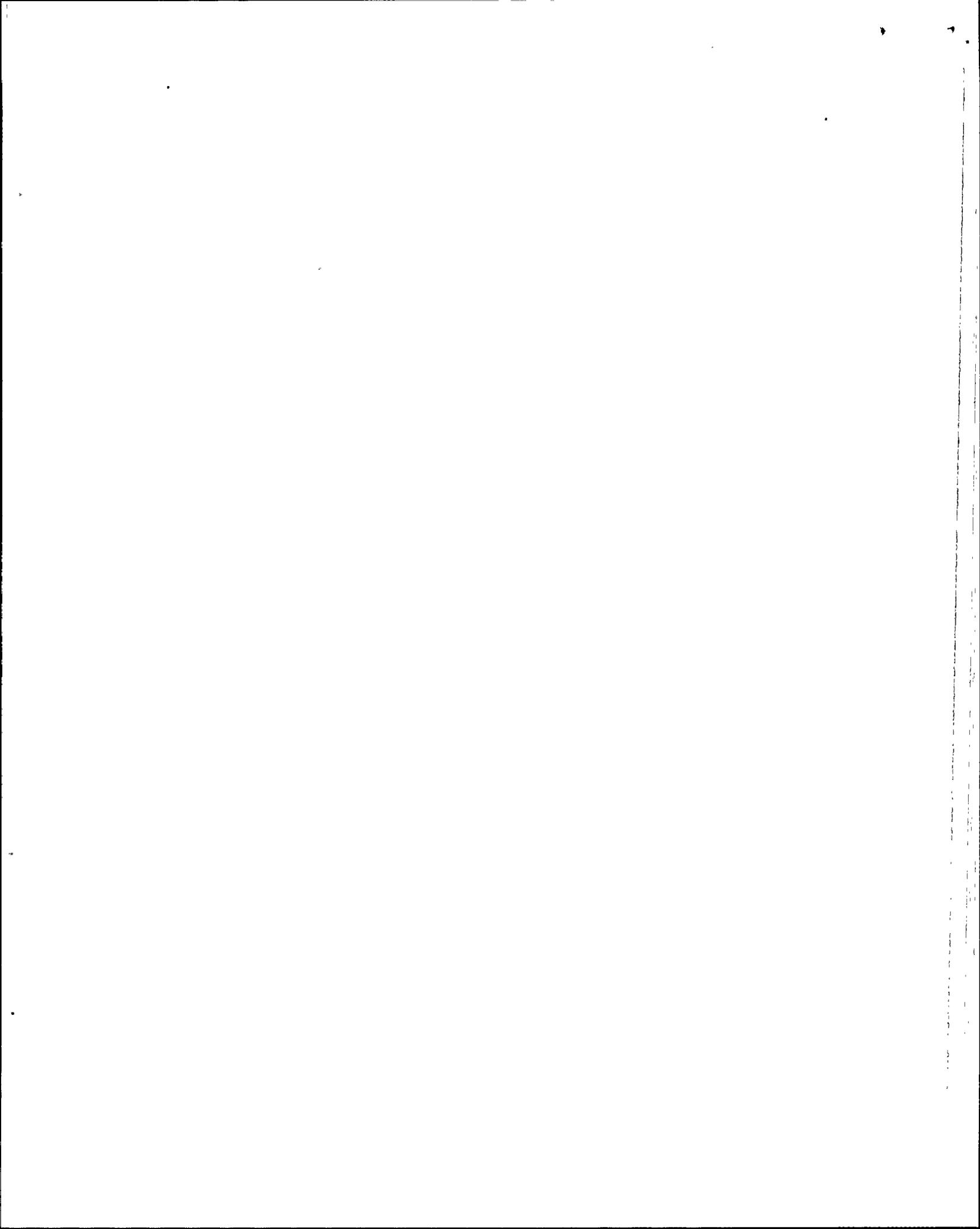


QUESTION 29





QUESTION 45



CORE RELOADING

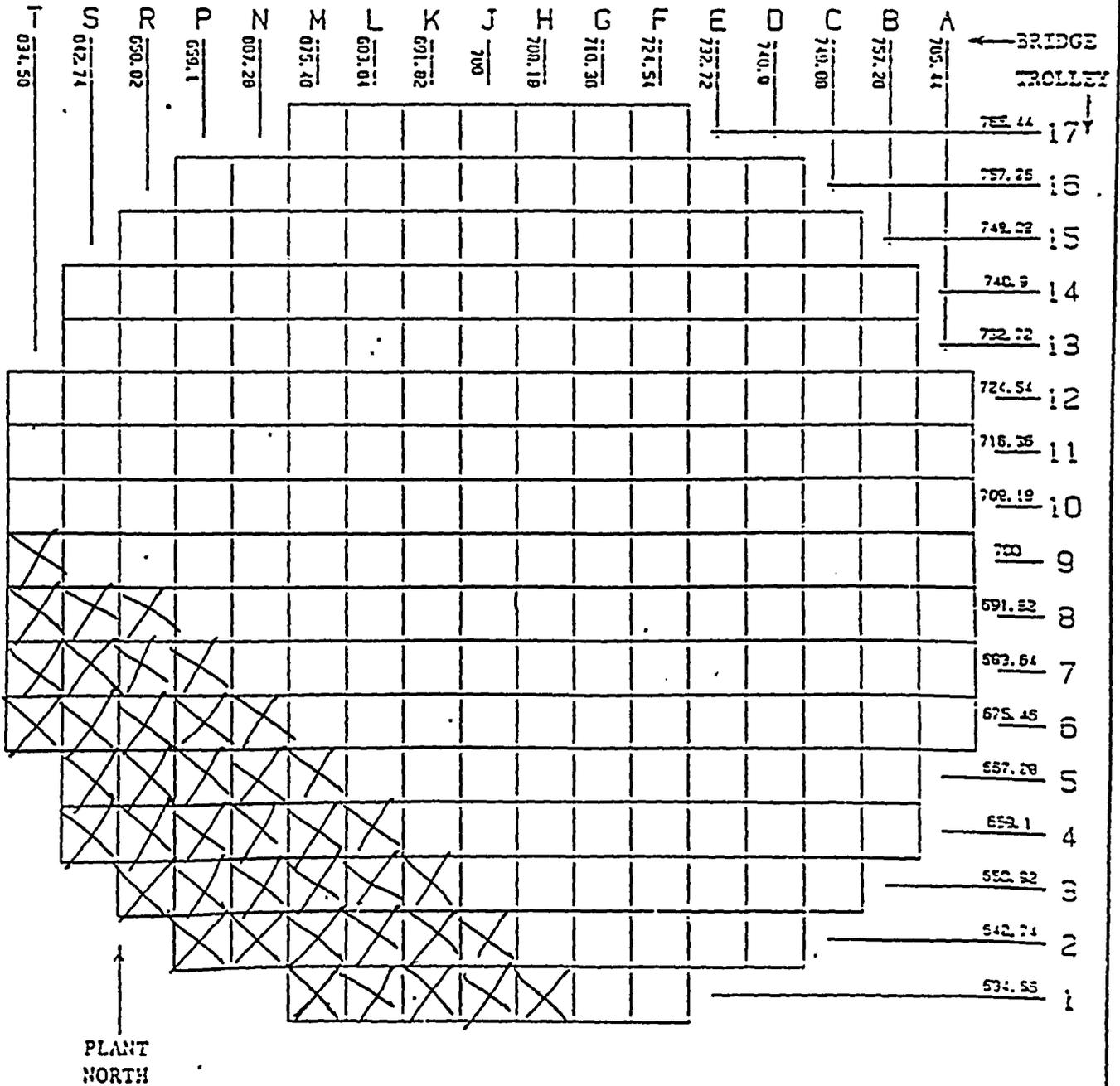
72IC-3RX03

Revision

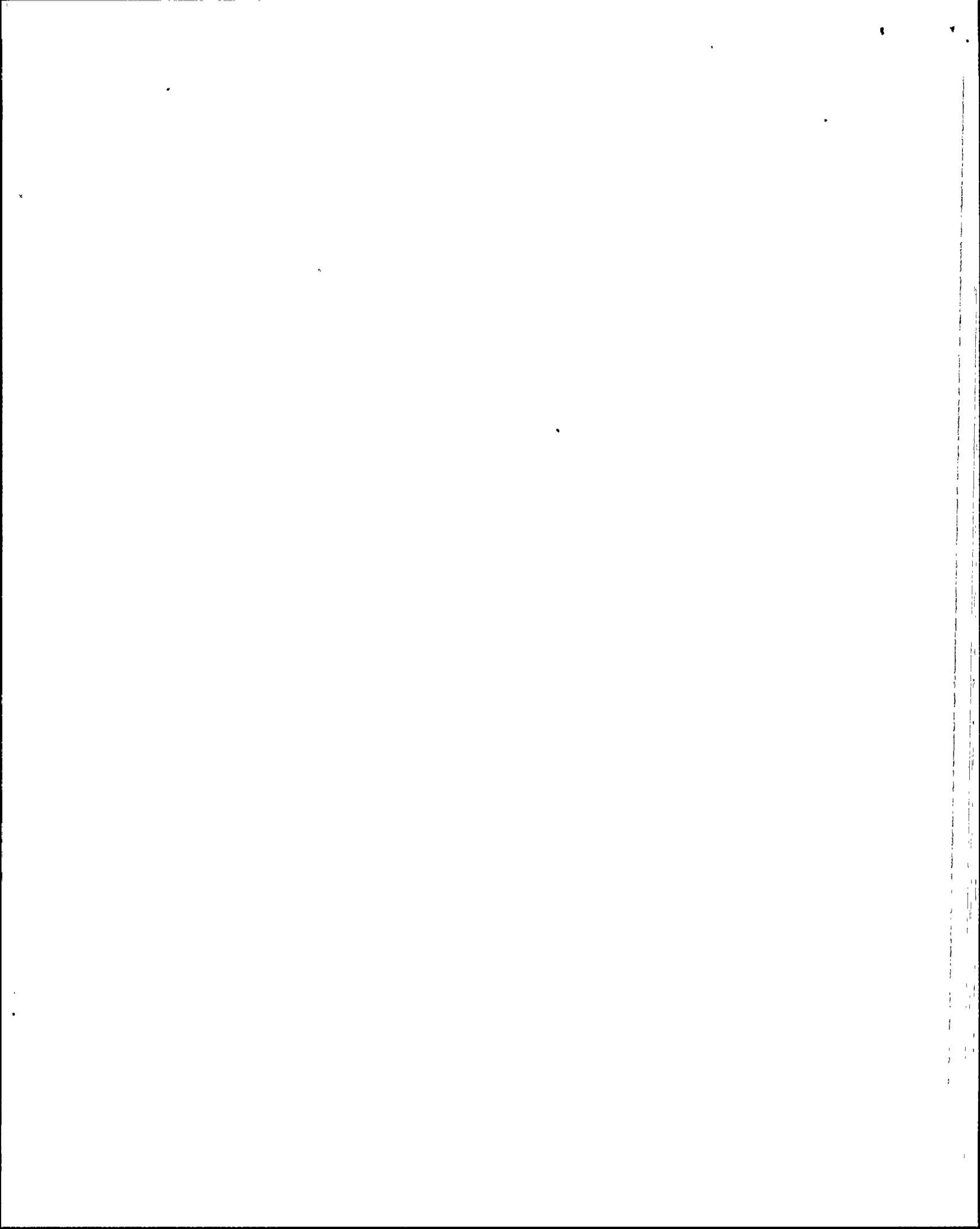
1

Appendix D Page 1 of 3

NOMINAL BRIDGE AND TROLLEY COORDINATES



QUESTION 49



U. S. NUCLEAR REGULATORY COMMISSION  
LIMITED SENIOR REACTOR OPERATOR LICENSE EXAMINATION

FACILITY: PALO VERDE  
REACTOR TYPE: PWR-CE80  
DATE ADMINISTERED: \_\_\_\_\_  
CANDIDATE: \_\_\_\_\_

INSTRUCTIONS TO CANDIDATE Read and follow the NRC Rules and Guidelines for License Examinations attached to your examination. The candidates must receive an overall grade of at least 80 percent to pass the examination. Examination papers will be collected 3 hours after the examination starts.

SITE SPECIFIC WRITTEN EXAMINATION

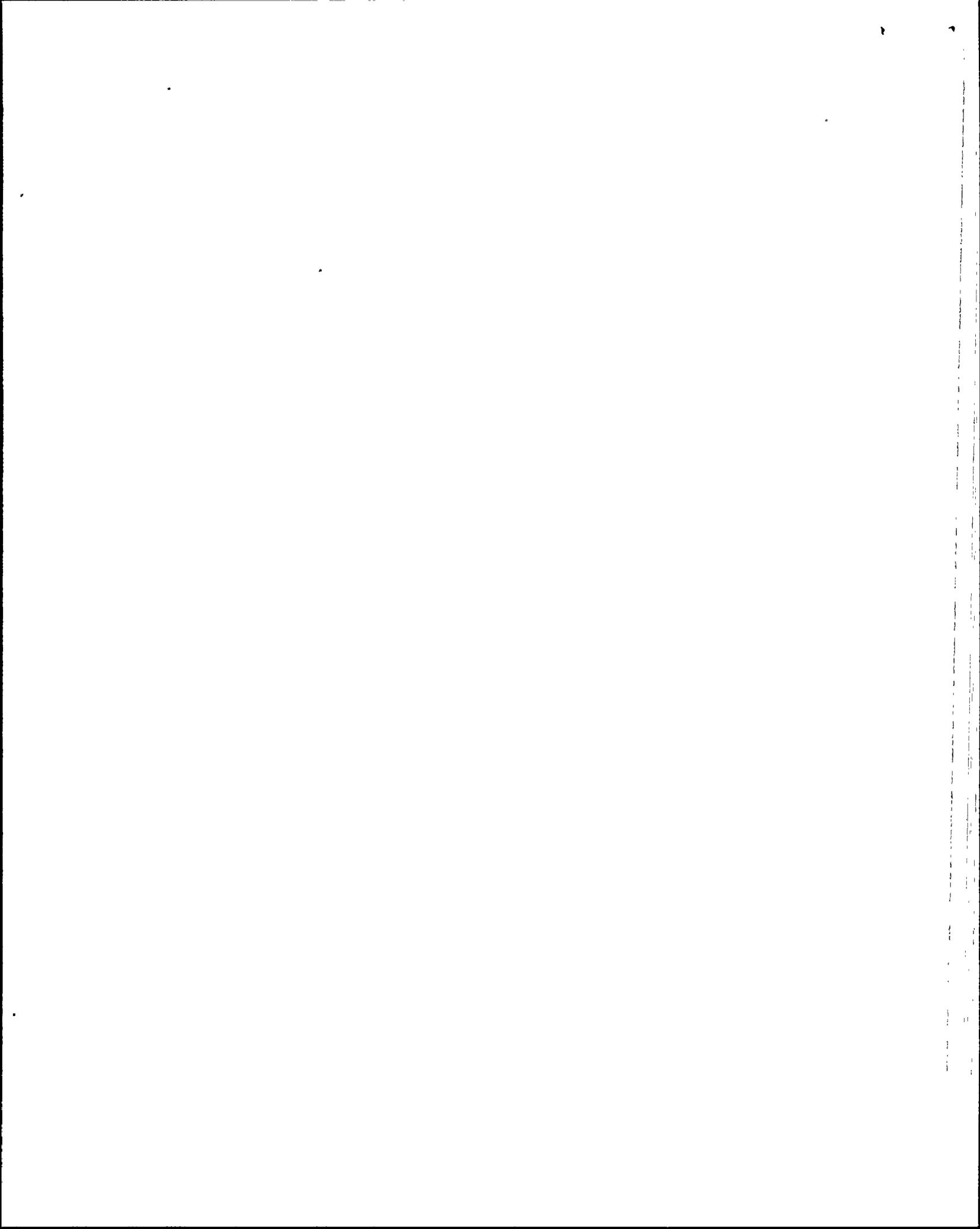
EXAMINATION POINTS      60  
CANDIDATE SCORE      \_\_\_\_\_  
FINAL GRADE      \_\_\_\_\_ %

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

\_\_\_\_\_  
Candidate's Signature

LSRO MASTER  
ADMINISTERED AT PVR6J

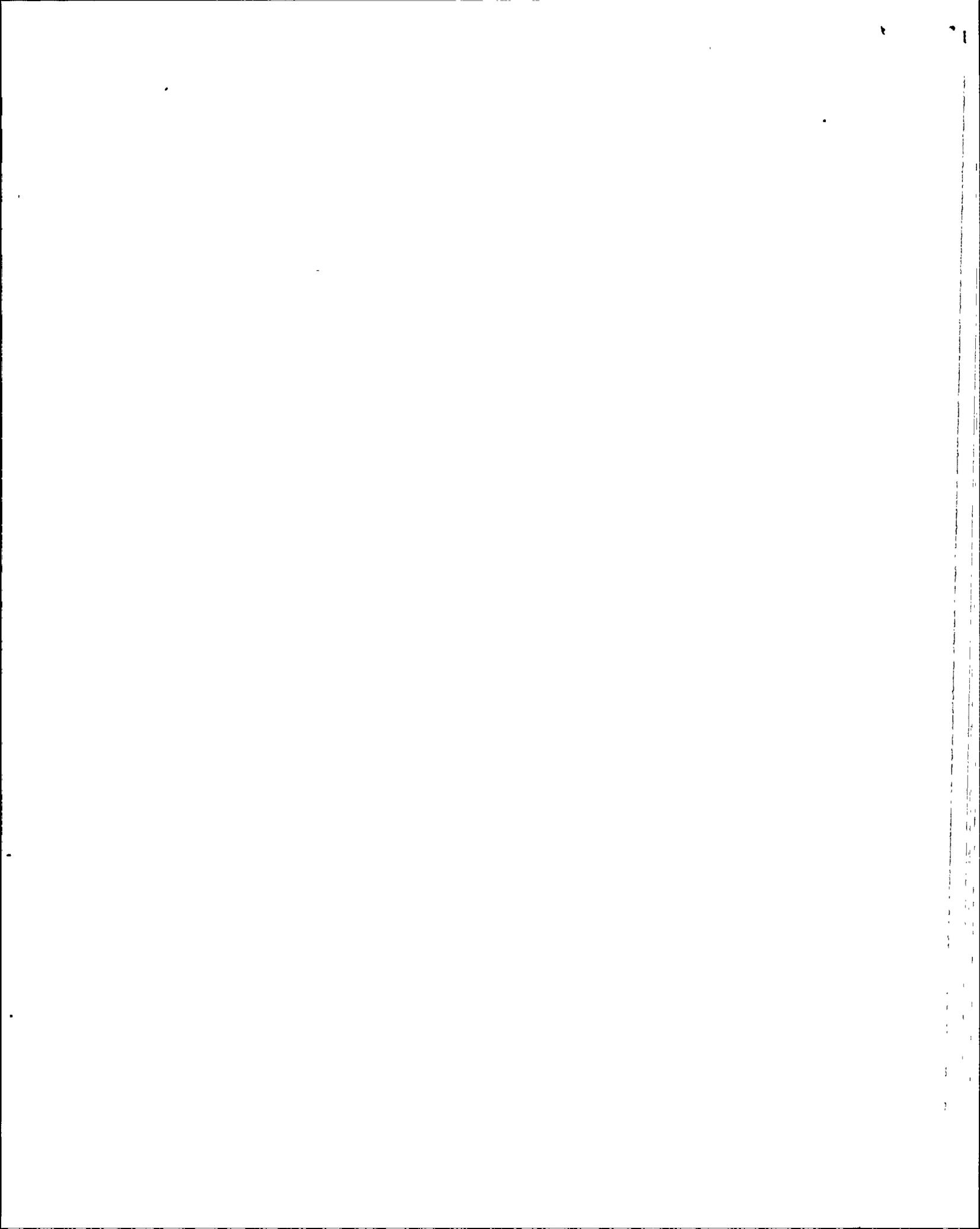
9/14/92



## PROCEDURES FOR THE ADMINISTRATION OF WRITTEN EXAMINATIONS

During the administration of this examination the following rules apply:

1. Cheating on the examination means an automatic denial of your application and could result in more severe penalties.
2. After the examination has been completed, you must sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination. This must be done after you complete the examination.
3. Restroom trips are to be limited and only one applicant at a time may leave. You must avoid all contacts with anyone outside the examination room to avoid even the appearance or possibility of cheating.
4. Use black ink or dark pencil only to facilitate legible reproductions.
5. Print your name in the blank provided in the upper right-hand corner of the examination cover sheet and each answer sheet.
6. Mark your answers on the answer sheet provided.
7. The point value for each question is indicated in parentheses after the question.
8. Mark only one correct answer per question. If you wish to change your answer either erase your old answer and blacken your new answer or cross out your old answer and write your new answer in the space provided.
9. If the intent of the question is unclear, ask questions of the examiner only.
10. When turning in your examination, assemble the completed examination with examination questions, examination aids, and answer sheets. In addition, turn in all scrap paper.
11. All information that will be considered is your indicated answer on the answer sheet. Scrap paper will be disposed of immediately following the examination.
12. To pass the examination, you must achieve a grade of 80% or greater.
13. There is a time limit of three (3) hours for completion of the examination.
14. When you are done and have turned in your examination, leave the examination area. If you are found in this area while the examination is still in progress, your license may be denied or revoked.



QUESTION 001

(1.0)

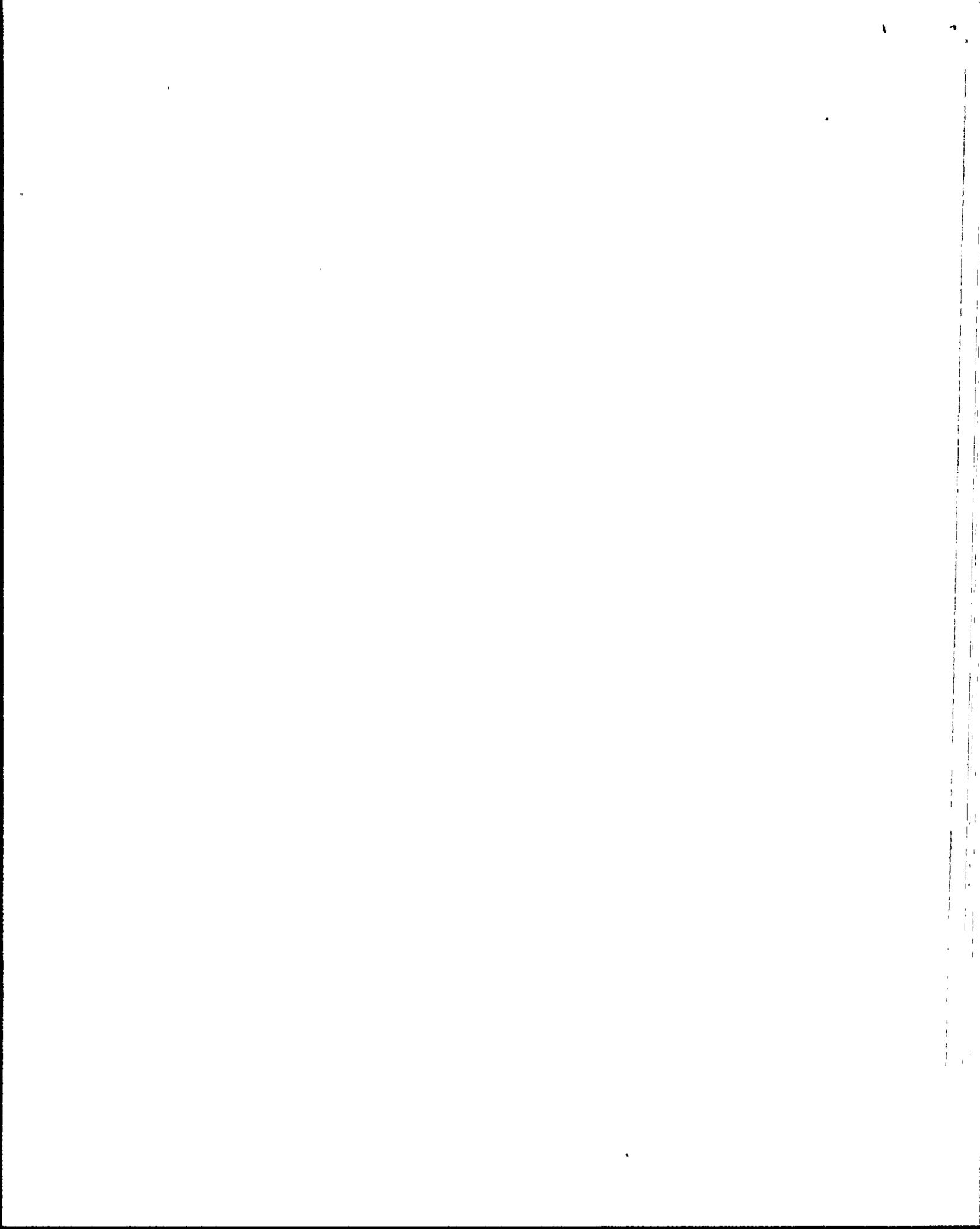
MULTIPLE CHOICE (Select the correct answer)

An individual is reviewing his occupational dose.

- He is 30 years old, male, and a licensed operator.
- He has a current NRC Form 4 on file.
- His lifetime whole body dose is 59 Rem.
- He has facility approval to exceed site limits.

Which one of the following is his maximum occupational dose limit to the whole body allowable under 10 CFR 20, for the current quarter?

- a. 1 Rem
- b. 1 1/4 Rem
- c. 3 Rem
- d. 5 Rem



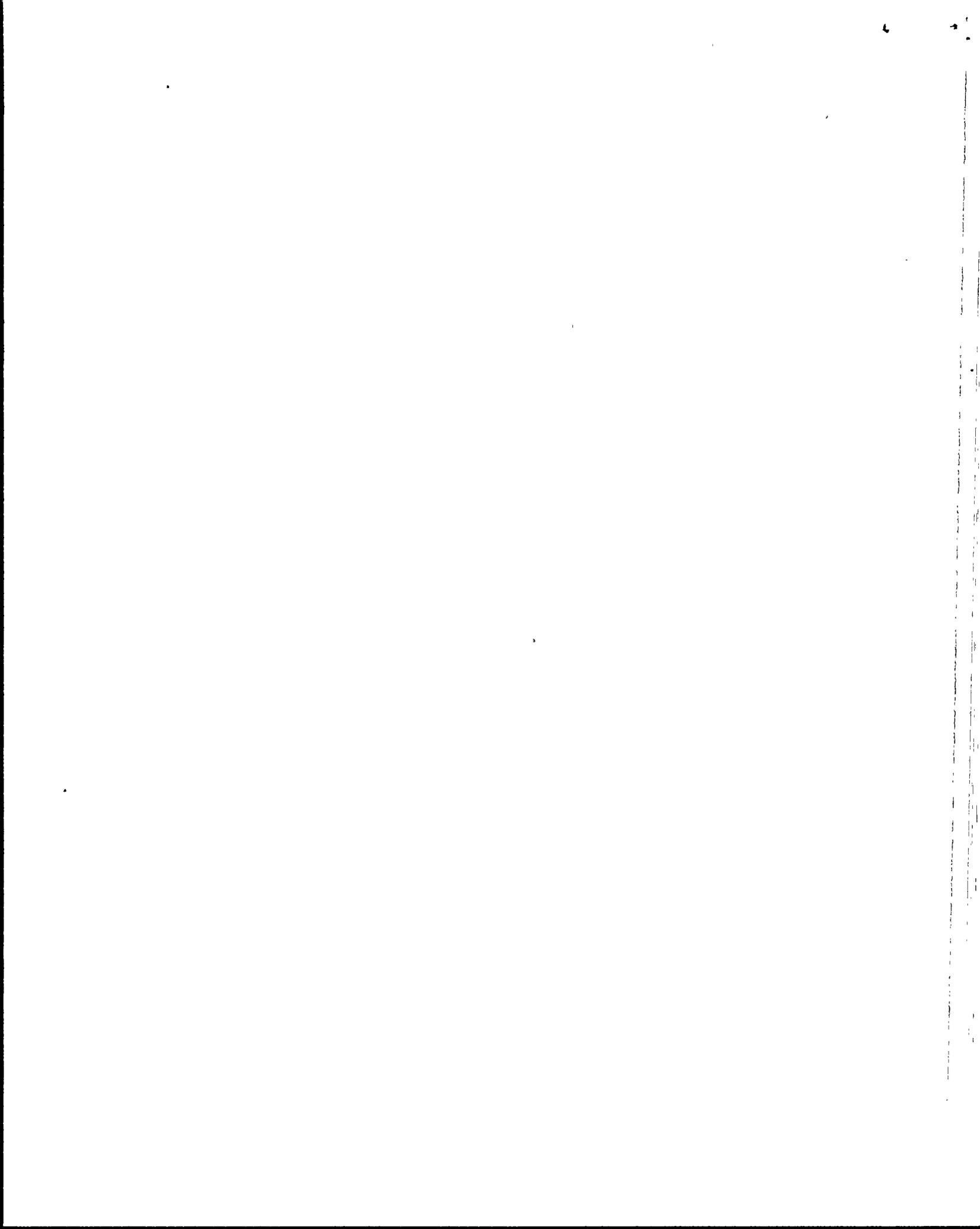
QUESTION 002 (1.0)

MULTIPLE CHOICE (Select the correct answer)

You are working in the Radiologically Controlled Area (RCA). You are wearing partial protective clothing (Boots, gloves, and labcoat). Rad Protection (RP) has not given you any specific direction.

What is the MAXIMUM amount of time that you can go without a whole body frisk?

- a. 4 hours
- b. 5 hours
- c. 6 hours
- d. There is no maximum



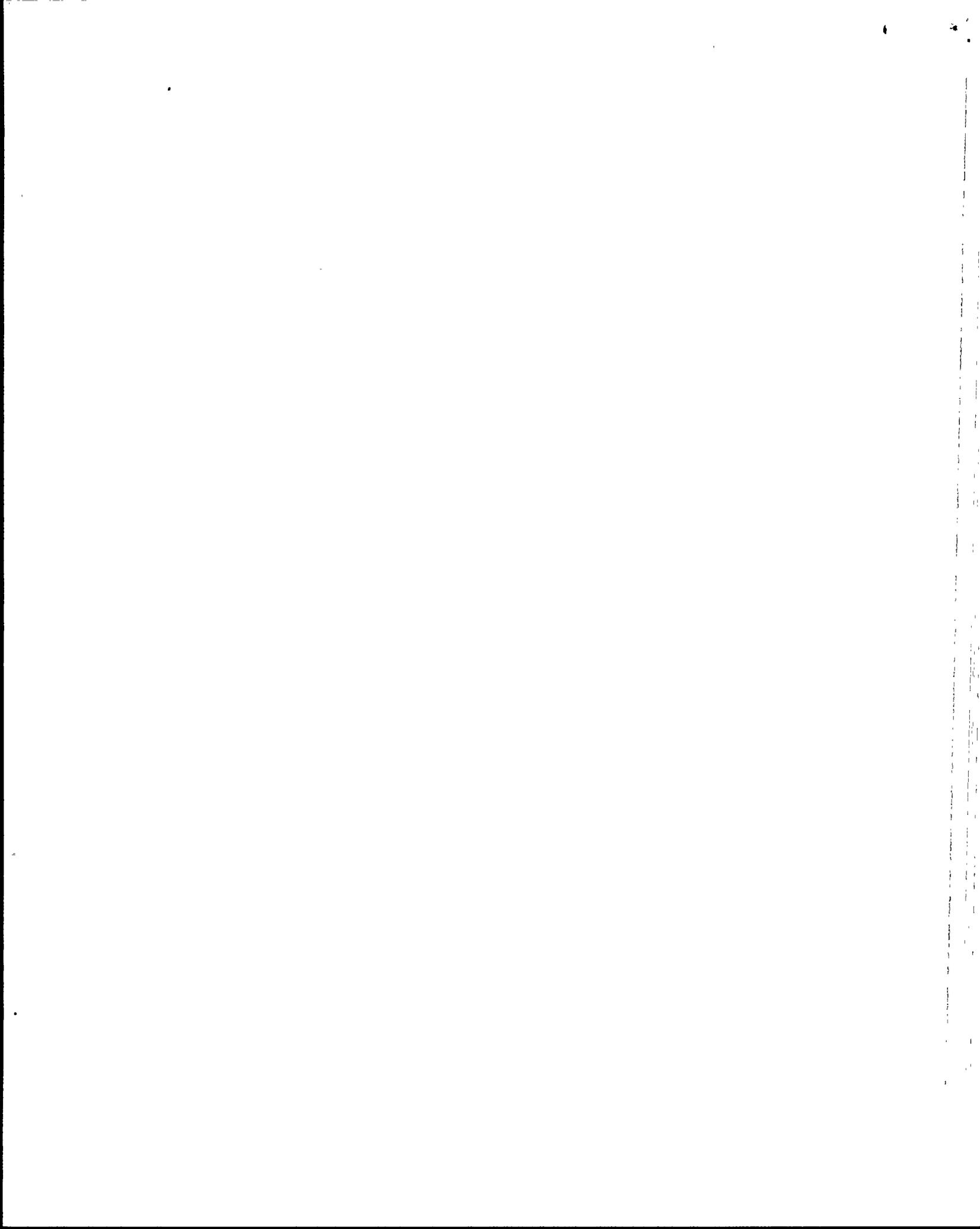
QUESTION 003

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What is the BINDING ENERGY that is associated with IONIZATION ENERGY?

- a. A negative number representing the energy required to completely free a proton from the nucleus.
- b. A positive number representing the energy required to completely free a proton from the nucleus.
- c. A negative number representing the energy required to move an electron to its next higher valence state.
- d. A positive number representing the energy required to move an electron to its next higher valence state.



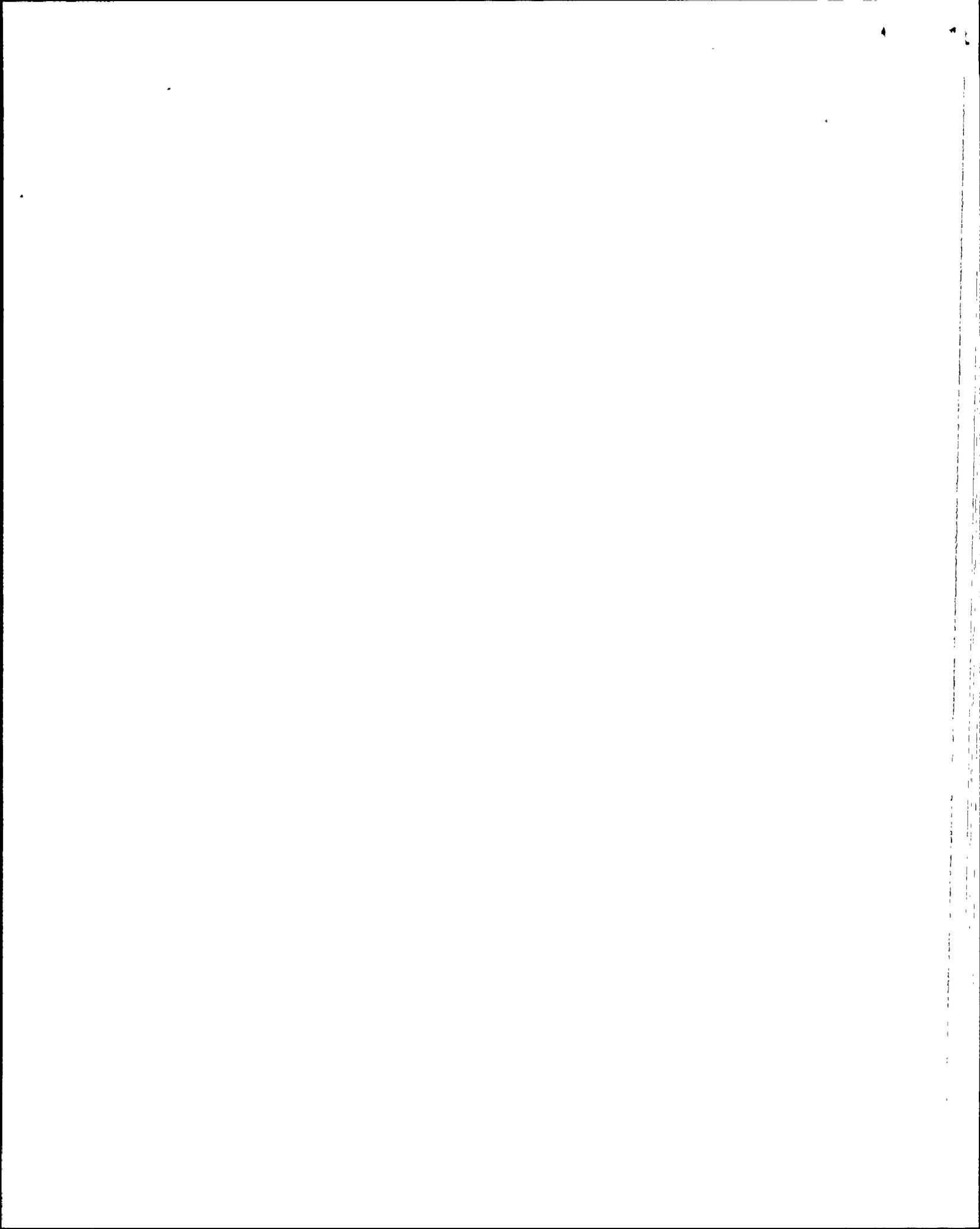
QUESTION 004

(1.0)

MULTIPLE CHOICE (Select the correct answer)

If I double the distance between myself and a small, spherical radiation source, how should my radiation exposure rate from this source change?

- a. Increase by about a factor of 2
- b. Decrease by about a factor of 2
- c. Increase by about a factor of 4
- d. Decrease by about a factor of 4



QUESTION 005

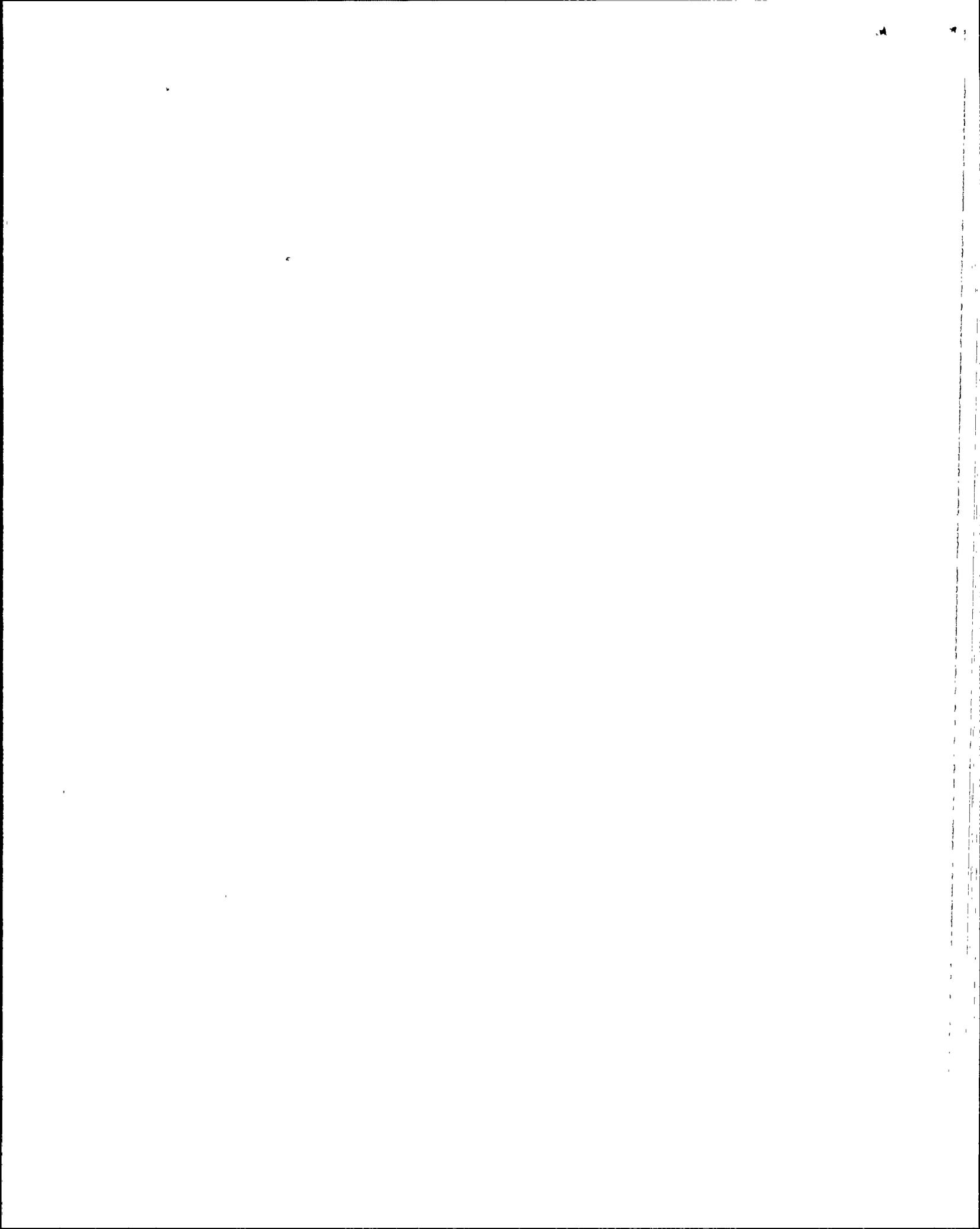
(1.0)

MULTIPLE CHOICE (Select the correct answer)

You are the LSRO on duty during a core onload. You are on the refueling machine talking to your refueling machine operator. She tells you that she is seventeen years old, but needed the job, so she said she was eighteen on all her employment paperwork.

At this point what should you do and why?

- a. WAIT till the end of your shift and report this to management because of potential security problems.
- b. WAIT till the end of your shift and report this to management because of potential dose limit problems.
- c. IMMEDIATELY cease core alterations and escort her out of the RCA because of a potential Technical Specification violation.
- d. IMMEDIATELY cease core alterations and escort her out of the RCA because of potential doubt as to proper reload configuration.



QUESTION 006

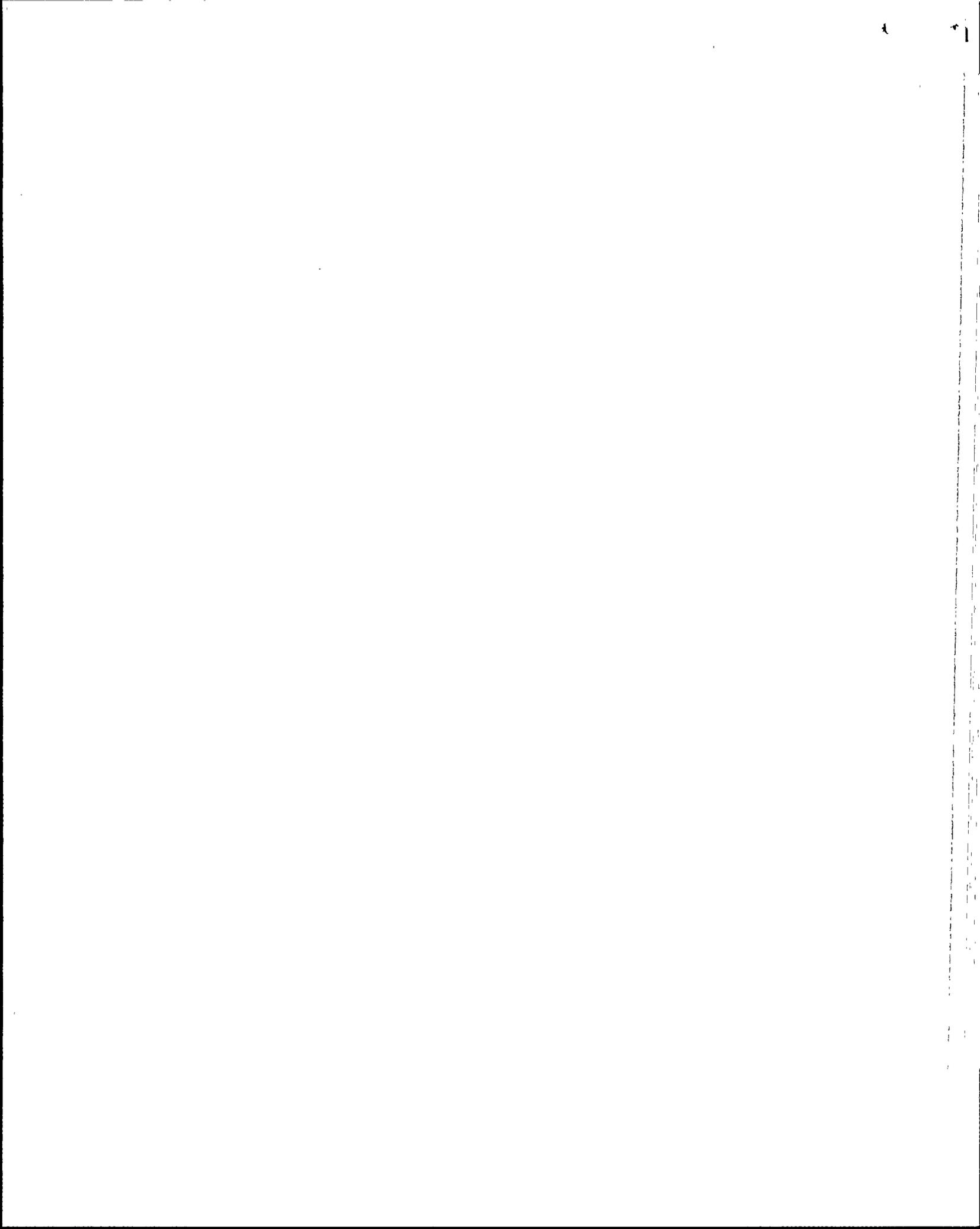
(1.0)

MULTIPLE CHOICE (Select the correct answer)

You are in the spent fuel pool area with no protective clothing on . You note that an operator, in full protective clothing, is operating the spent fuel pool machine. He or she slips, hits his or her head, and is knocked unconscious. You can see blood and feel this injury is serious. You are with an operator qualified to give first aid who also has no protective clothing on.

What should you tell him to do, after you call for help?

- a. Locate and don full protective clothing, enter the spent fuel pool machine, and render first aid.
- b. Enter the spent fuel pool machine as you are dressed, and render first aid.
- c. *Remain out of* the contaminated area as much as possible, attempt to pull the individual off the spent fuel pool machine, remove his or her protective clothing, and render first aid.
- d. Locate and don boots and gloves only, enter the spent fuel pool machine, and render first aid.



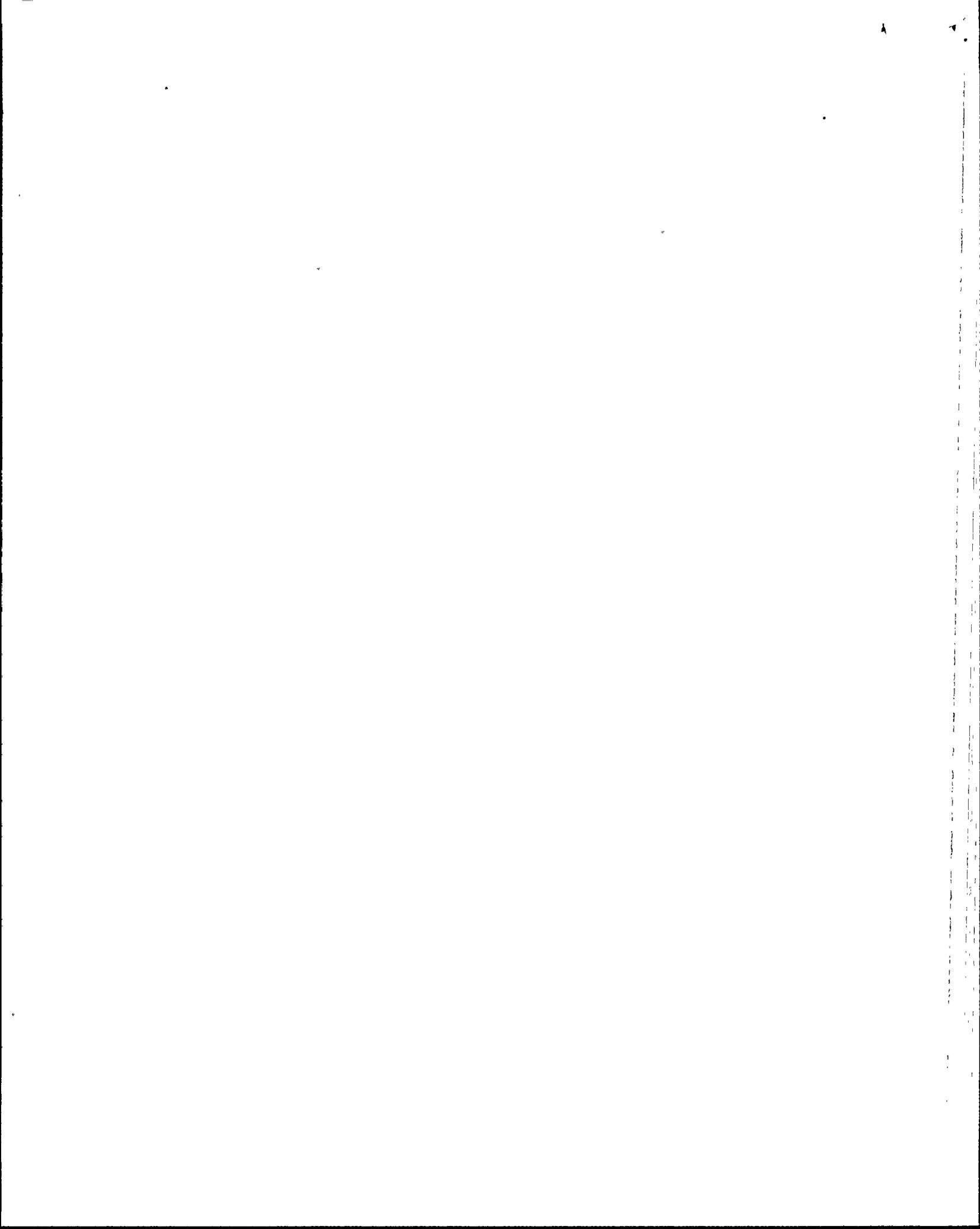
QUESTION 007

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the reason for the HIGHER SENSITIVITY of a Geiger-Mueller tube radiation detector?

- a. Changes in applied detector voltage have little effect on detector output.
- b. Geiger-Mueller tubes are longer than other detector types.
- c. Any incident radiation event causing primary ionization results in ionization of the entire detector.
- d. Geiger-Mueller tubes are capable of operating at lower detector voltages than Ion-Chamber tubes, allowing detection of lower energy radiation.



QUESTION 008

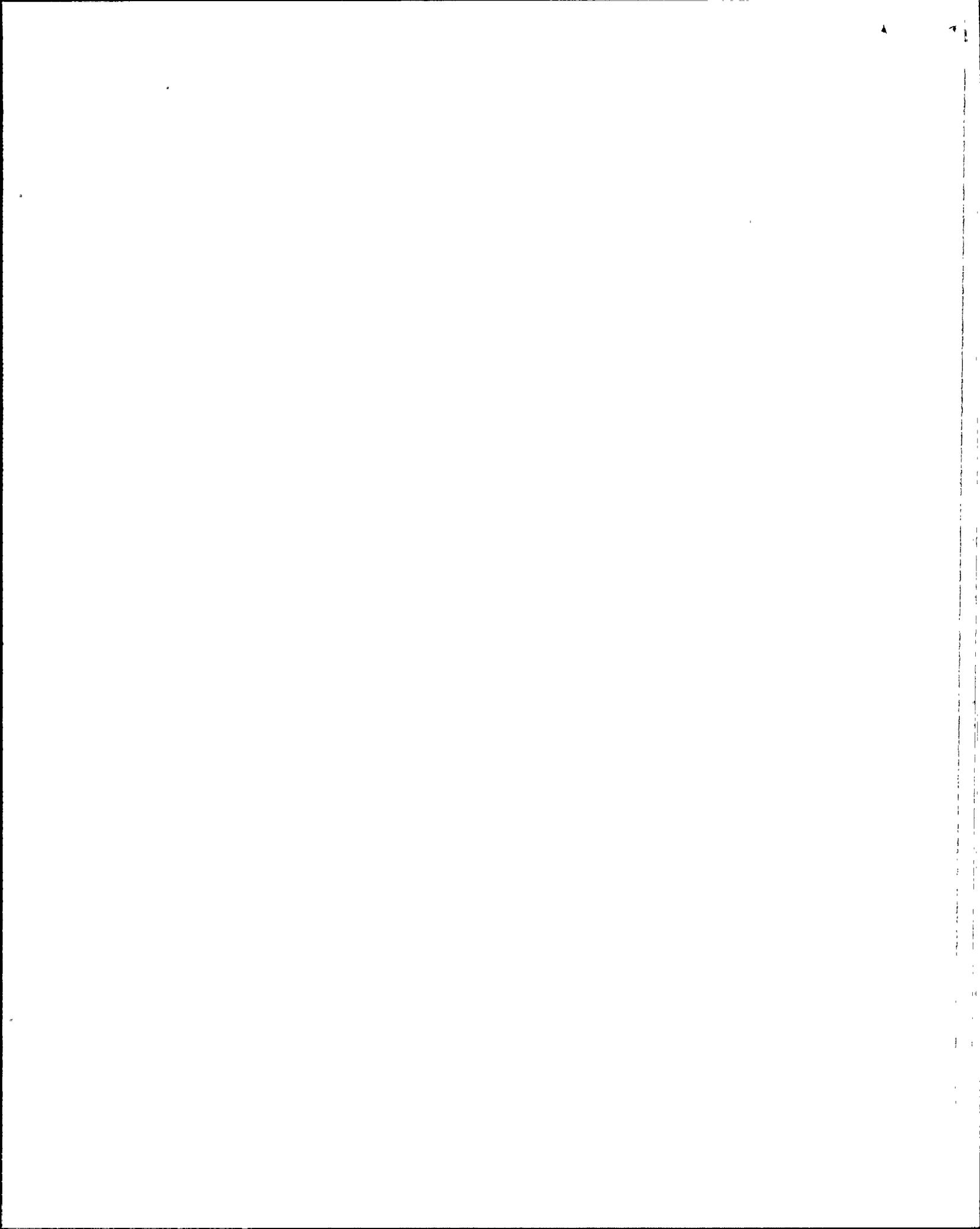
(1.0)

MULTIPLE CHOICE (Select the correct answer)

An emergency has been declared. The emergency coordinator asks you to volunteer to enter the refueling floor to save the life of an operator who is injured. General area rad levels you will be exposed to are 100 Rem/ Hr.

Using emergency exposure guidelines, what is the MAXIMUM amount of time (in minutes) you can spend in this radiation field?

- a. 30
- b. 45
- c. 60
- d. 75



QUESTION 009

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following is a measure of the dose of any ionizing radiation in terms of its estimated biological effect?

- a. Rad
- b. Rem
- c. Curie
- d. Roentgen

QUESTION 010

(1.0)

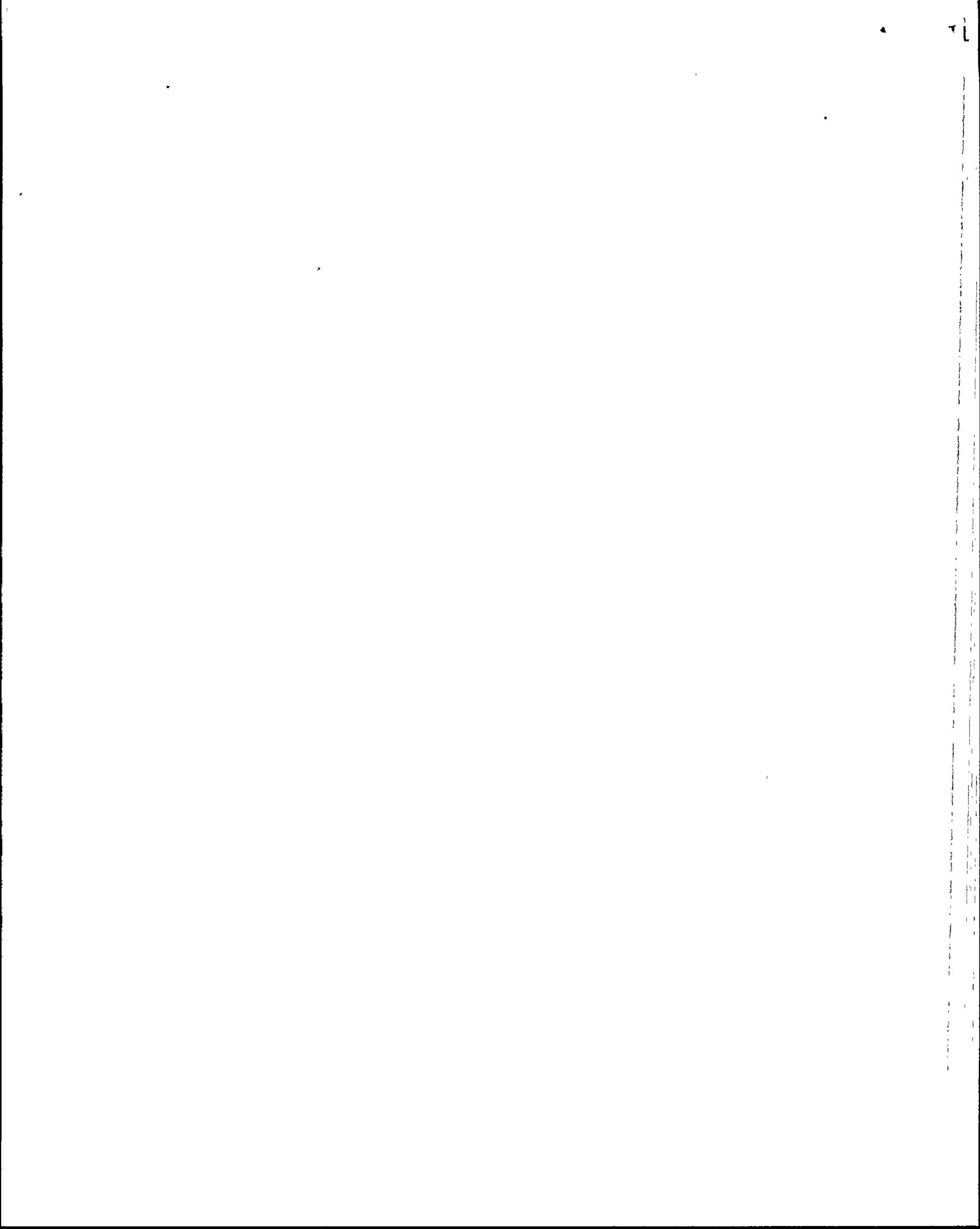
MULTIPLE CHOICE (Select the correct answer)

There is an area radiation survey in progress. You have a portable Ion Chamber instrument (an R02) and are wearing protective glasses. The instrument has a shield that can be positioned opened or closed. You read 100 mr/hr with the shield open and 50 mr/hr with the shield closed, at a certain location.

It is the first day of the quarter. You have 1050 mr already this year.

How long can you stand in this radiation field until you reach your Palo Verde administrative limit for whole body exposure?

- a. 7 hours.
- b. 10 hours.
- c. 20 hours.
- d. 40 hours.



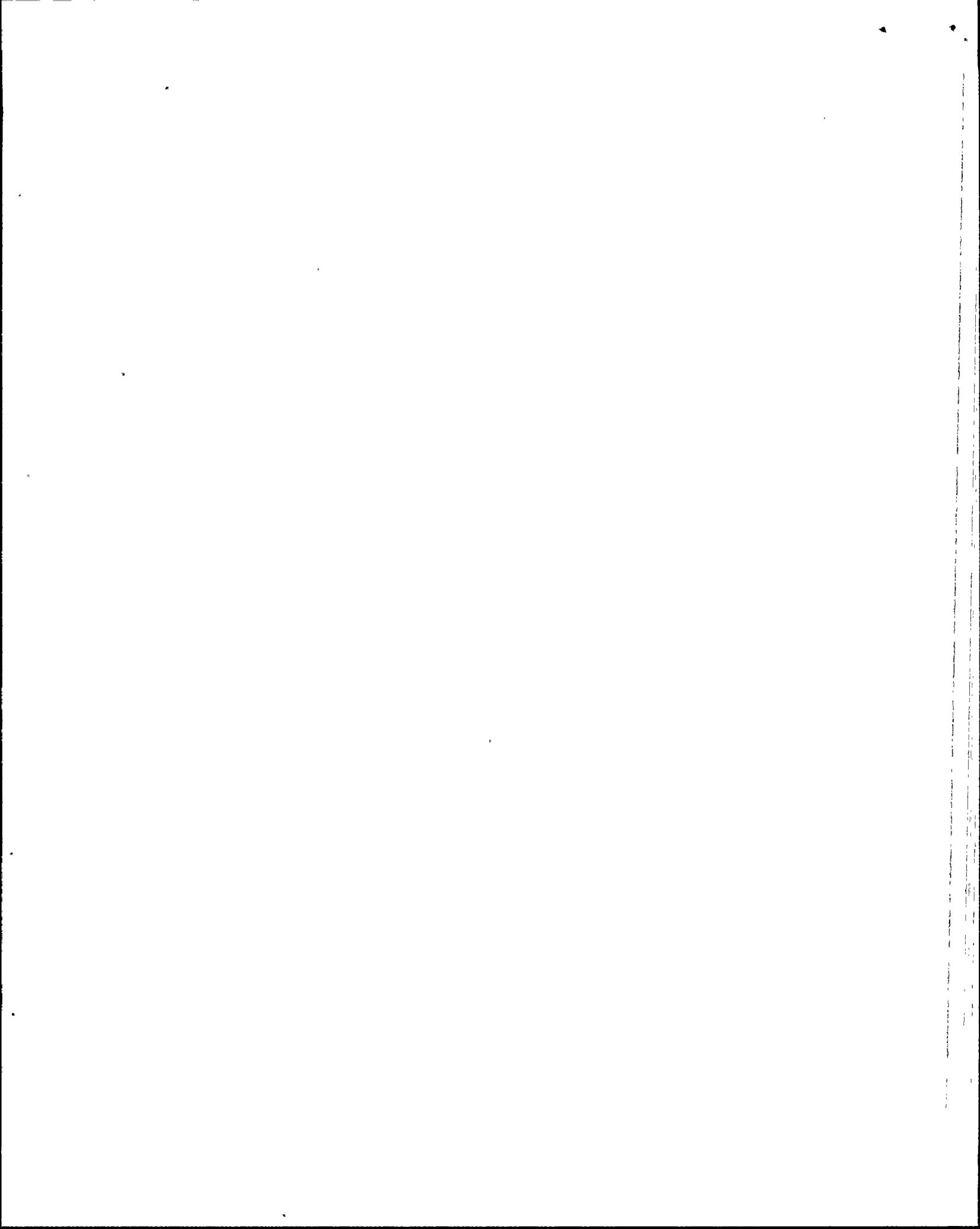
QUESTION 011

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Your coworker states that he has received an acute whole body dose of 150 Rem. Which of the following describes the PROBABLE short term and long term effects of this dose?

- a. Clinically detectable blood changes, tremors, an injury but no disability.
- b. Nausea, vomiting, internal bleeding, blood disorder, an injury and a disability.
- c. Nausea, vomiting, an injury but no disability.
- d. Nausea, vomiting, possible death, an injury and a disability.



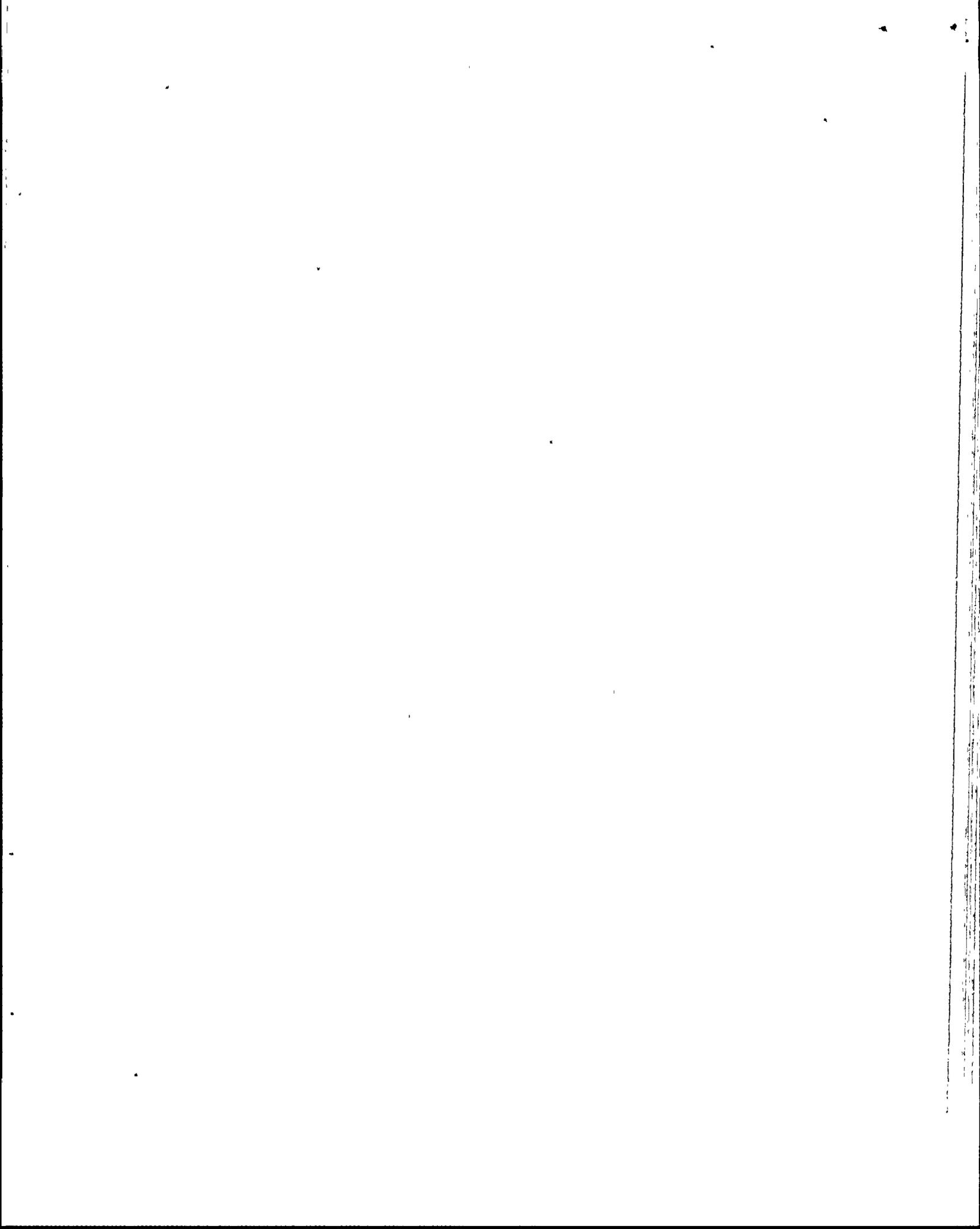
QUESTION 012

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Should you use a supplied air respirator in a tritium environment ? Why or why not?

- a. Yes, as long as you use a plastic or rubber suit.
- b. Yes, tritium will be filtered out through the mask.
- c. No, tritium particulate can be adsorbed through the skin.
- d. No, the maximum permissible concentration will be too high.



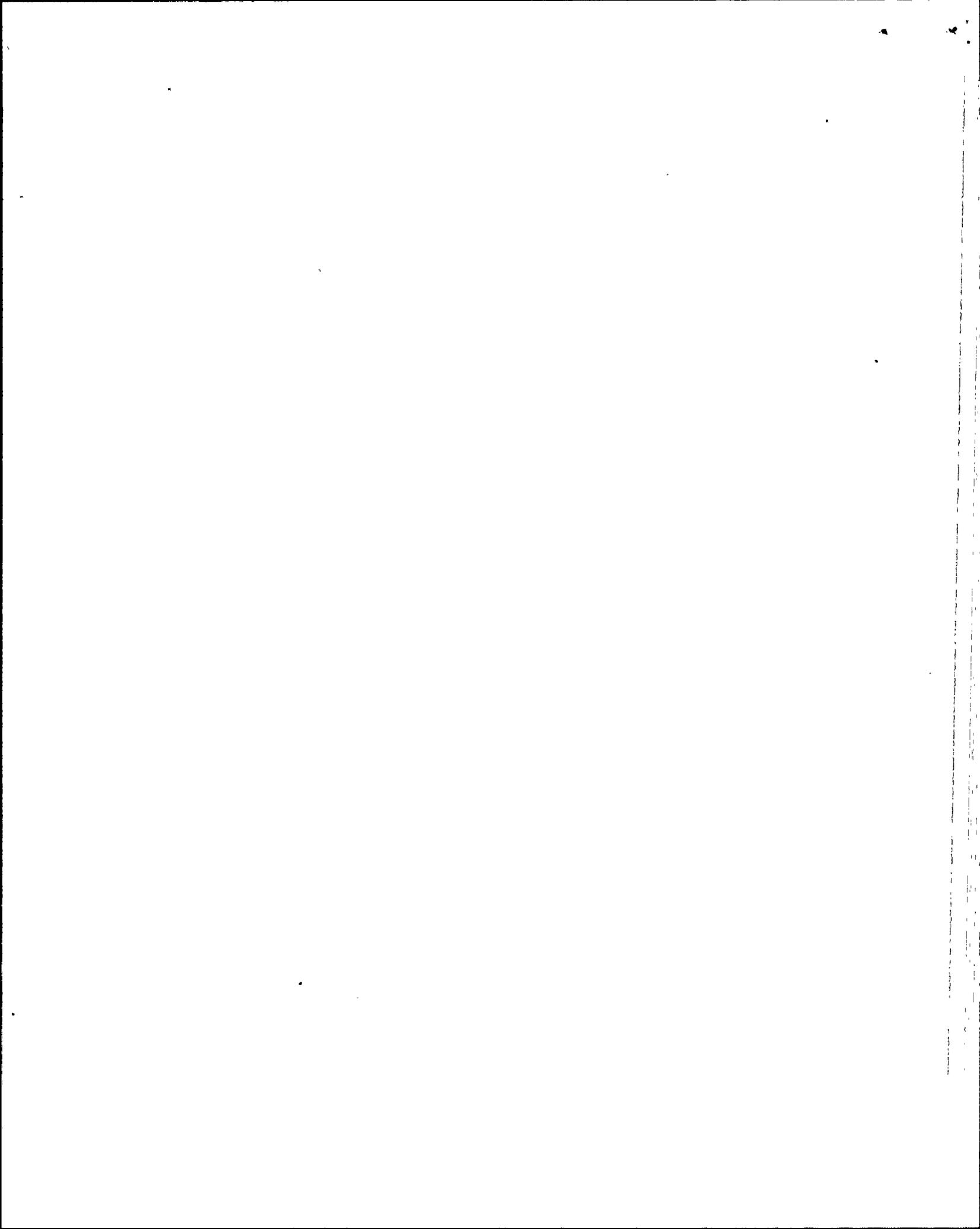
QUESTION 013

(1.0)

MULTIPLE CHOICE (Select the correct answer)

K-effective is 0.94. What is the value of net reactivity ( $\rho$  in  $\Delta k/k$ ) and what does this mean?

- a. -0.064, neutron population is decreasing by 6.4 % each generation.
- b. +0.064, neutron population is increasing by 6.4 % each generation.
- c. +16.67, neutron population is increasing by 16.67 % each generation.
- d. -16.67, neutron population is decreasing by 16.67 % each generation.



QUESTION 014

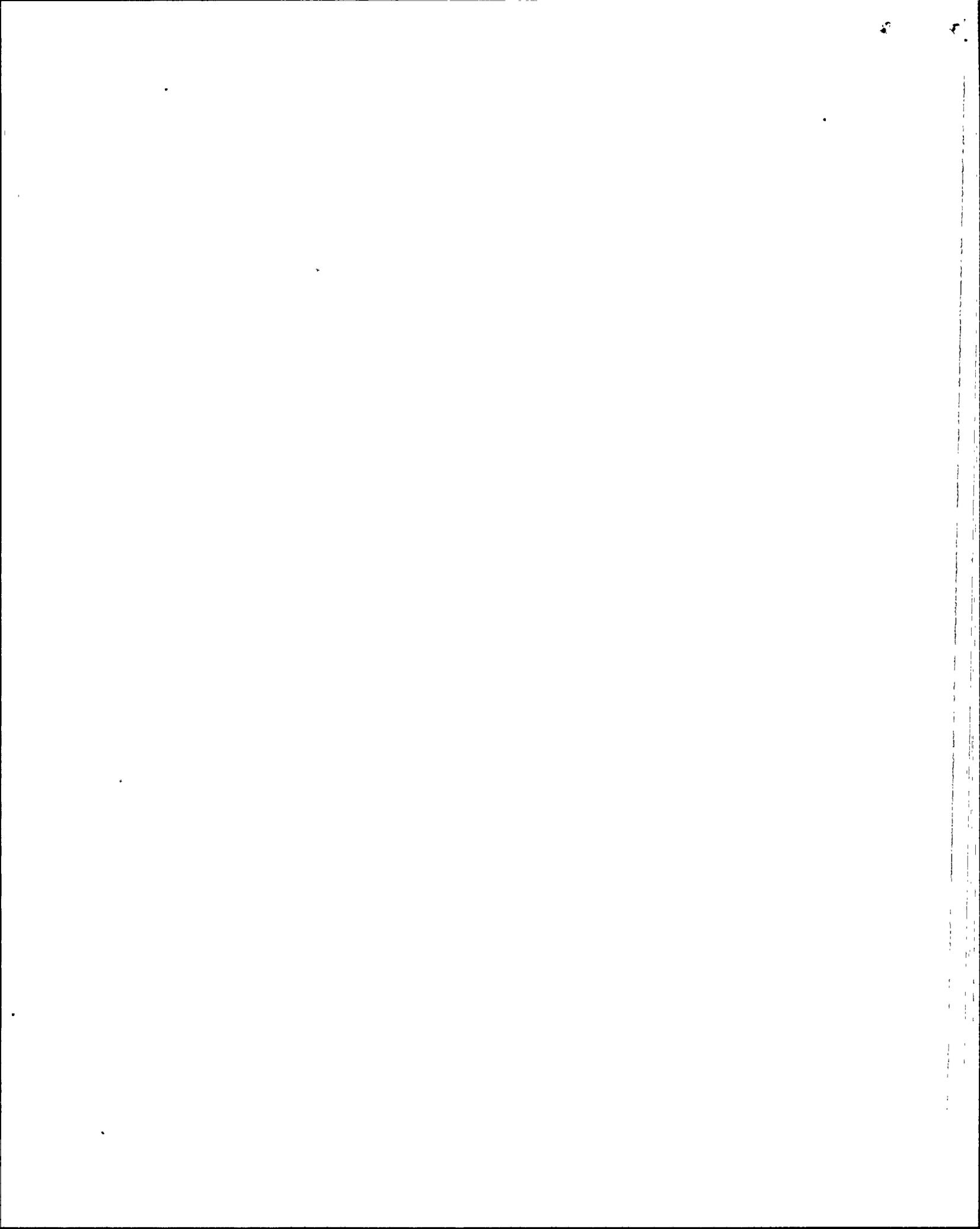
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The following question concerns the Fuel Temperature Coefficient (Doppler Coefficient). Refer to the attached diagram.

The temperature of the fuel DECREASES. The microscopic cross section for absorption, ( $\sigma_a$ ), for off resonance neutrons, changes in what manner?

- a. The base of spike broadens and peak drops.
- b. The base of spike narrows and the resonance integral decreases.
- c. The base of spike narrows and the peak increases.
- d. The base of spike broadens and the resonance integral increases.



QUESTION 015

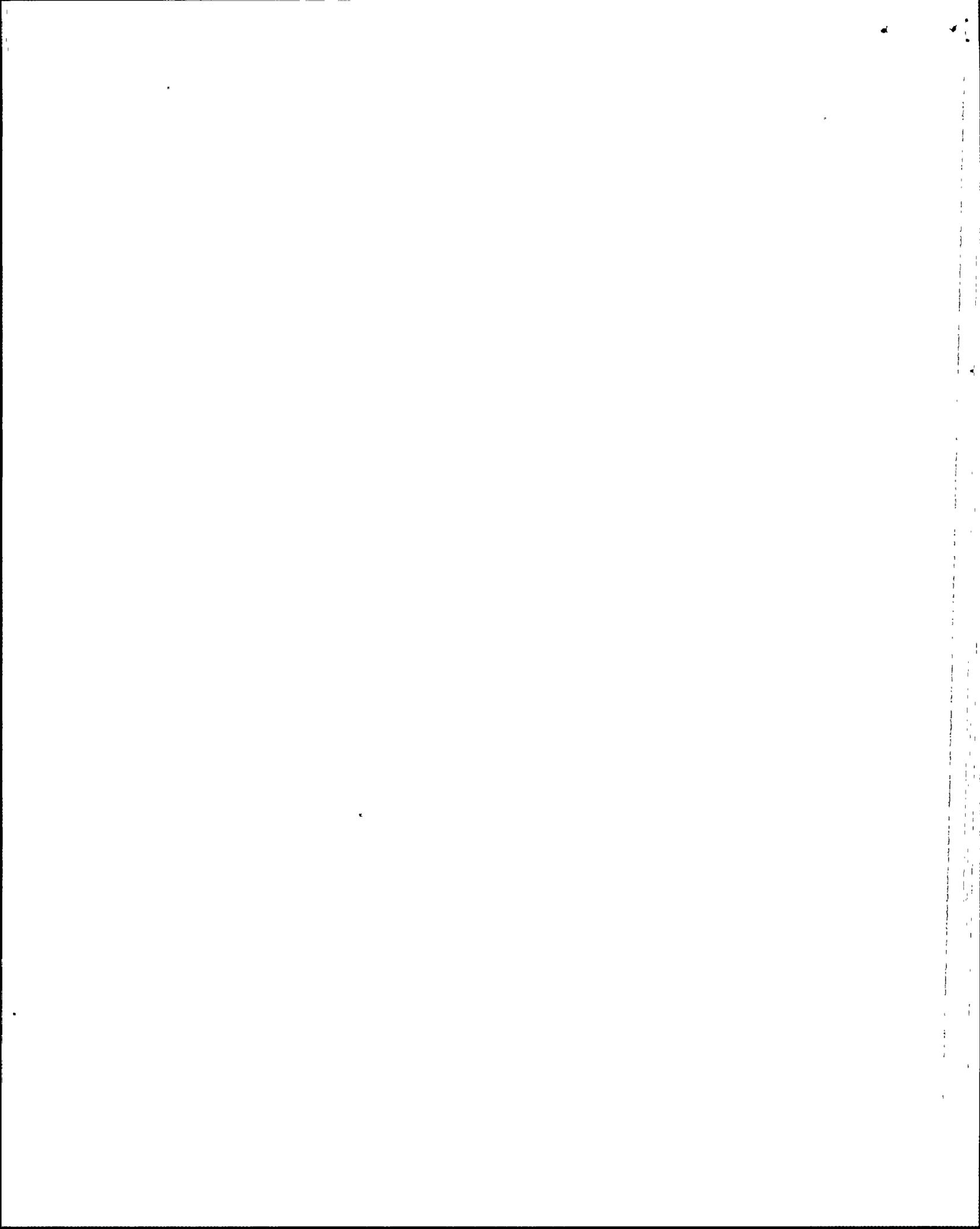
(1.0)

MULTIPLE CHOICE (Select the correct answer)

No delayed neutrons are required to maintain a constant neutron population in the core.

Which of the following describes reactor status?

- a. Critical
- b. Supercritical
- c. The reactor has an extremely long period.
- d. The reactor has a negative Start Up Rate.



QUESTION 016

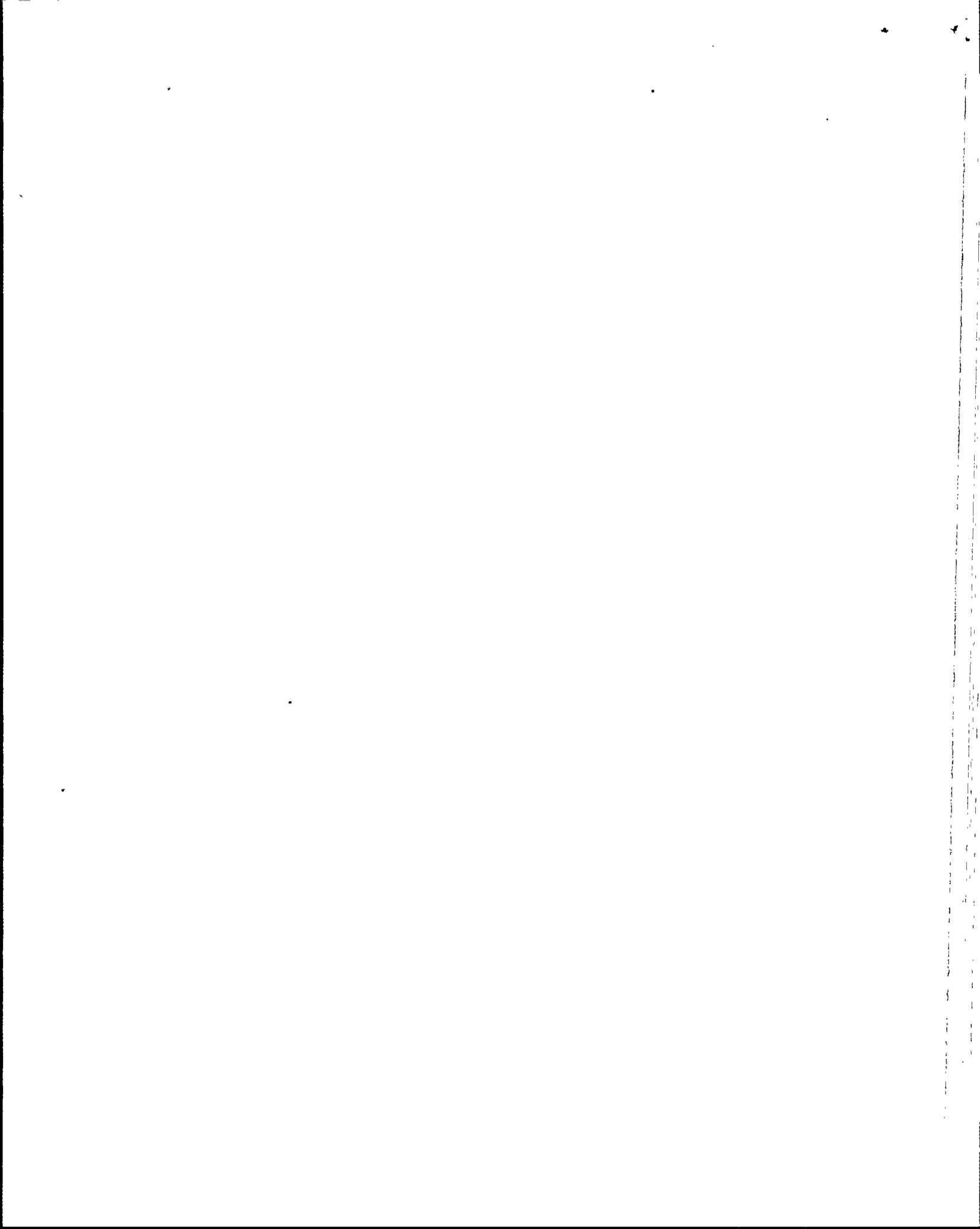
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Given that  $Q/L$  is heat transfer rate per unit length.

How does the buildup of a corrosion layer on the fuel clad effect the fuel centerline temperature and why?

- a. Decreases because  $Q/L$  increases.
- b. Increases because  $Q/L$  decreases.
- c. Remains the same because heat generation is constant.
- d. Remains the same because the corrosion layer has the same thermal conductivity as the clad.



QUESTION 017

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Given the following:

The plant is in Mode 6

A loss of shutdown cooling is in progress

The mass of water to uncover the reactor is  $4.084E6$  lbm.

The water has just reached 212 degrees F

The fuel is transferring  $6.52E7$  BTU/hr

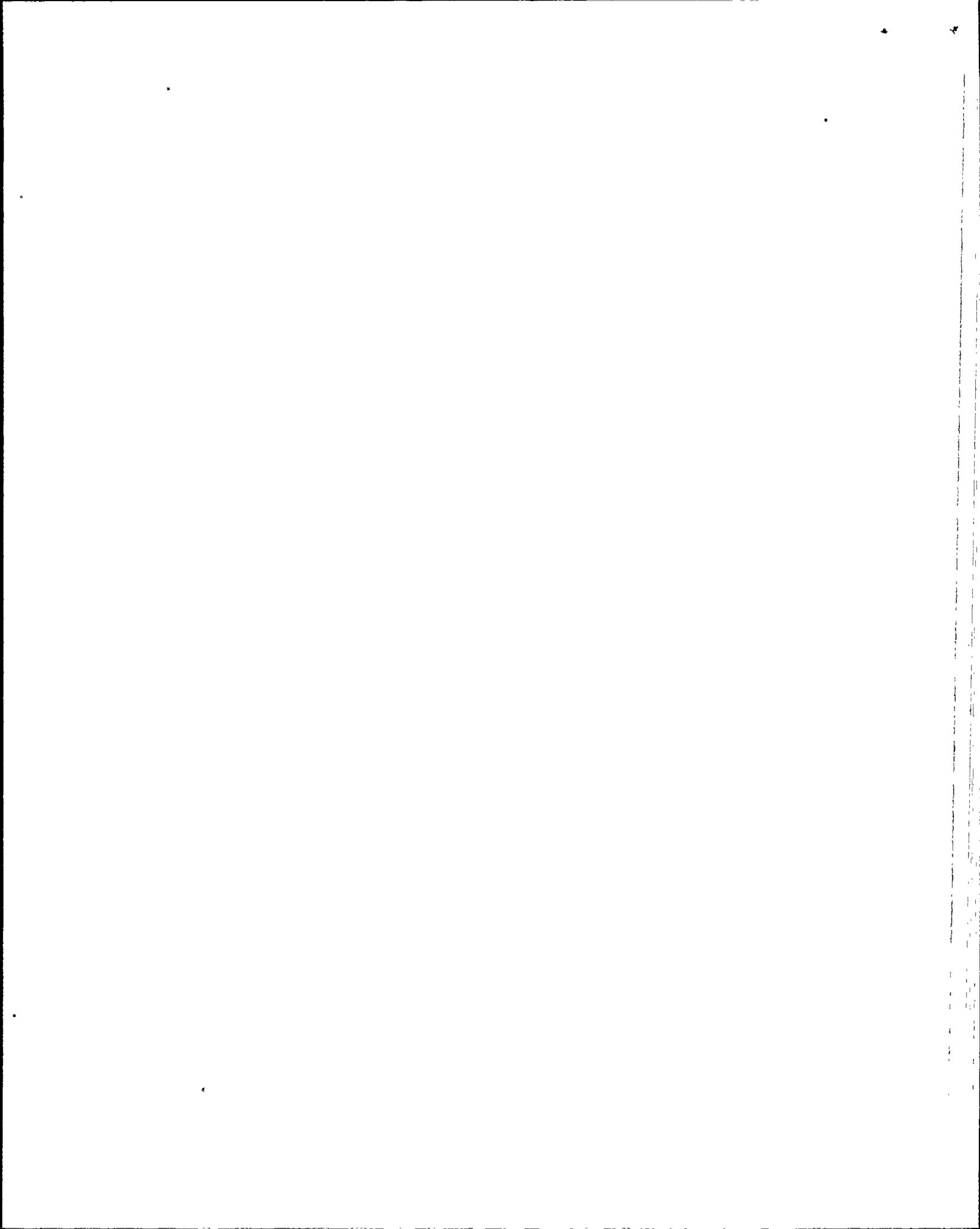
How long, in hours, will it take to uncover the reactor?

a. 58.78

b. 59.78

c. 60.78

d. 61.78



QUESTION 018

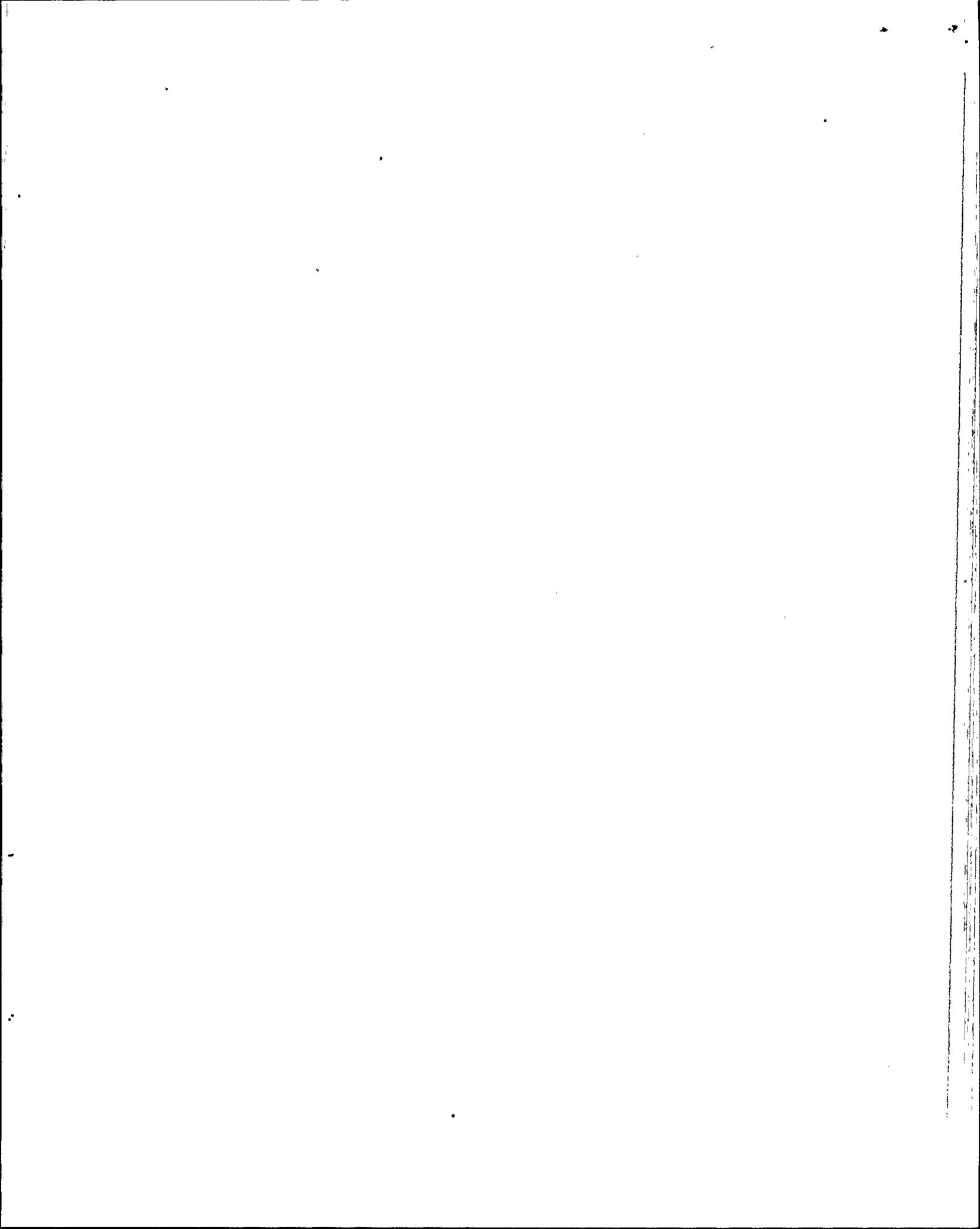
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Fill in the blanks.

Heat transfer from the centerline of the pellet to the gas gap is mostly by \_\_\_\_\_ and heat transfer from the clad to the coolant is mostly by \_\_\_\_\_.

- a. Convection, conduction
- b. Conduction, convection.
- c. Convection, convection.
- d. Conduction, conduction..



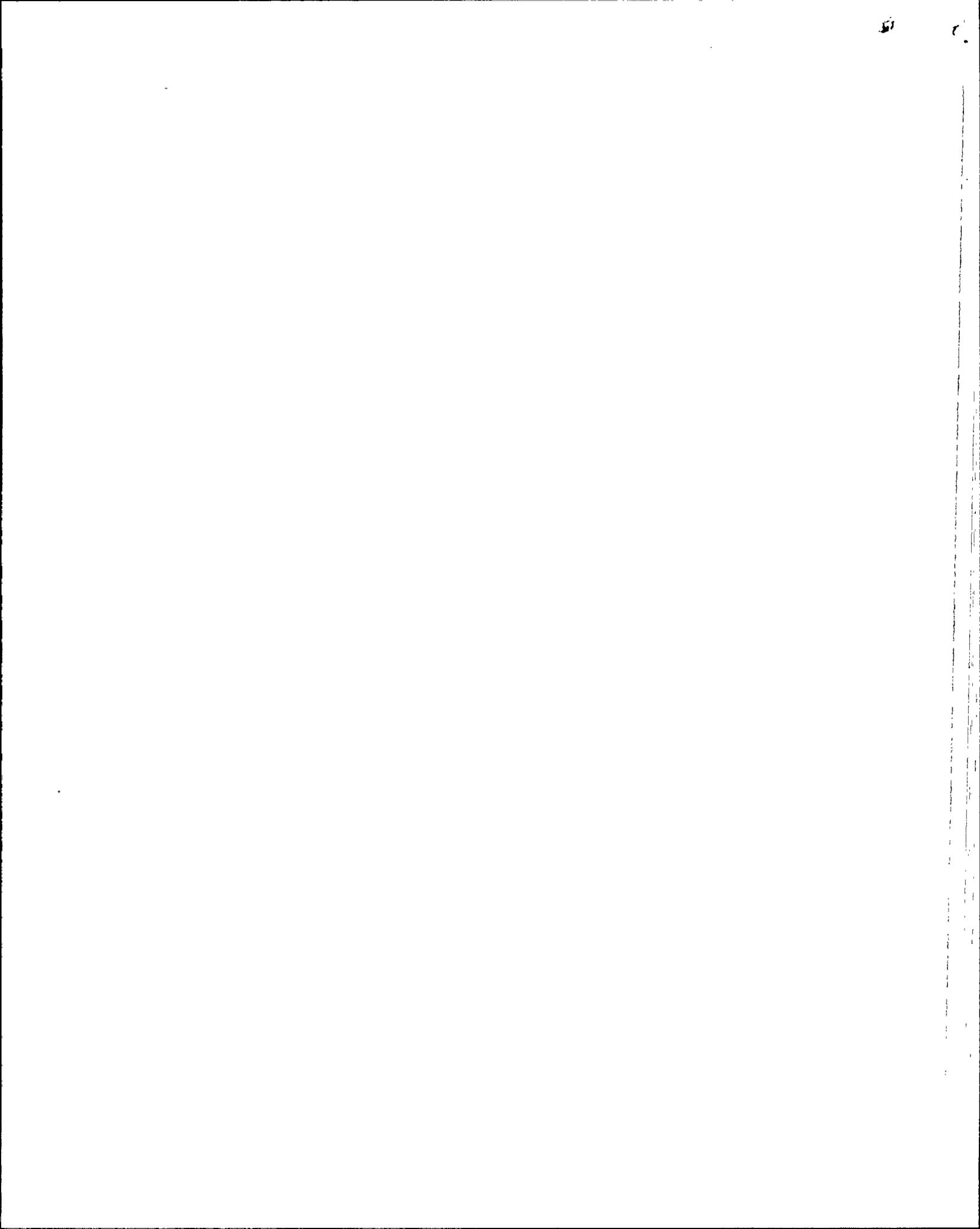
QUESTION 019

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What supports the weight of the reactor internals with the upper closure head bolted in place?

- a. Reactor vessel closure flange.
- b. Lower core stops.
- c. Vessel *snubbers*.
- d. Nozzles in the vessel head.



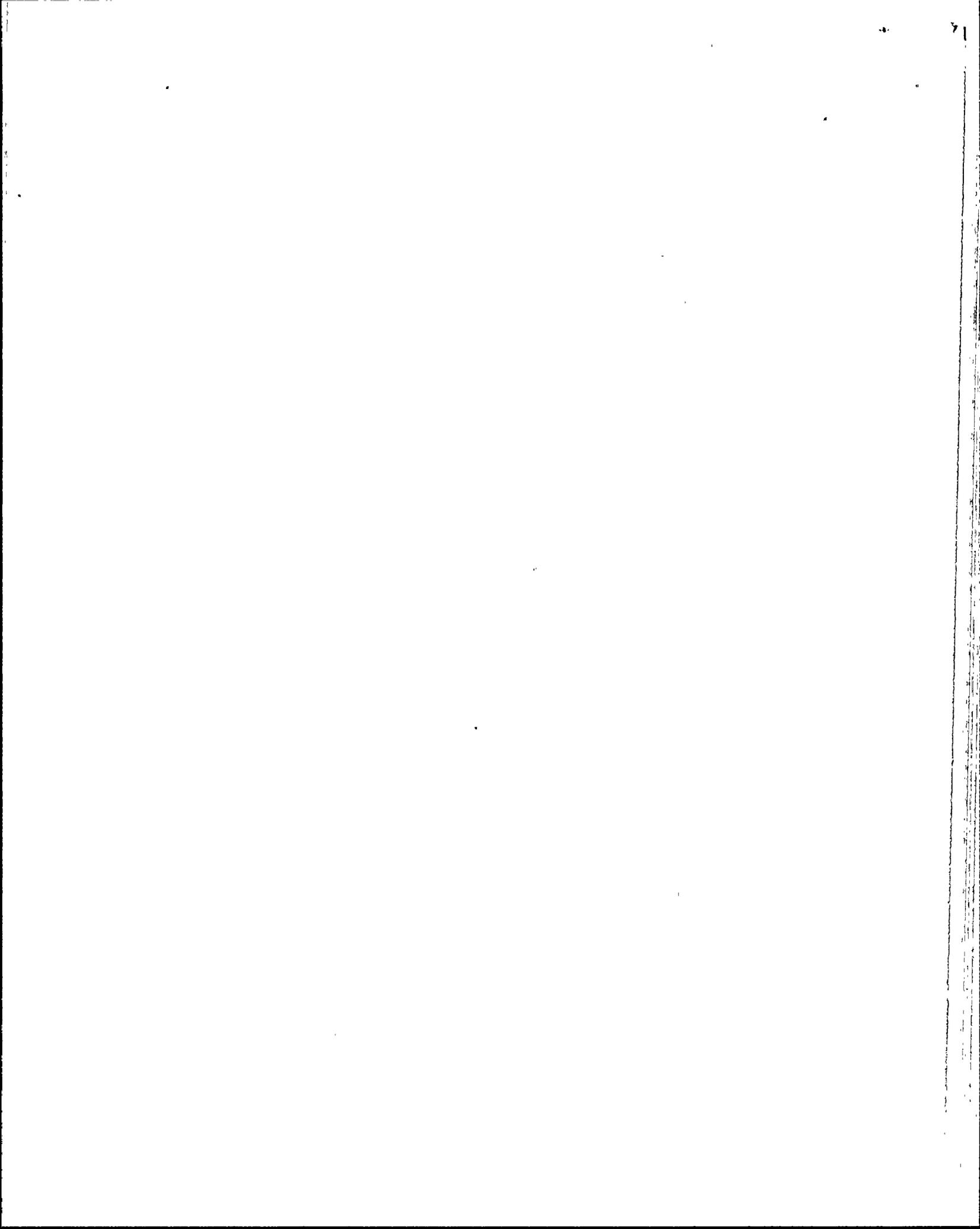
QUESTION 020

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following accommodates the differential thermal expansion of the Upper Guide Structure assembly flange and the Reactor Vessel Closure Head?

- a. Core shroud assembly
- b. Hold down ring
- c. Closure head alignment pins
- d. Vessel head O rings



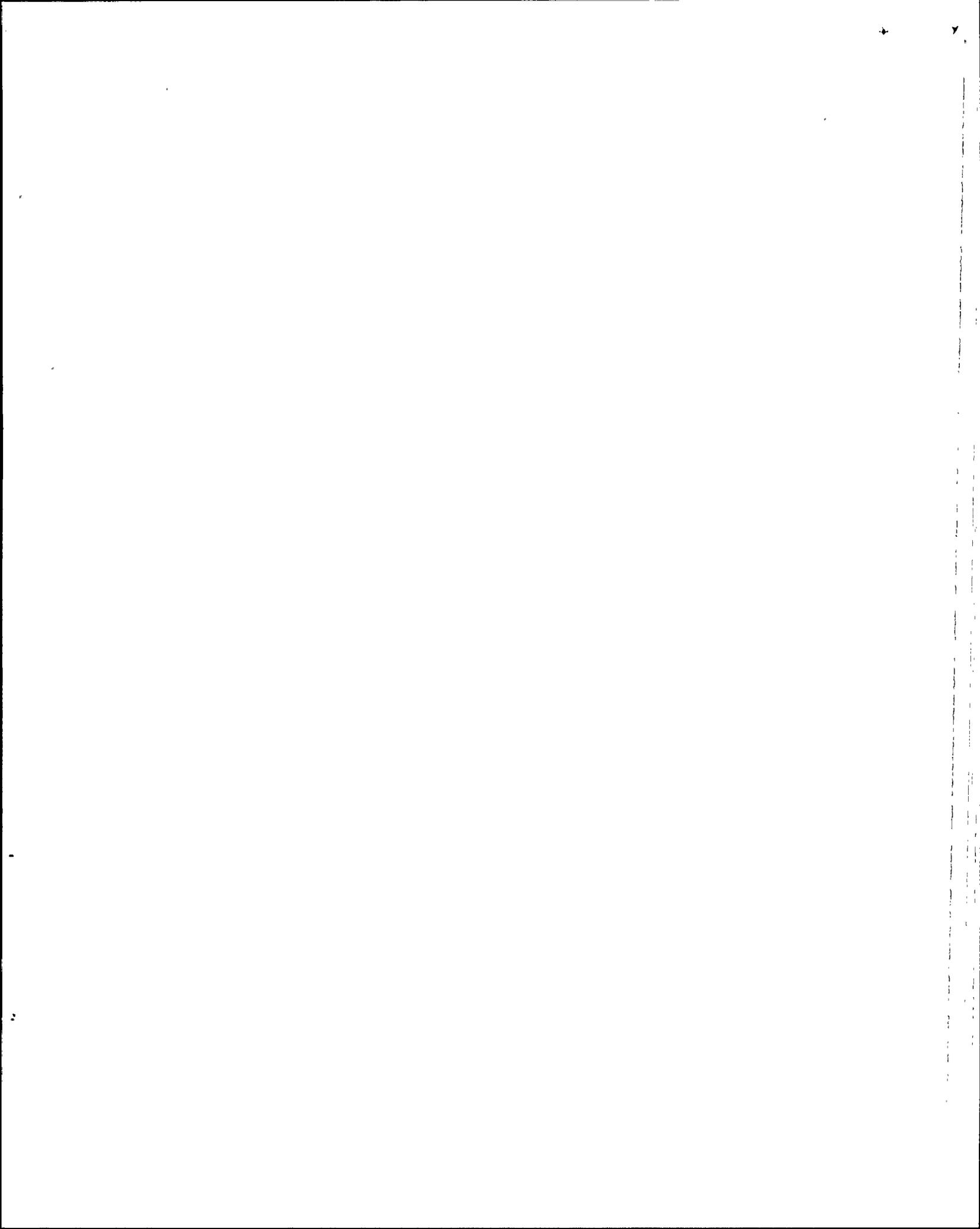
QUESTION 021

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What are, in order, the normal, backup, and emergency sources of makeup water for the spent fuel pool?

- a. VCT, RWT, Condensate Tank
- b. RWT, VCT, Condensate Tank
- c. Condensate Tank, RWT, LRS Recycle Water Tank
- d. RWT, LRS Recycle Water Tank, Condensate Tank



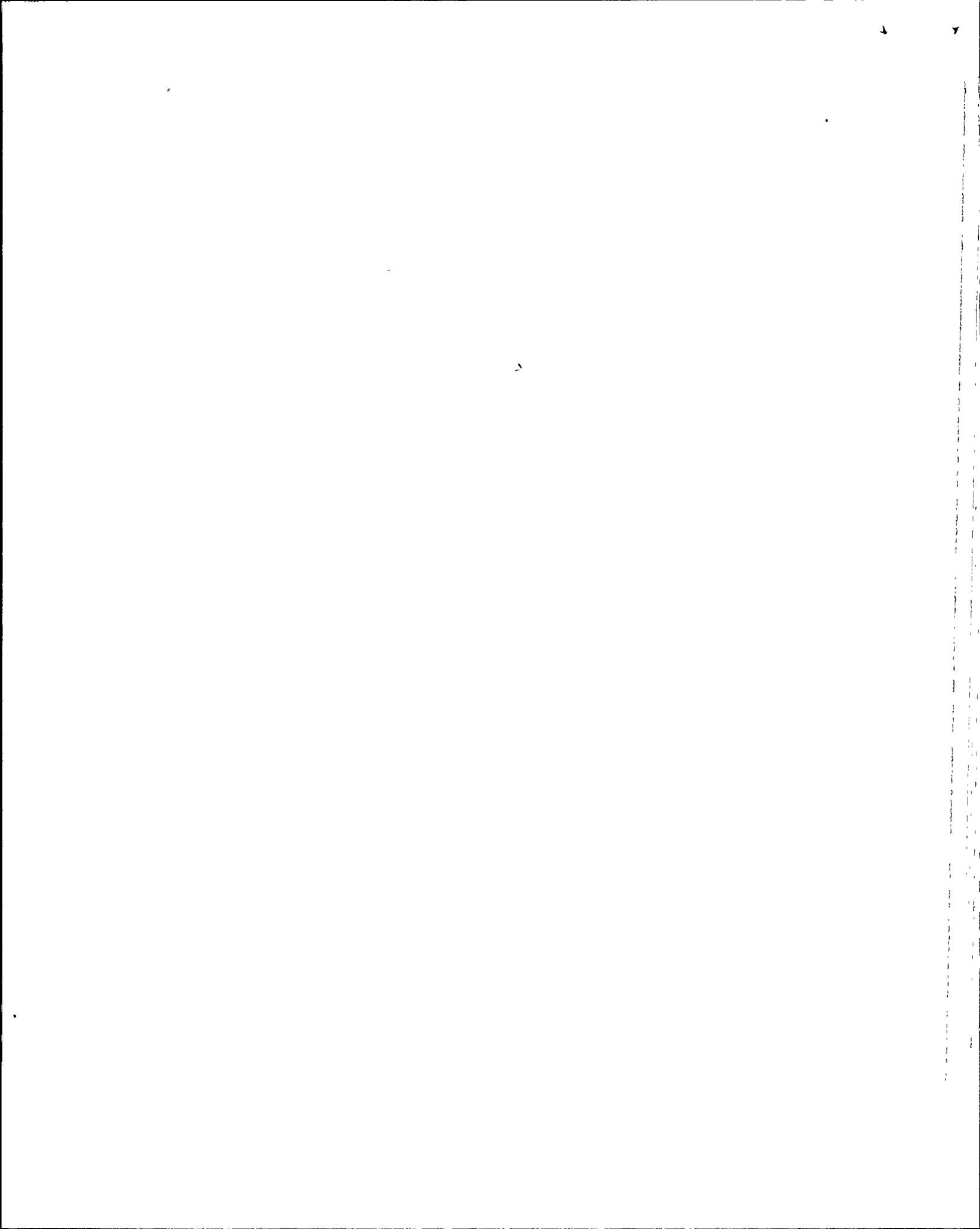
QUESTION 022

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Why are there siphon breaks in the spent fuel pool cooling and cleanup system piping?

- a. To maintain 8 feet above the fuel for shielding
- b. To maintain 23 feet above the fuel for iodine scrubbing
- c. To maintain NPSH to the fuel pool cooling pumps
- d. To provide for increased circulation during normal operation



QUESTION 023

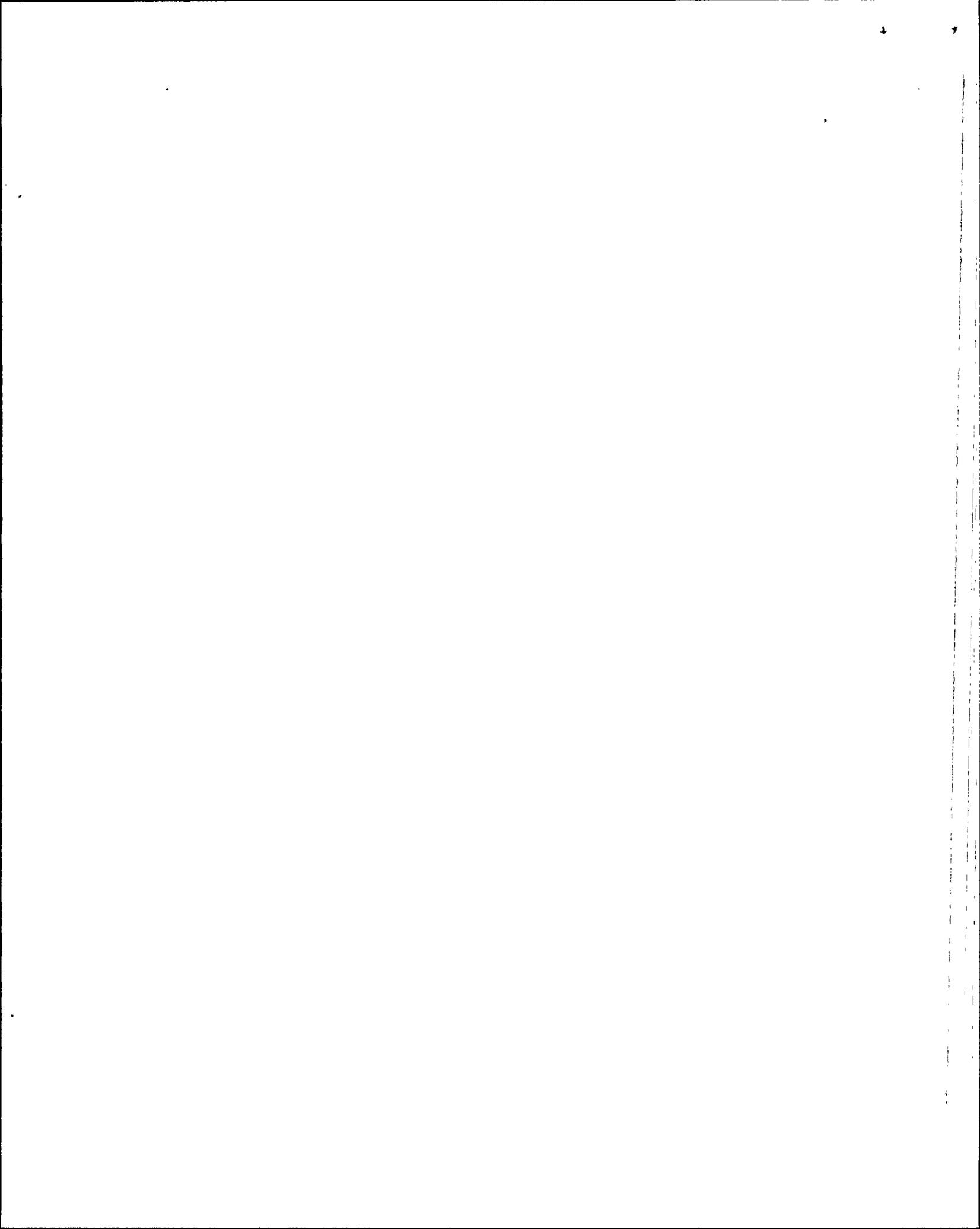
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The shutdown cooling cross connect is to be used to augment fuel pool cooling.

What is the preferred pump to be used and why?

- a. LPSI because there is less danger of runout.
- b. CS because there is less danger of runout.
- c. LPSI because flow instrumentation will be bypassed.
- d. CS because miniflow to the RWT will not be a concern.



QUESTION 024

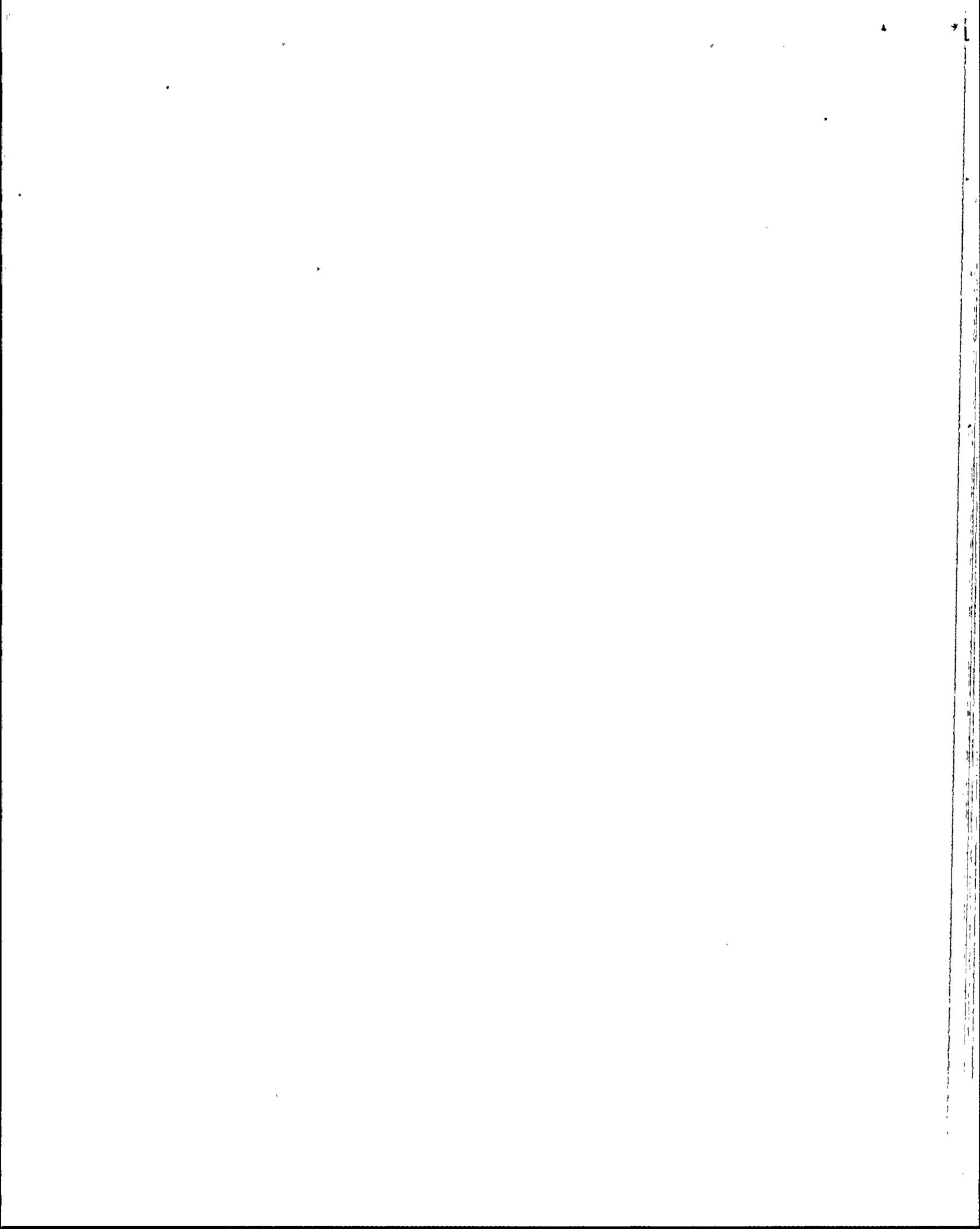
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The Reactor Coolant System is at 0 % of rated thermal power with K eff less than 0.99 and Cold Leg Temperature at 220 degrees F. Volume in the spent fuel pool is 133 feet 0 inches. Tech Spec 3.1.2.6 is attached.

What action, if any, is REQUIRED per TS 3.1.2.6?

- a. No action is required
- b. Lower Cold Leg Temperature to less than 210 degrees within 78 hours.
- c. Lower Cold Leg Temperature to less than 180 degrees within 276 hours.
- d. Lower Cold Leg Temperature to less than 210 degrees within 198 hours.



QUESTION 025

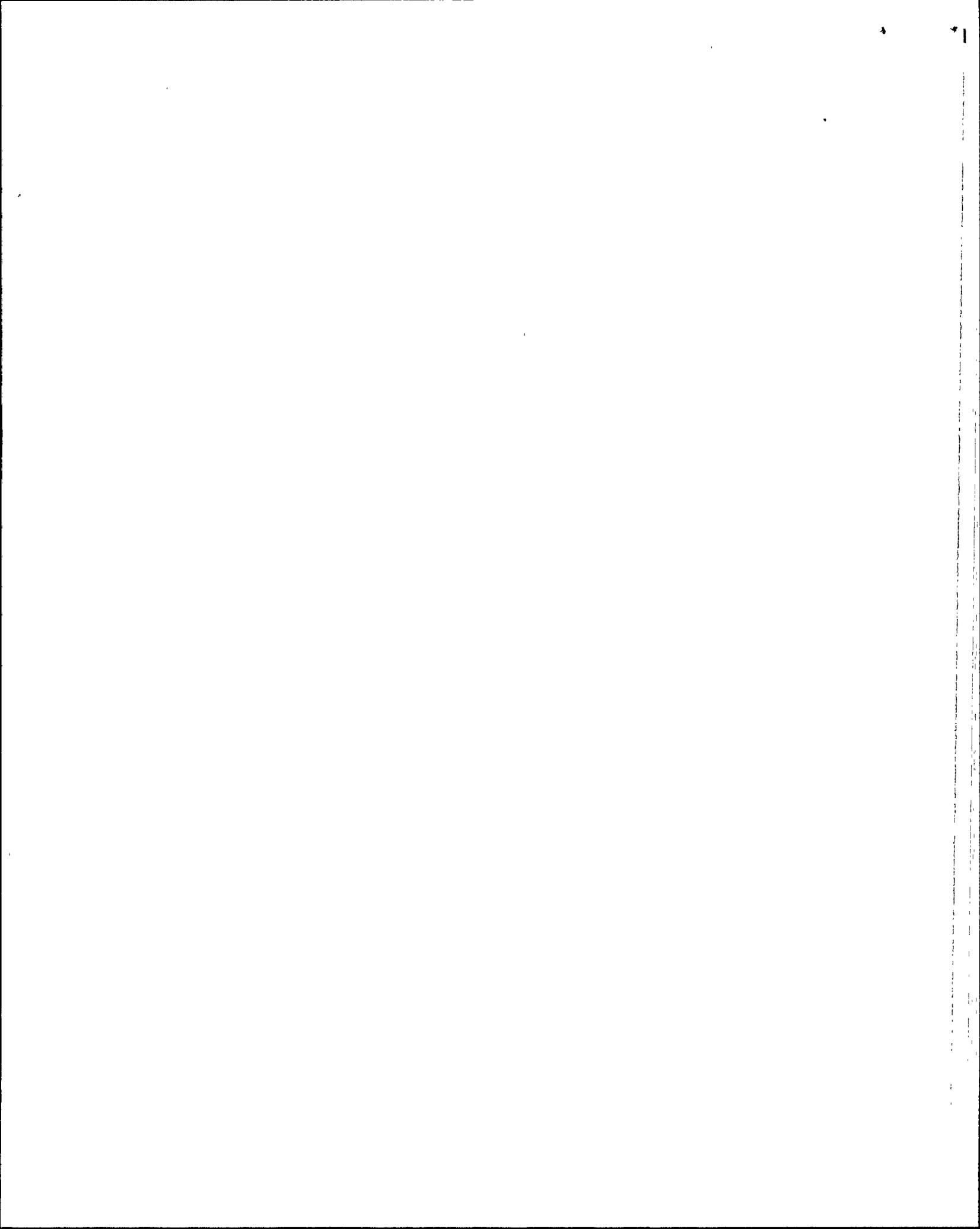
(1.0)

MULTIPLE CHOICE (Select the correct answer)

A core reload is in progress. The Bridge Drive is in the AUTO mode. The Bridge control switch is midway between neutral and forward. The Bridge is exactly midway between the core and the fuel transfer carrier with a new fuel assembly being transported.

What would you expect bridge speed to be?

- a. 0 FPM
- b. 15 FPM
- c. 30 FPM
- d. 40 FPM



QUESTION 026

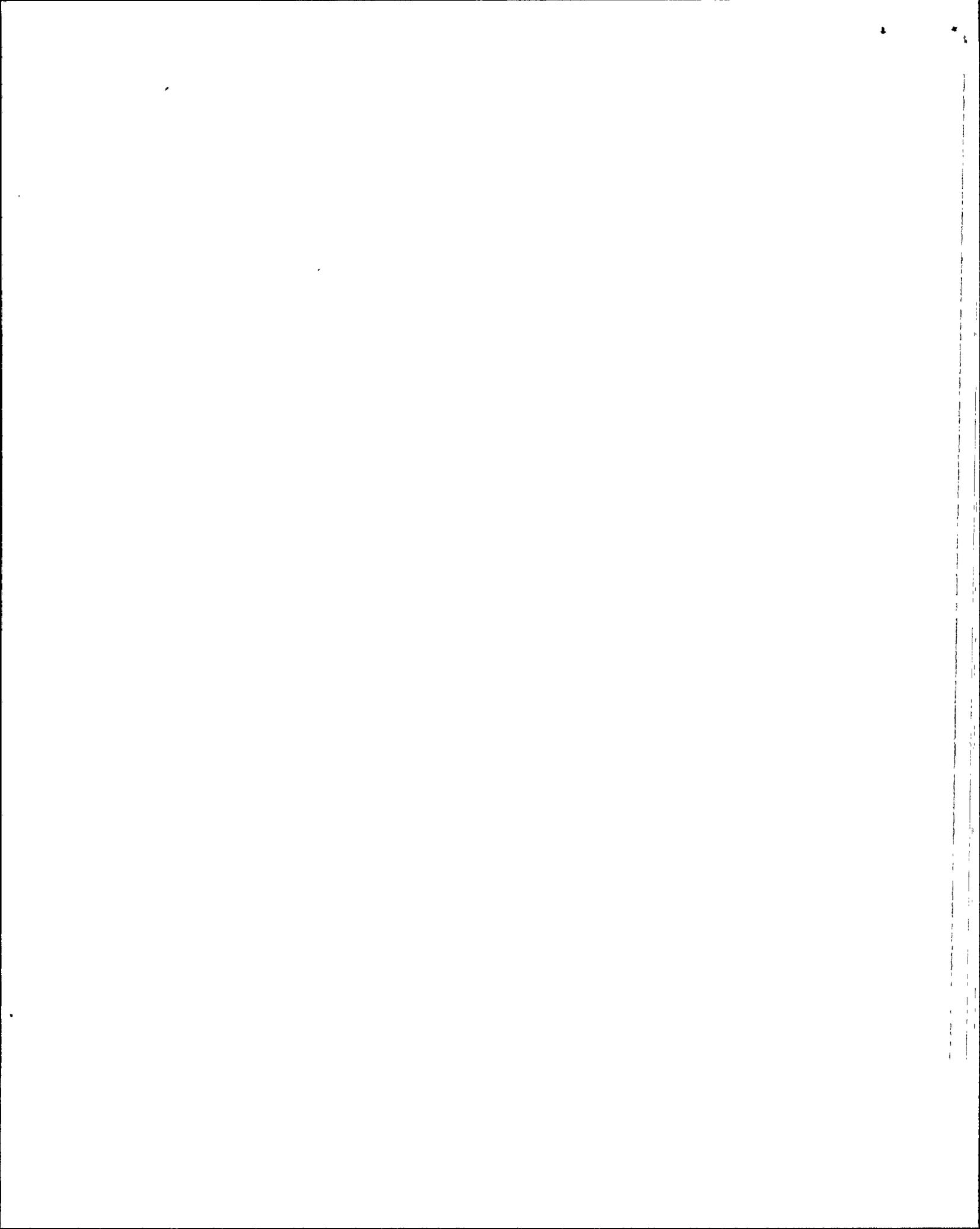
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The Refueling Machine enters the Reactor Tilt Machine Zone during a normal core offload. The operator notes that the upender is horizontal when he or she enters the zone.

Is this a problem and why or why not?

- a. No, because the interlock that should prevent this is normally overridden.
- b. No, because there is no interlock to prevent this.
- c. Yes, because this should not be possible because of an interlock.
- d. Yes, because the mast bumper interlock may be overridden.



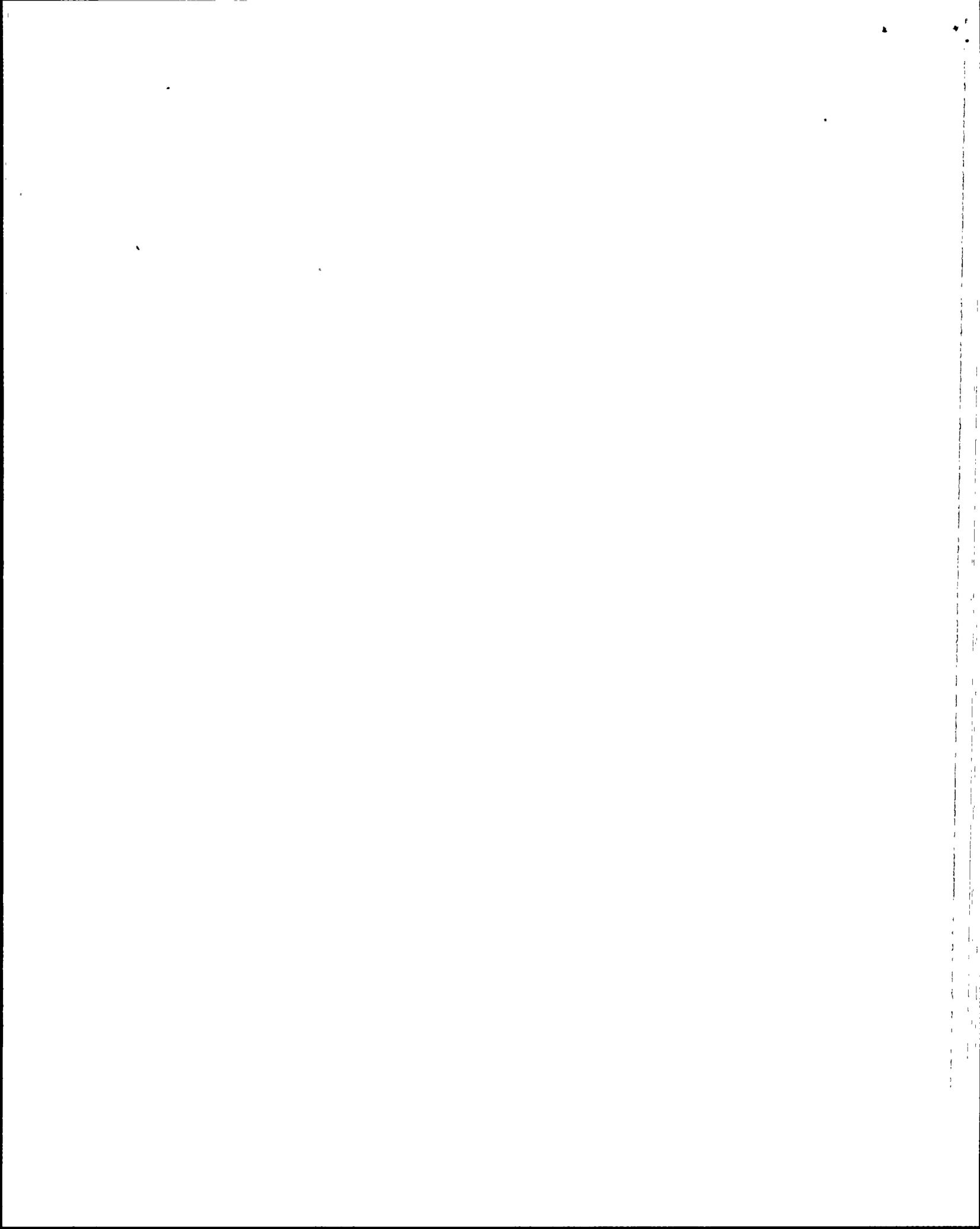
QUESTION 027

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which one of the following should stop downward movement of the hoist?

- a. The hoist is at an overload condition.
- b. The hoist is at an underload condition.
- c. The mast bumper is actuated.
- d. The upender is not vertical.



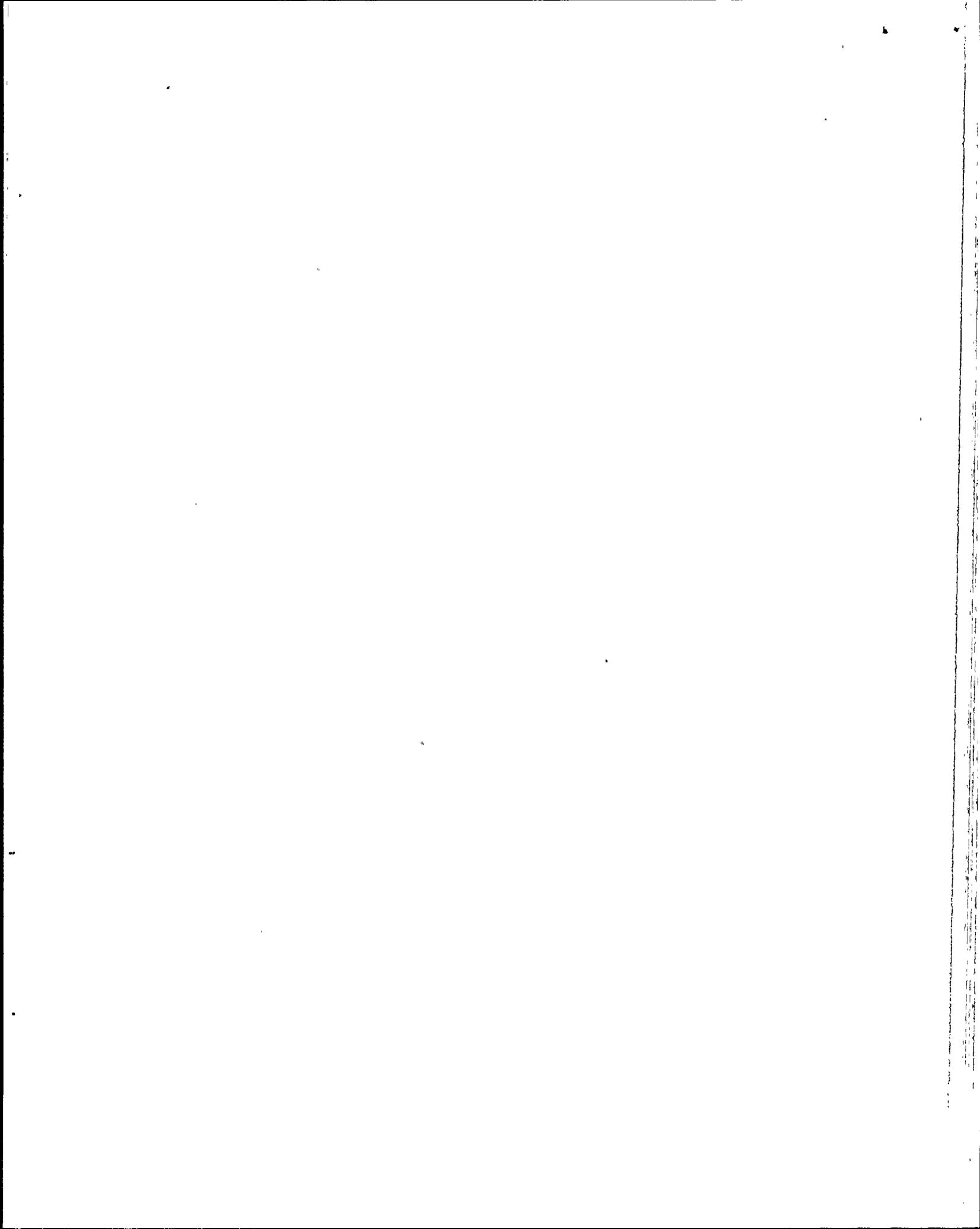
QUESTION 028

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the source of motive power for vertical motion of the HOIST BOX?

- a. Synchronous motor.
- b. Air pressure.
- c. Induction motor.
- d. Fluid hydraulics.



QUESTION 029

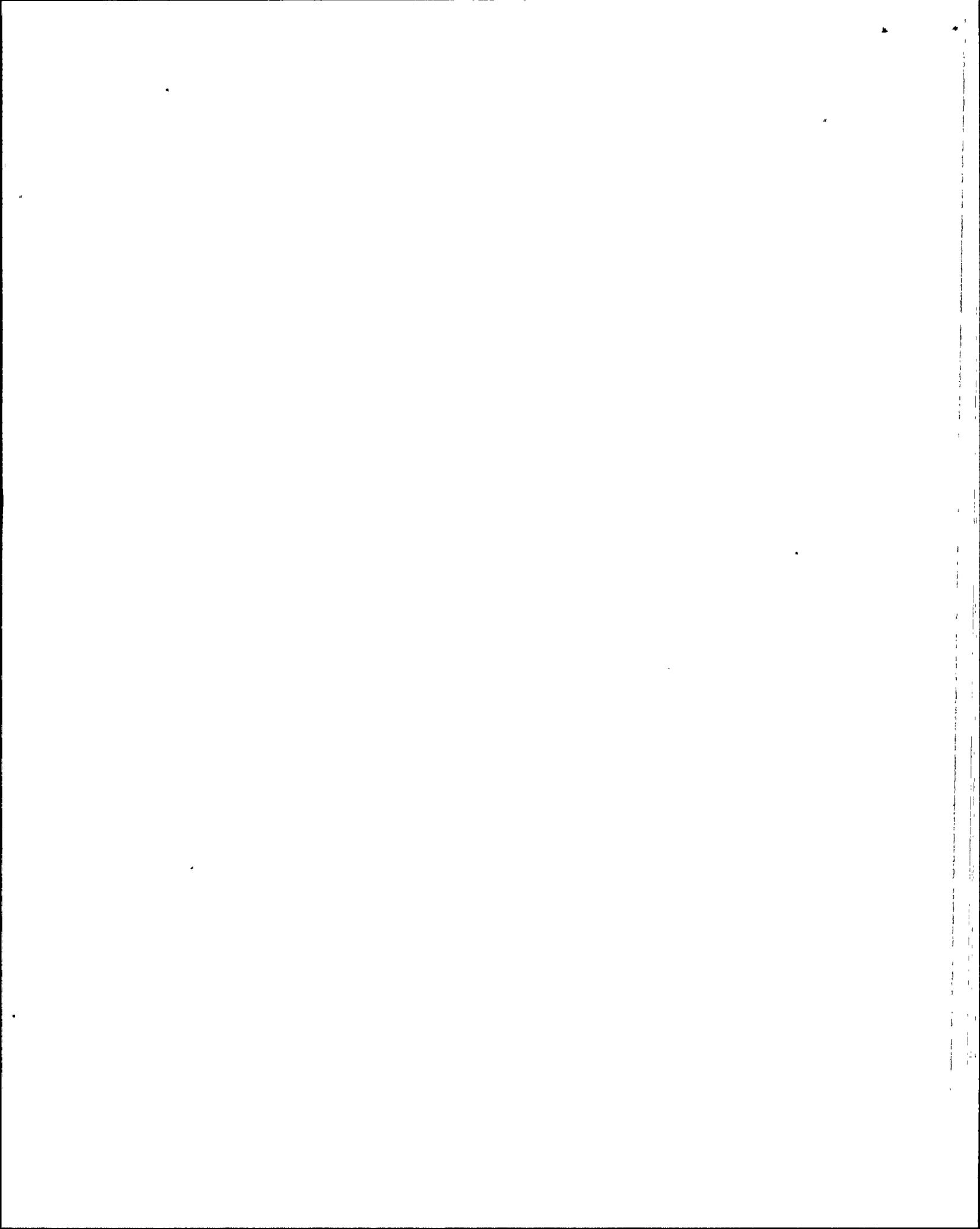
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Attached is an unlabeled diagram of the Fuel Hoist Assembly. As indicated in the diagram a fuel assembly is grappled. A normal core offload is in progress.

In which ZONE of the REFUELING POOL would you expect the Fuel Hoist Assembly to be as indicated in the diagram?

- a. Core Clear Zone.
- b. Intermediate Storage Rack Zone.
- c. Reactor Tilt Machine Zone.
- d. Alignment Pin Zone.



QUESTION 030

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What does the LATCHED indication, on the vertical control panel of the refueling machine, directly indicate?

- a. The hoist box is on the uplatch.
- b. The hoist is fully up.
- c. Engagement of the fuel assembly is allowable.
- d. An empty grapple may be closed.

QUESTION 031

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What is the power supply for LPSI pump "B"?

- a. NBN-S01
- b. NBN-S02
- c. PBA-S03
- d. PBB-S04



QUESTION 032

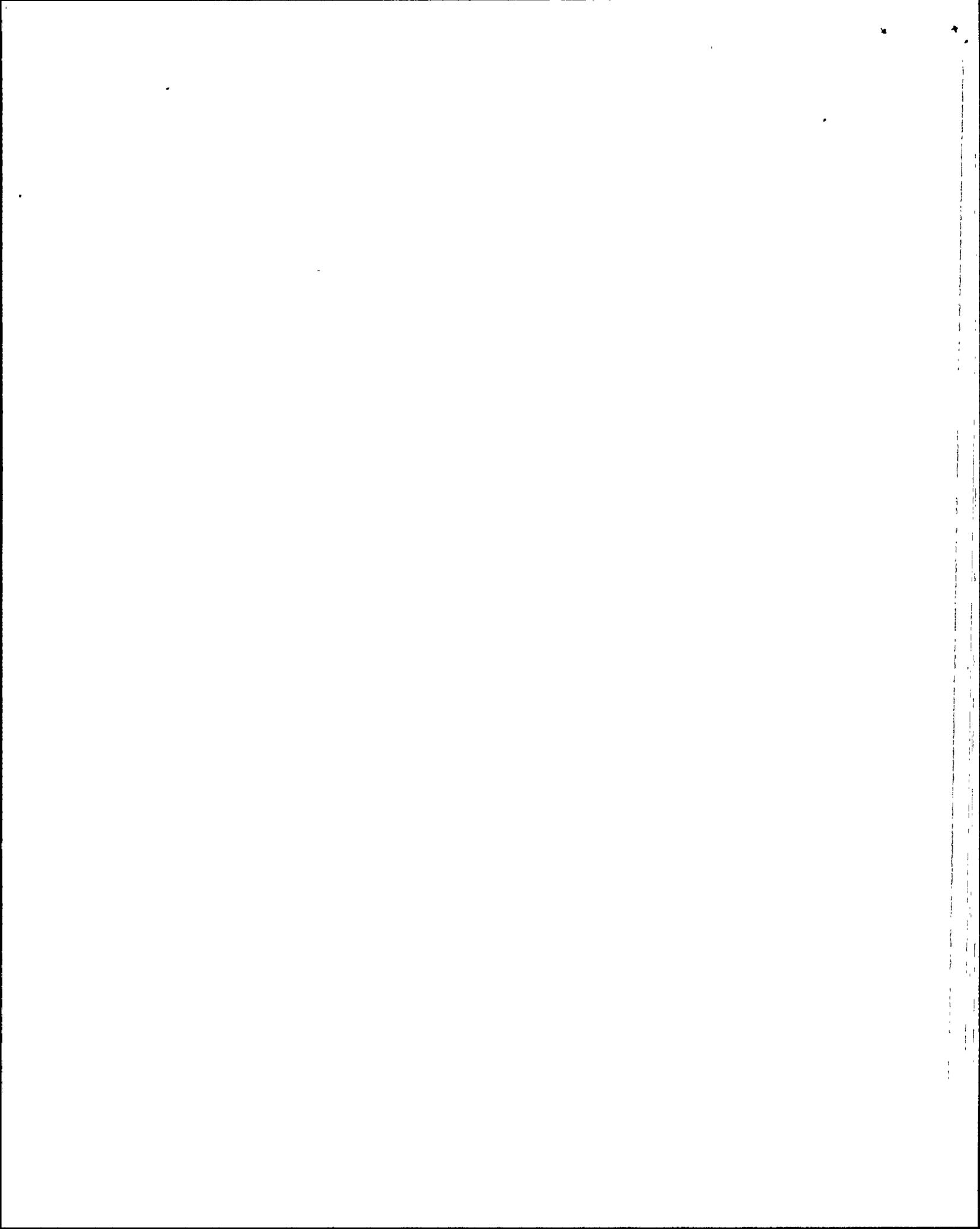
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is refueling. Core offload is in progress. The Control Room reports a loss of shutdown cooling to the LSRO.

Which one of the following conditions, in the refueling pool, indicates a loss of shutdown cooling?

- a. Surging in the water and decreased thermal gradient.
- b. Water level change and changes in flow bubbles.
- c. Changes in flow bubbles and the reactivity approaching zero.
- d. Decreased thermal gradient and water level change.



QUESTION 033

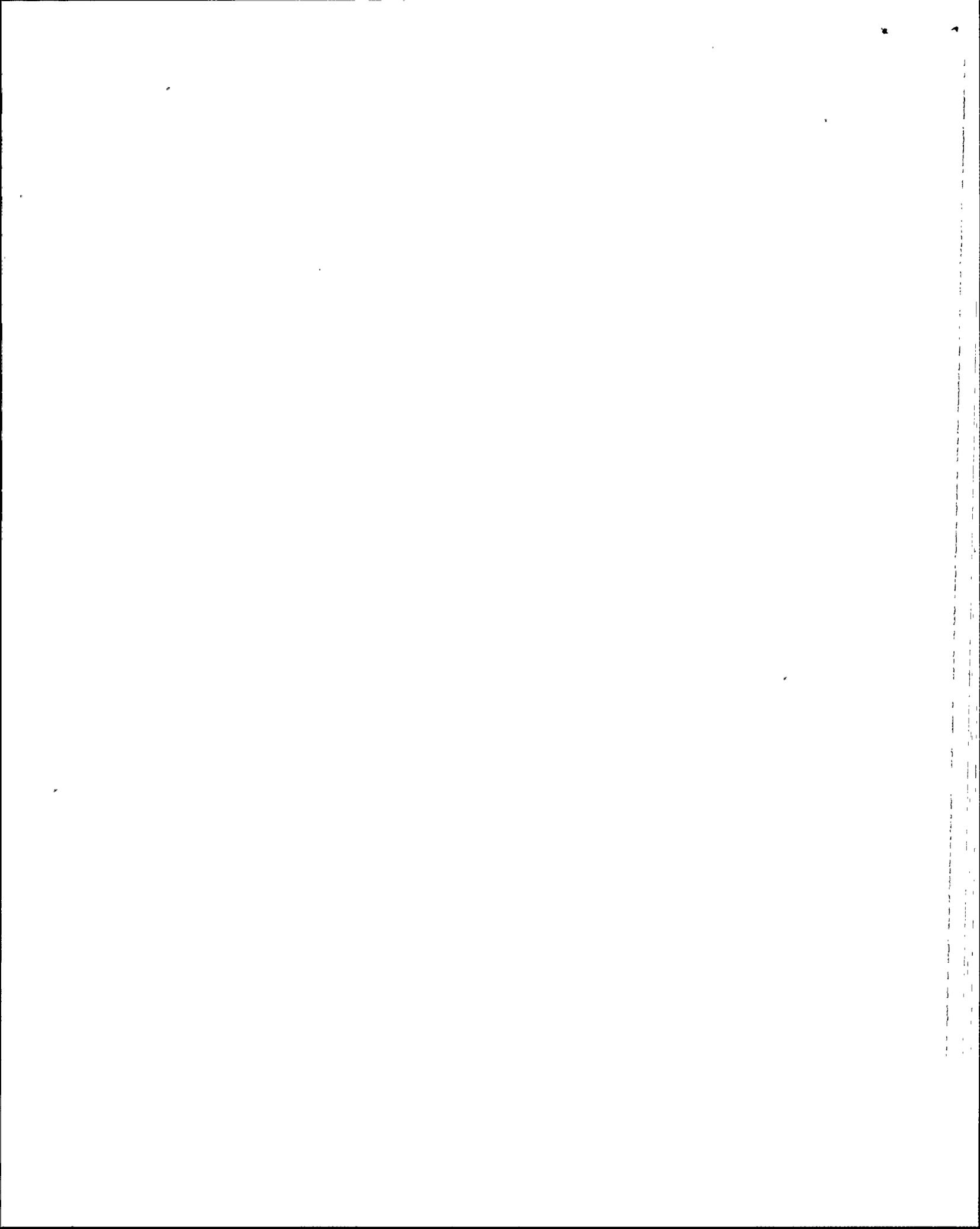
(1.0)

MULTIPLE CHOICE (Select the correct answer)

A plant cooldown is in progress with substantial core decay heat generation. The shutdown cooling system is in service.

In order to maintain the same cooldown rate, what should happen to reactor coolant flow through the shutdown cooling heat exchanger and to reactor coolant flow bypassing the heat exchanger? (cooling water flow and cooling water inlet temperature to the heat exchanger are constant)

|    | Heat Exchanger Flow | Bypass Flow |
|----|---------------------|-------------|
| a. | Decrease            | Increase    |
| b. | Constant            | Constant    |
| c. | Increase            | Constant    |
| d. | Increase            | Decrease    |



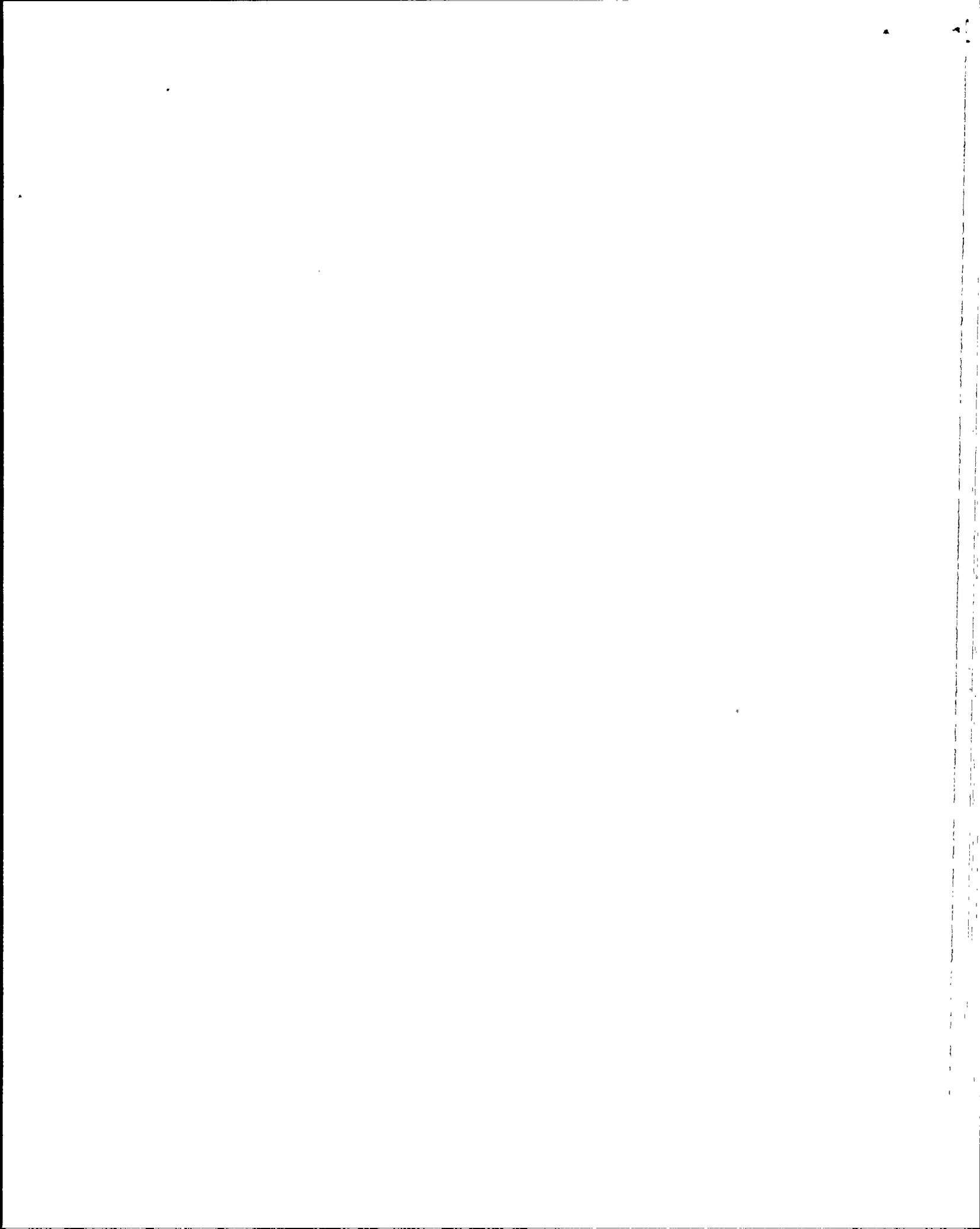
QUESTION 034

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Essential Cooling Water (EW) pumps will auto start on which one of the following? (Assume no other signals present)

- a. CSAS
- b. Reactor Trip
- c. Reactor Cutback
- d. LOP



QUESTION 035

(1.0)

MULTIPLE CHOICE (Select the correct answer)

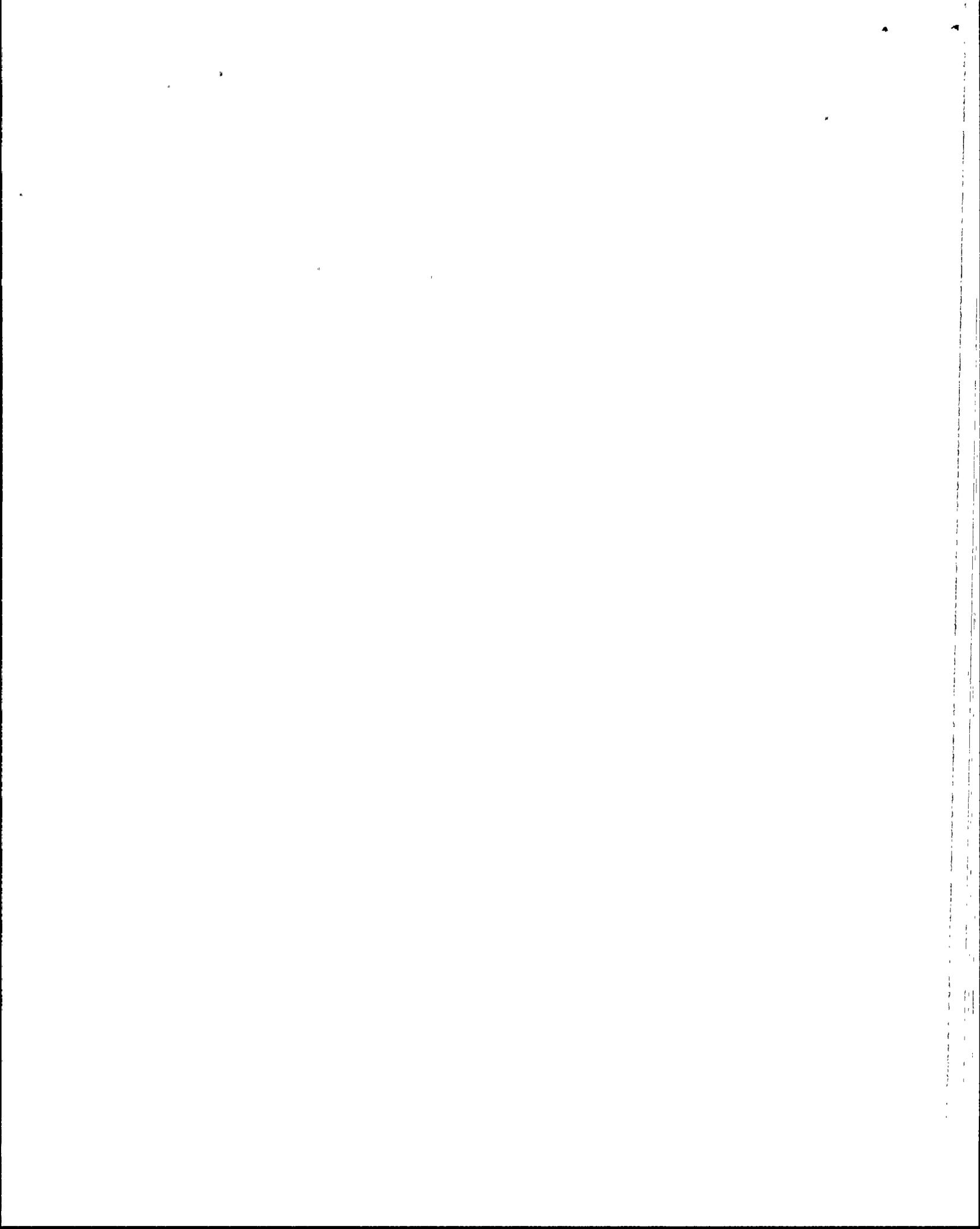
The following communication takes place between the LSRO on the refueling floor and the Control Room Shift Supervisor in the control room :

Shift Supervisor: "LSRO this is the shift supervisor, Close PCN-V118, the fuel transfer tube isolation."

LSRO: "I understand and will comply."

Is this MINIMALLY proper communication per guidelines and why?

- a. Yes, because it was acknowledged sufficiently.
- b. Yes, because originator and recipient were identified.
- c. No, because the shift supervisor used TWO names for the valve and it is not brief.
- d. No, because the LSRO didn't repeat back the valve AND intended position.



QUESTION 036

(1.0)

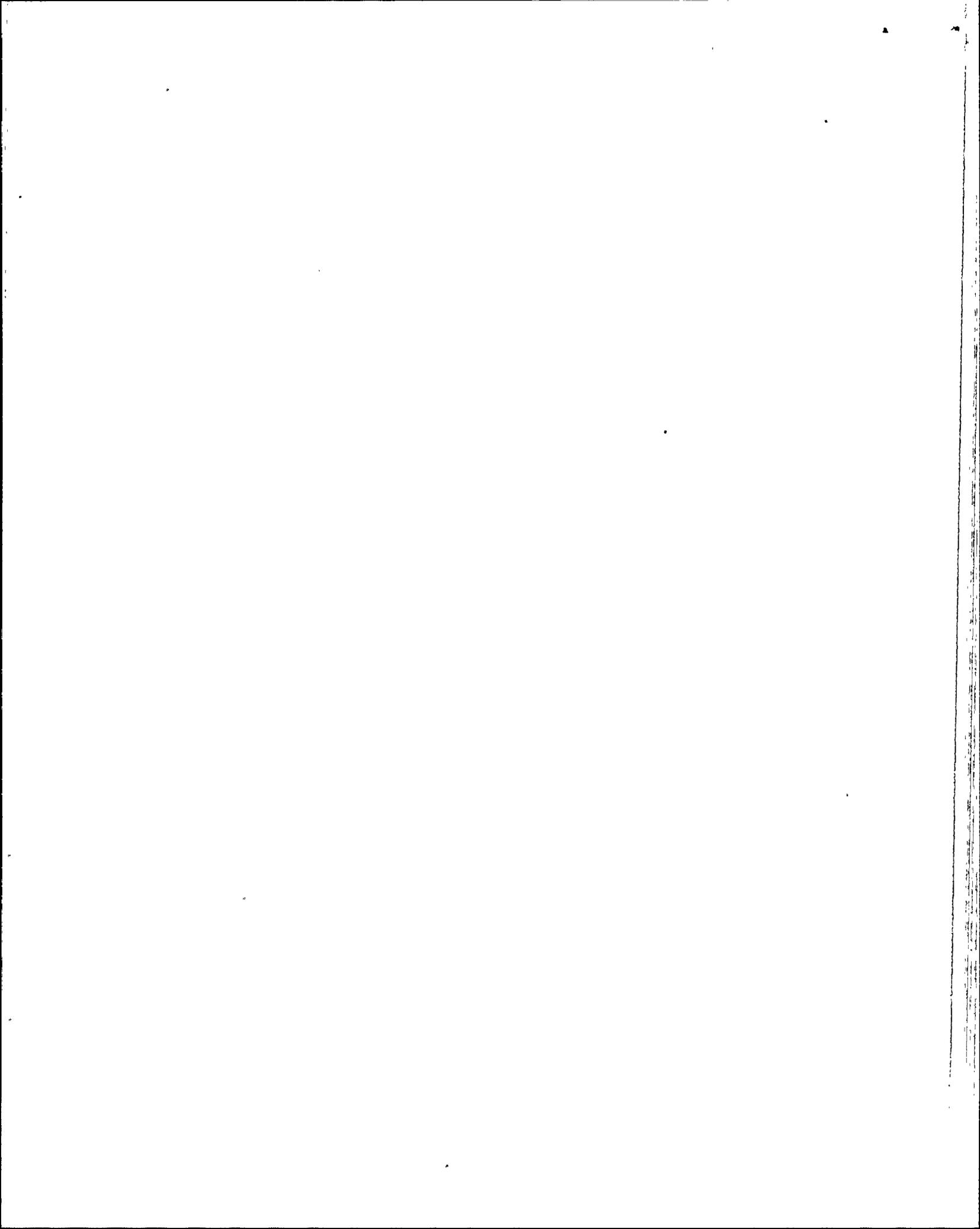
MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core onload is in progress. A fuel assembly is grappled and the refueling machine is in place preparing to lower the assembly into the core. The LSRO is on the refueling machine. Two Startup Channel Nuclear Instruments are in service.

The LSRO receives a report from the control room that one of the Startup Channel Nuclear Instruments is now reading zero.

What action should the LSRO take first?

- a. Complete placing the assembly into the core.
- b. Place the assembly in an intermediate position in the core.
- c. Maintain the fuel assembly in its present position.
- d. Place the fuel assembly in a safe position outside the core.



QUESTION 037

(1.0)

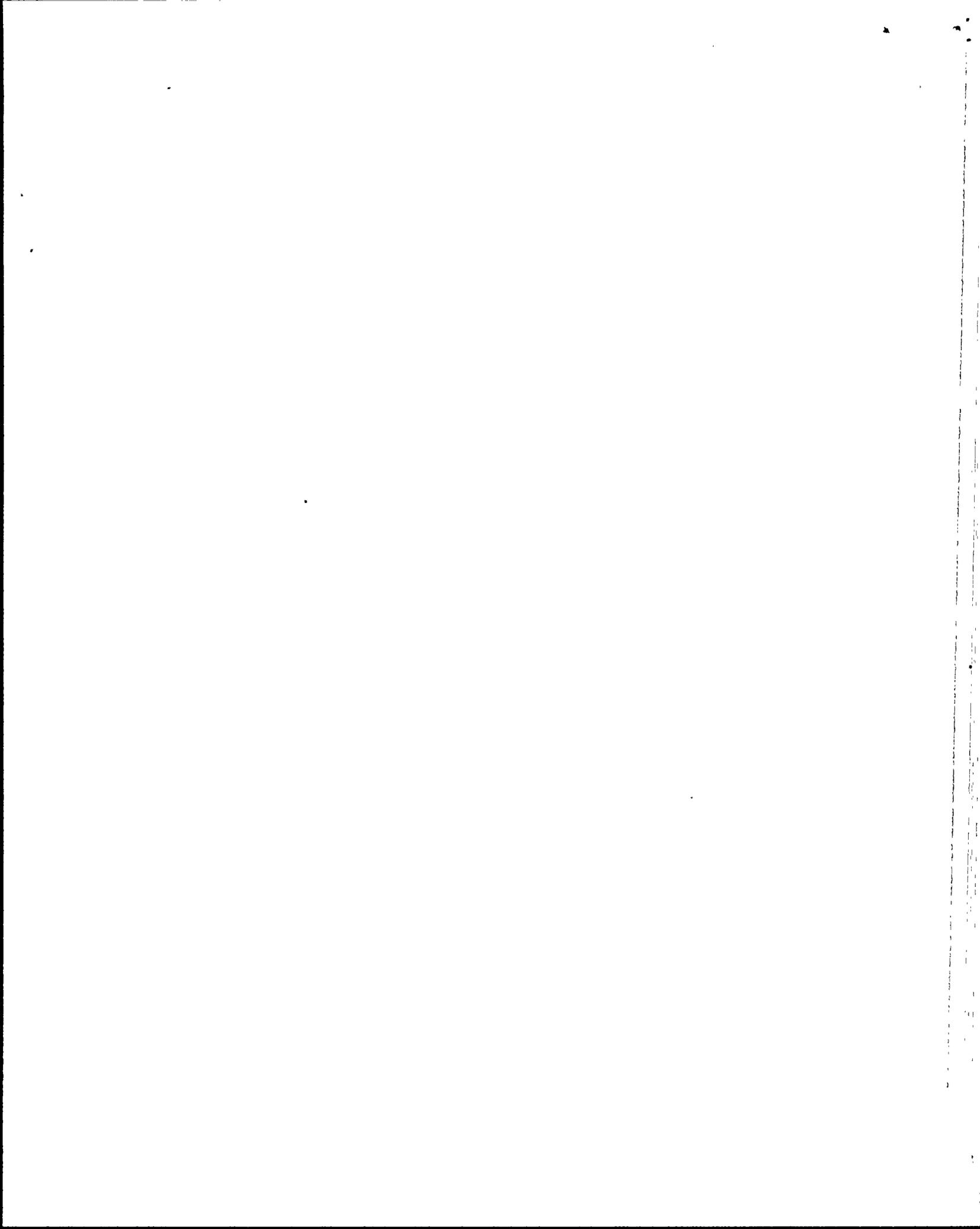
MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core offload is in progress. Approximately half of the fuel assemblies have been offloaded. You are the LSRO on the refueling machine. You are over the core and have just grappled your next fuel assembly, retracted the spreader, and are raising the hoist to the up limit.

You note bubbles emerging from the fuel assembly you are raising and it appears twisted.

What should you do FIRST?

- a. Open the grapple and evacuate the area.
- b. Hoist down to auto stop and open the grapple.
- c. Continue to raise hoist to the up limit and position machine mast at a location away from other fuel assemblies but still in the core.
- d. Continue to raise hoist to the up limit and position machine mast at the upender.



QUESTION 038

(1.0)

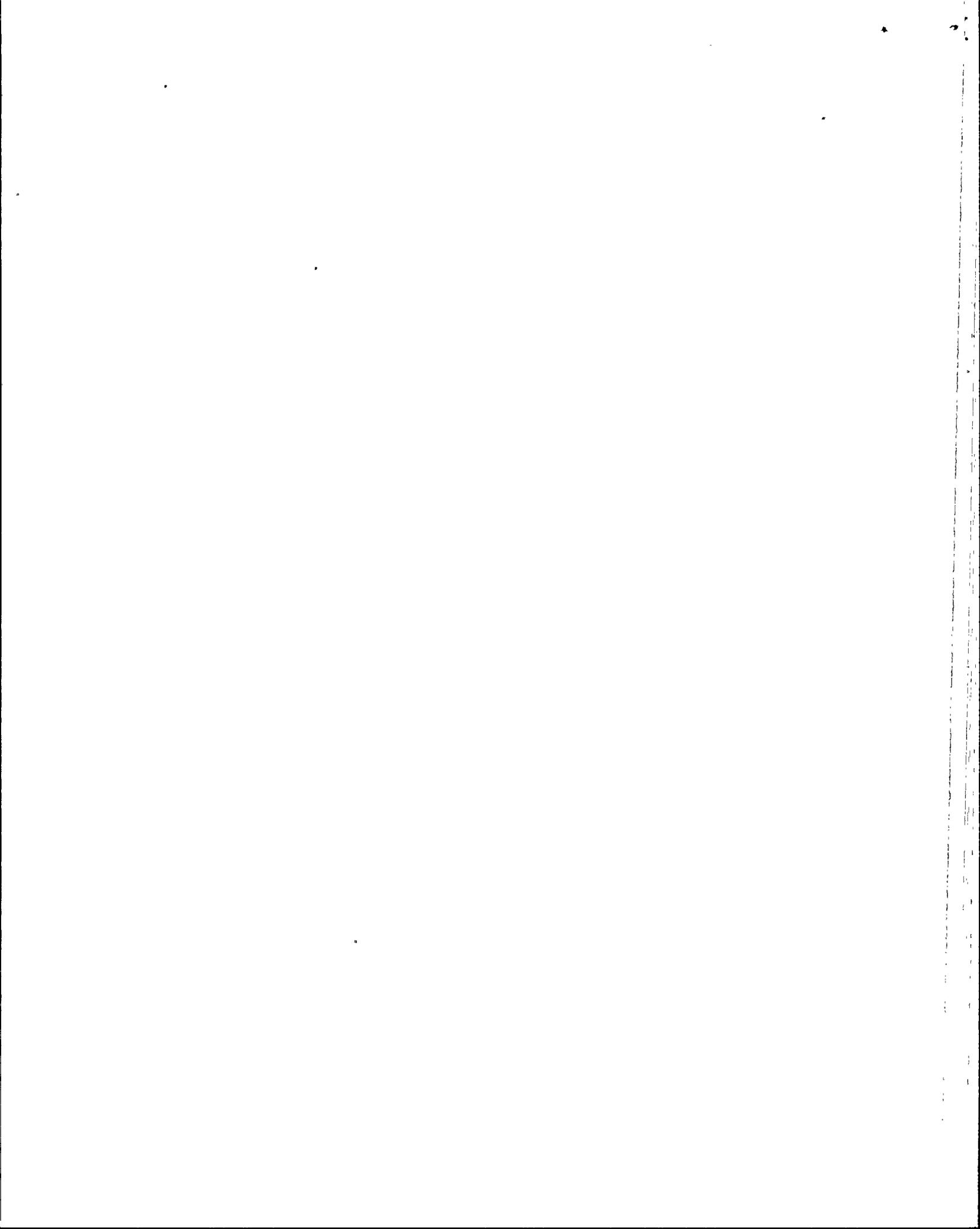
MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core offload is in progress. Approximately half of the fuel assemblies have been offloaded. You are the LSRO on the refueling machine. You are over the core and have just grappled your next fuel assembly, retracted the spreader, and are raising the hoist to the up limit.

J-SQA-RU-33, "Refueling Machine Area Monitor," alarms and it is a valid alarm.

What should you do FIRST?

- a. Evacuate the area.
- b. Notify RP to perform surveys.
- c. Ensure a FBEVAS is actuated.
- d. Position the fuel assembly in a stable configuration.



QUESTION 039

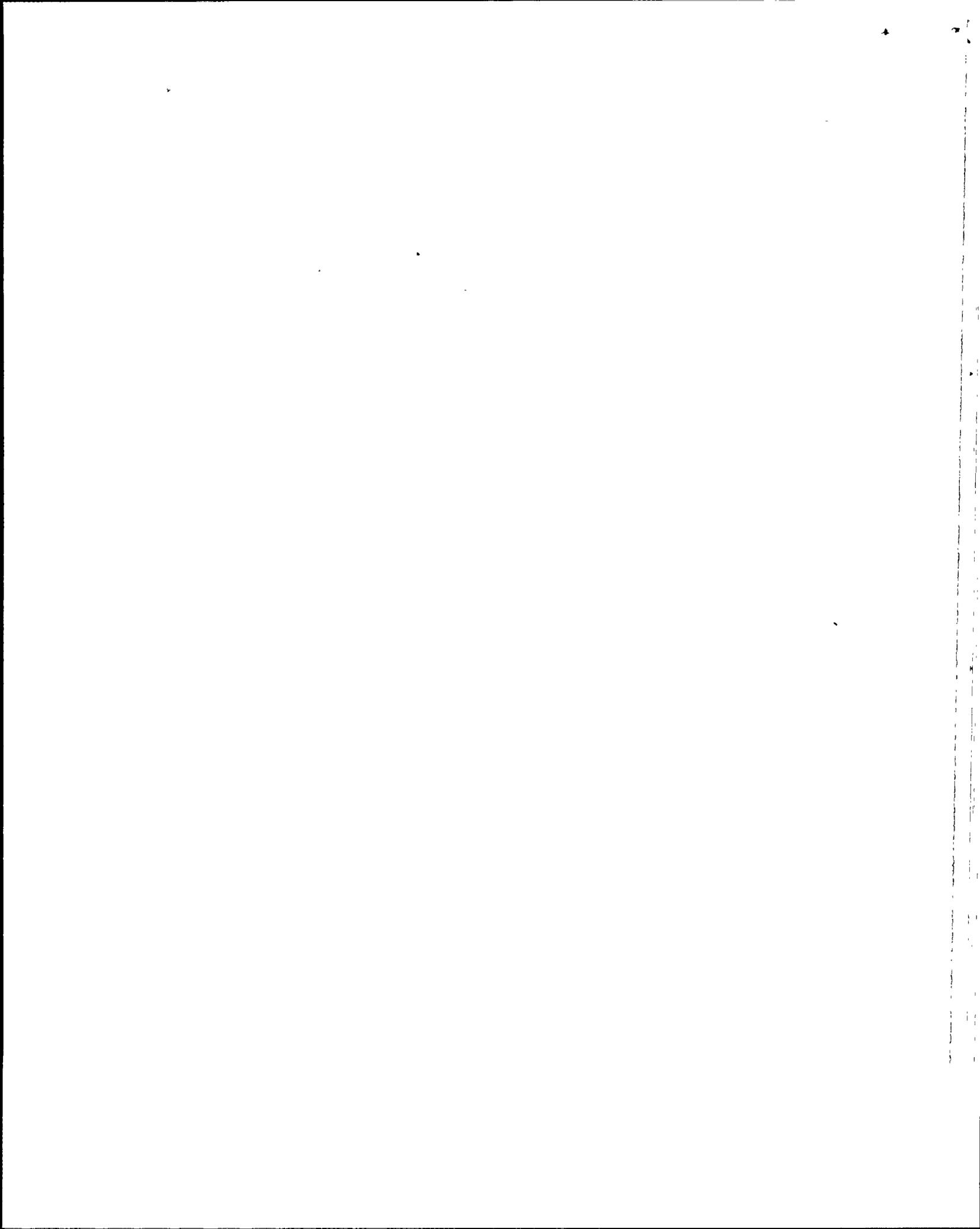
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in mode 6 and a core offload is in progress. The refueling machine has an irradiated fuel assembly grappled, is positioned over the upender, and the spreader is retracted.

Given the following actions, select the correct sequence to place the fuel assembly in the upender.

- 1) Move hoist up to grapple load weight only and open the grapple.
  - 2) Hoist control down, observe hoist box latched.
  - 3) Hoist up to UGOZ and close the grapple, then hoist up to up limit.
  - 4) Observe cable load change, hoist down to auto stop.
- a. 4, 2, 1, 3.
  - b. 4, 2, 3, 1.
  - c. 2, 4, 1, 3.
  - d. 2, 4, 3, 1.



QUESTION 040

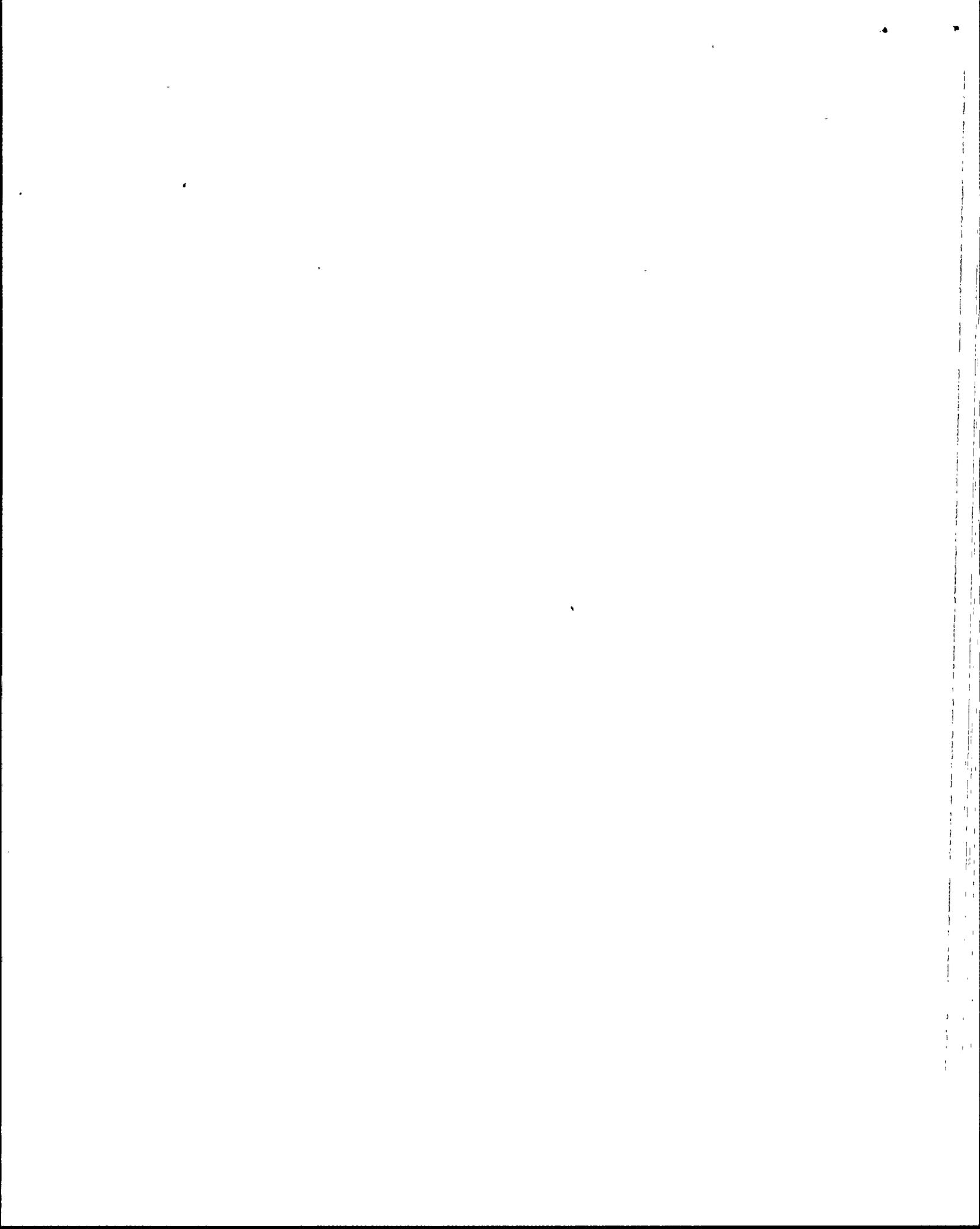
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Unit III has specific instructions for operation of the Fuel Transfer Machine.

What is broken in the Unit III Transfer Machine and what precaution is used?

- a. The winch overload is broken so cable stress must be monitored manually.
- b. The horizontal limit switch is broken so upender position must be visually verified.
- c. The vertical limit switch is broken so upender position must be visually verified.
- d. The seismic restraints are broken so temporary restraints are used.



QUESTION 041

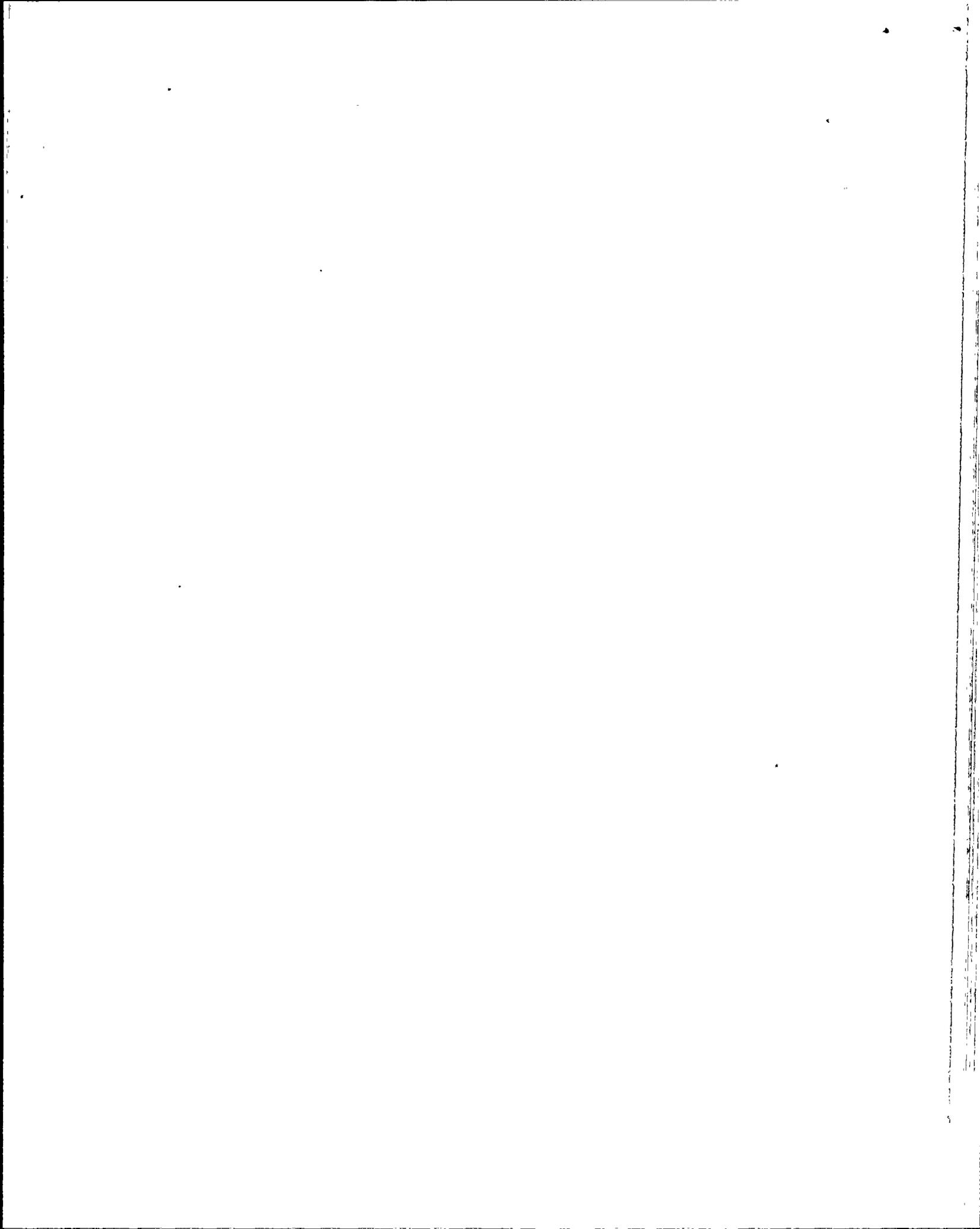
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Concerning the Spent Fuel Handling Machine, manual hoist operations are permitted only to place a fuel assembly in a safe position.

What is the basis for this restriction?

- a. There is no variable speed feature in manual.
- b. Manual operations require additional personnel.
- c. Manual operations do allow use of precluded storage cells.
- d. Limit switch protection is not effective in manual.



QUESTION 042

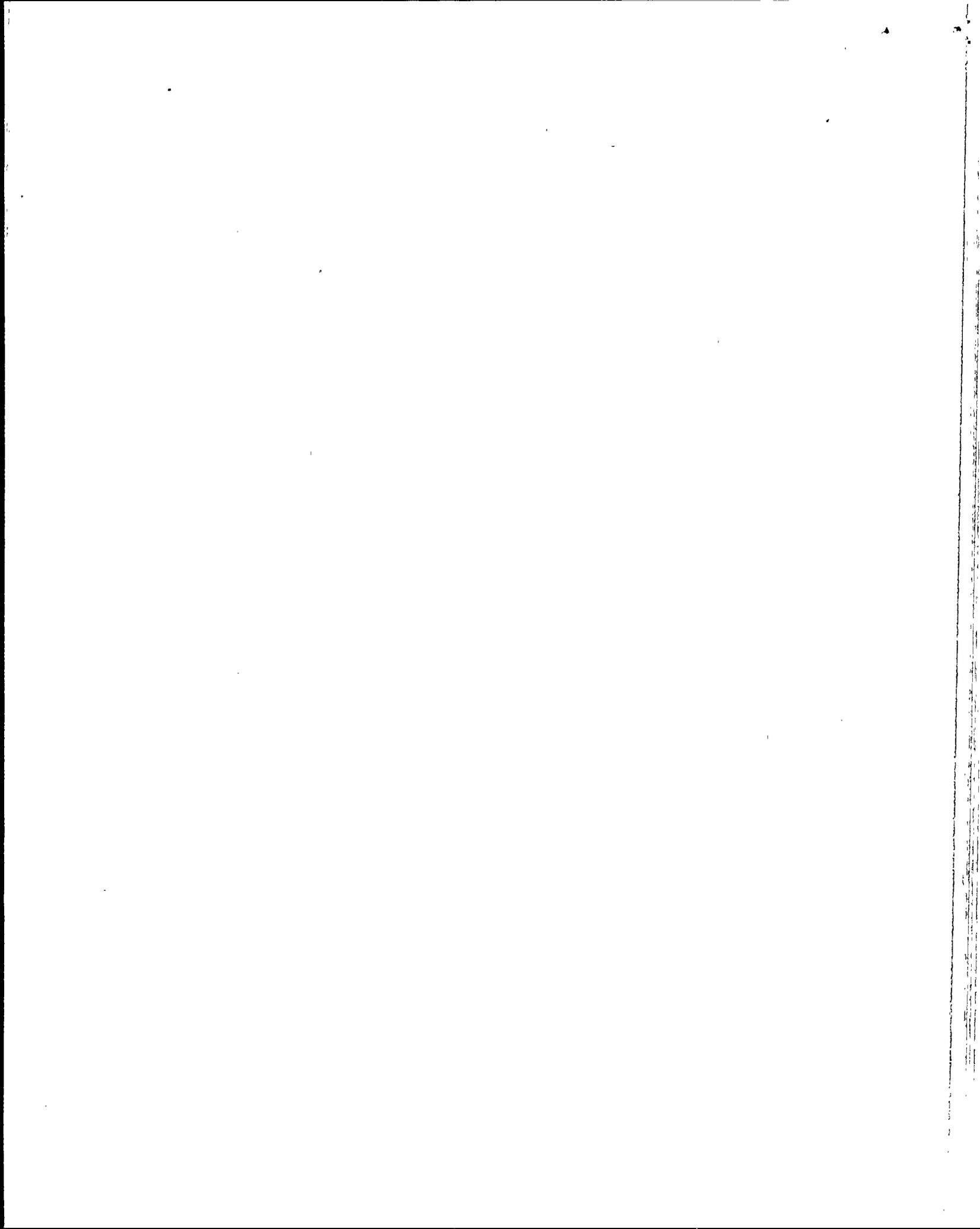
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Technical Specification 6.2 states that all core alterations shall be observed and directly supervised by a Senior Reactor Operator Limited to Fuel Handling.

Which of the following is a core alteration?

- a. Raising Fuel Pool level.
- b. Moving an irradiated assembly from the upender to the spent fuel pool.
- c. Removing the Reactor Vessel Head.
- d. Core load verification check.



QUESTION 043

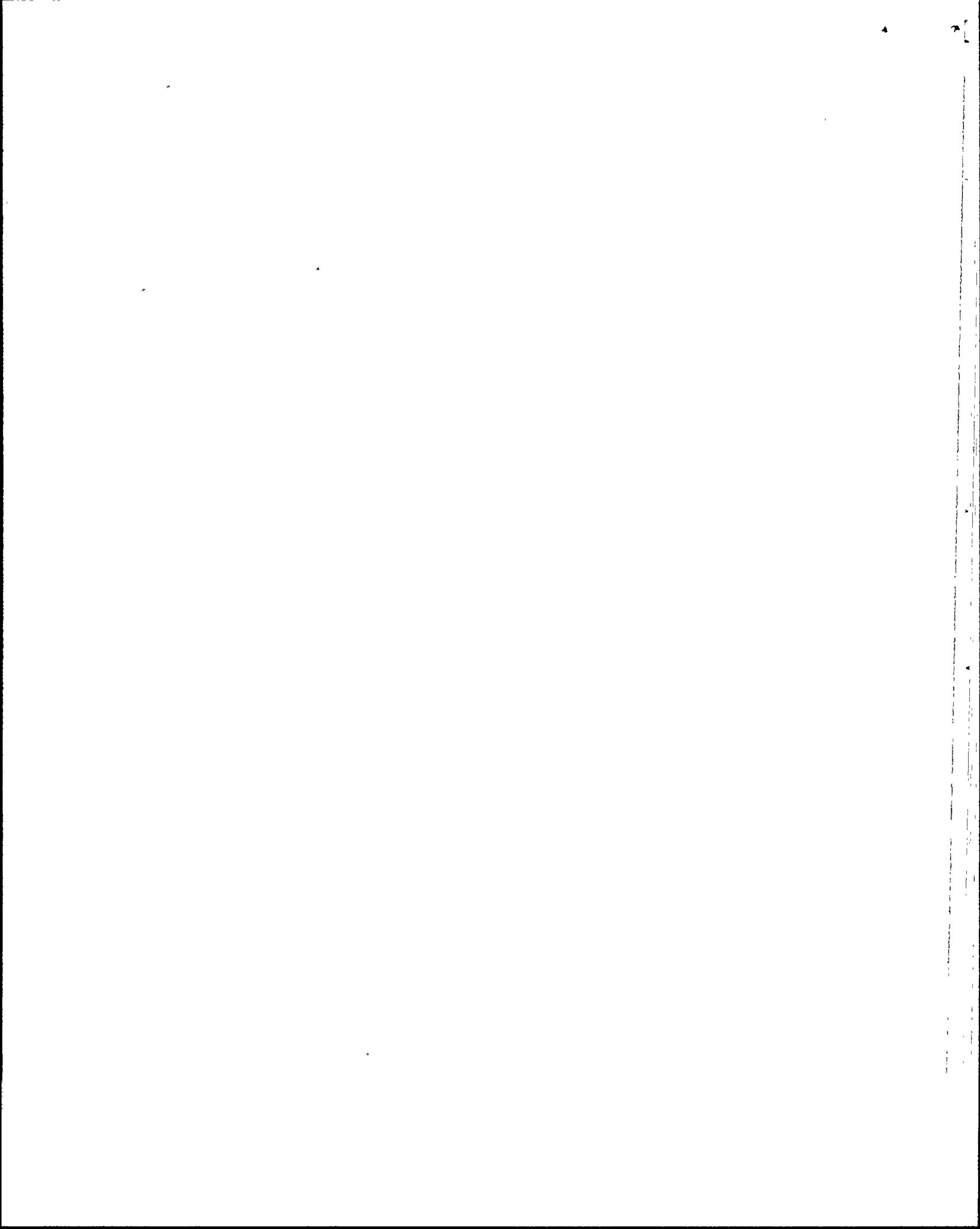
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 with core offload in progress. Plant conditions prevent performing a procedure as written.

What should the operators involved in the performance of the procedure do at this point?

- a. Stop and place the system in a safe configuration.
- b. Stop and comply with the procedure as much as possible.
- c. Attempt to continue and inform supervision.
- d. Attempt to continue in order to complete the task as safely as possible.



QUESTION 044

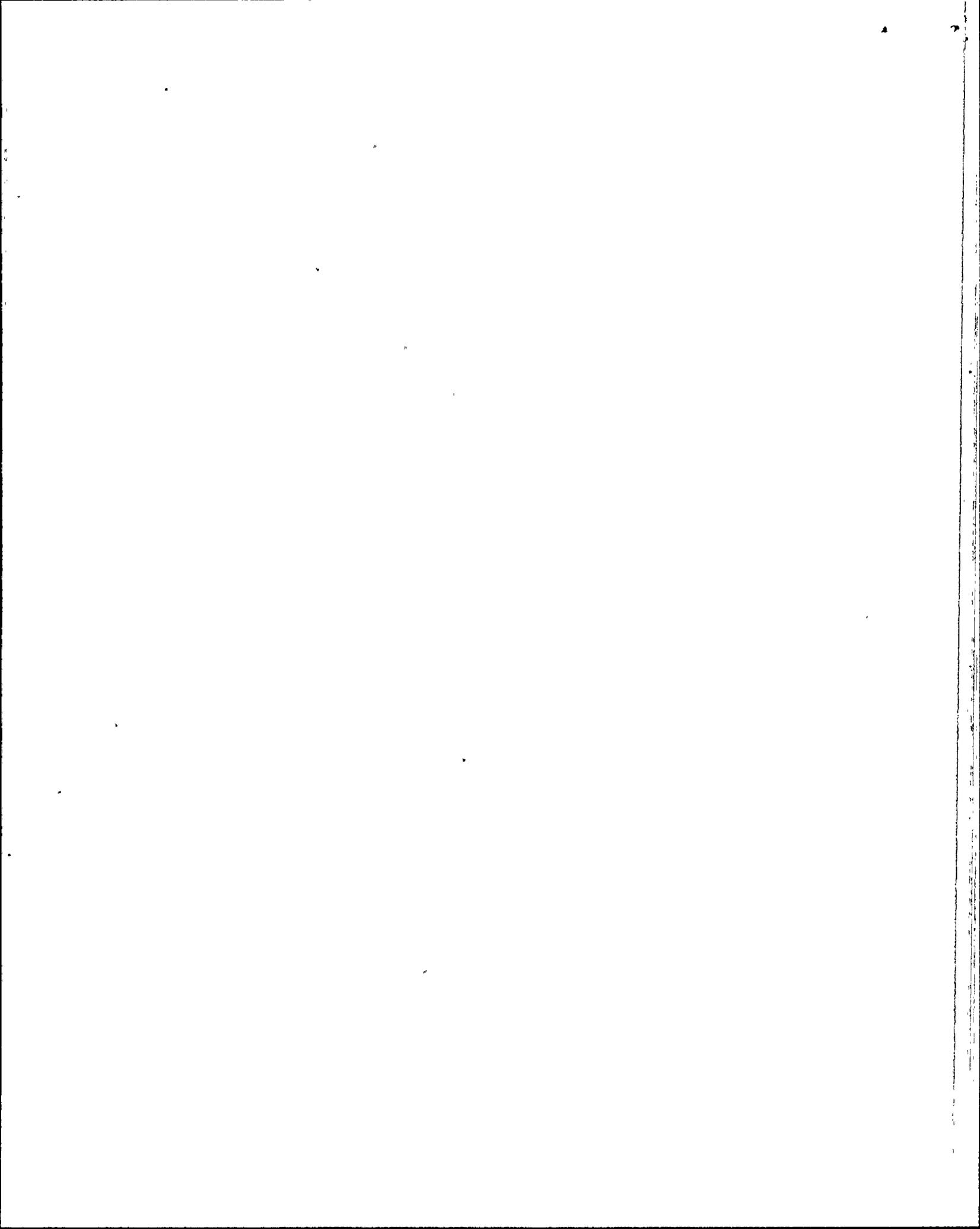
(1.0)

MULTIPLE CHOICE (Select the correct answer)

This concerns the new fuel storage racks in the fuel building. The new fuel storage racks are designed to be completely dry.

What is the PRINCIPAL reason for the new fuel storage racks to be completely dry?

- a. To minimize corrosion.
- b. To minimize contamination of new fuel.
- c. To minimize (stop) criticality of new fuel.
- d. To minimize (stop) new fuel from slipping in the rack.



QUESTION 045 (1.0)

MULTIPLE CHOICE (Select the correct answer)

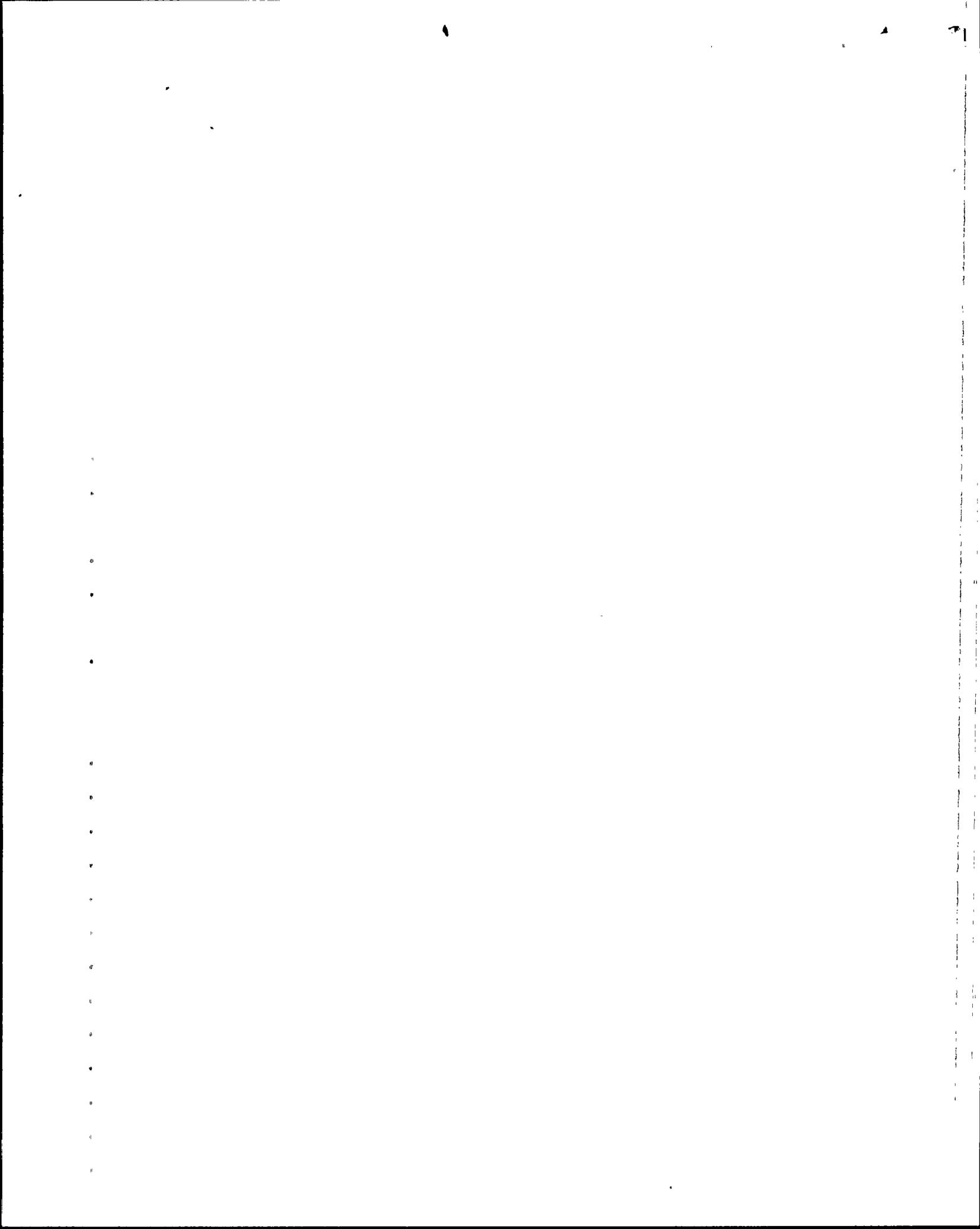
Attached is a diagram showing locations of RU-148 and RU-16.

Which of the following radiation levels do these instruments measure?

RU-148

RU-16

- |                                |                             |
|--------------------------------|-----------------------------|
| a. Operating Level Area        | Primary Coolant Activity    |
| b. Incore Instrumentation Area | Operating Level Area        |
| c. Containment Area High Range | Operating Level Area        |
| d. Steam Generator Blowdown    | Containment Area High Range |



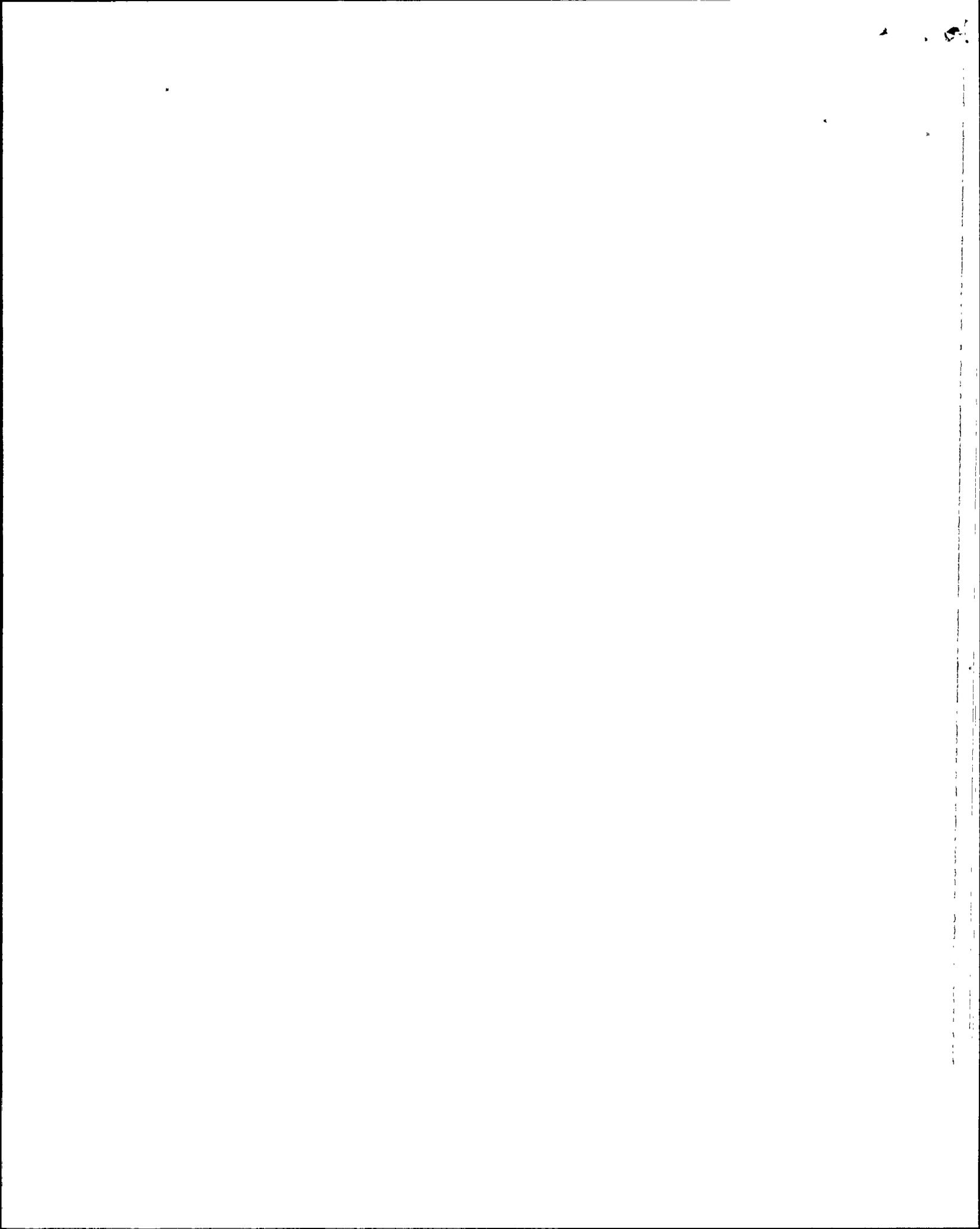
QUESTION 046

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following is Special Nuclear Material (SNM) as defined in Federal Regulations?

- a. The Cs-137 check source for a radiation monitor.
- b. An irradiated Pressure Vessel sample.
- c. A fuel pin which is not part of a fuel assembly.
- d. A Control Element Assembly.



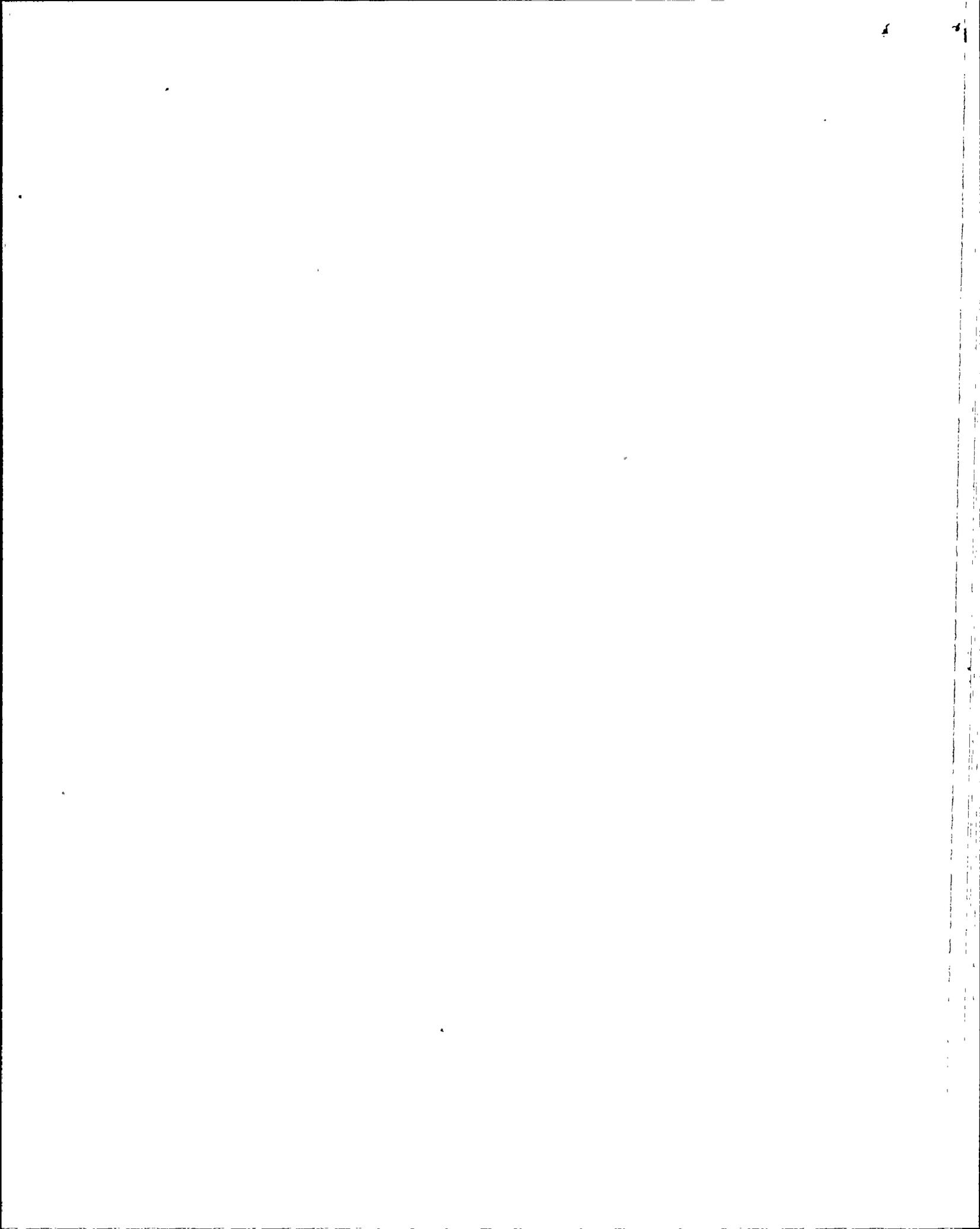
QUESTION 047

(1.0)

MULTIPLE CHOICE (Select the correct answer)

What are the locations, in order of preference, for irradiated fuel to be INTERMEDIATELY stored?

- a. Storage racks, vessel, upender (horizontal).
- b. Upender (horizontal), storage racks, vessel.
- c. Upender (horizontal), vessel, storage racks.
- d. Storage racks, upender (horizontal), vessel.



QUESTION 048

(1.0)

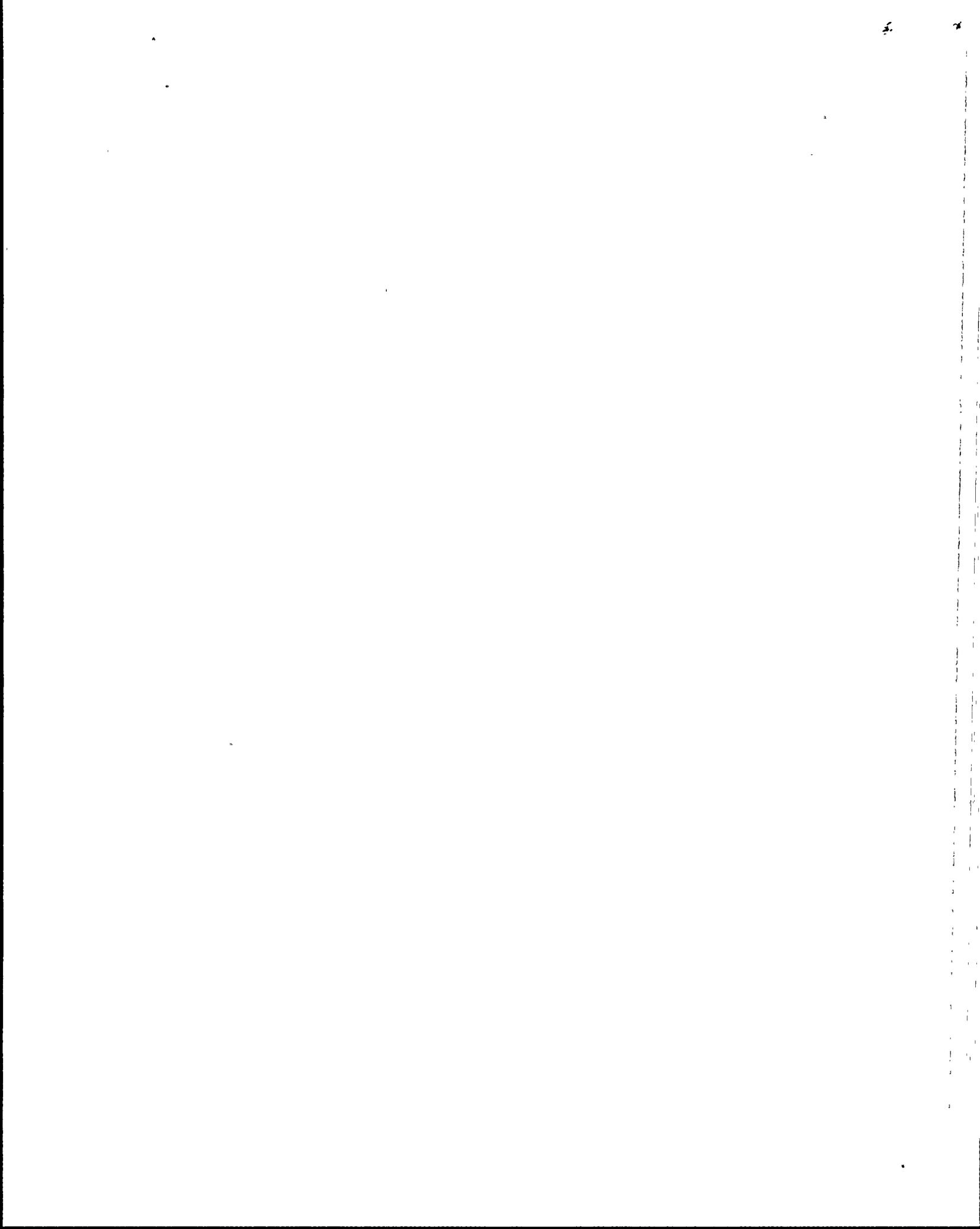
MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core onload is in progress.  
Channel 1 Startup Nuclear Channel count rate is 10 CPS, Channel 2 is 10 CPS.  
A fuel assembly is lowered into the core.

Channel 1 now reads 60 CPS, Channel 2 still reads 10 CPS.  
No spatial effects were anticipated.

You are the LSRO. What INITIAL action, if any, should you take?

- a. Have I and C check Channel 1.
- b. Check the 1/M plot.
- c. Withdraw the fuel assembly just inserted.
- d. Evacuate containment.



QUESTION 049

(1.0)

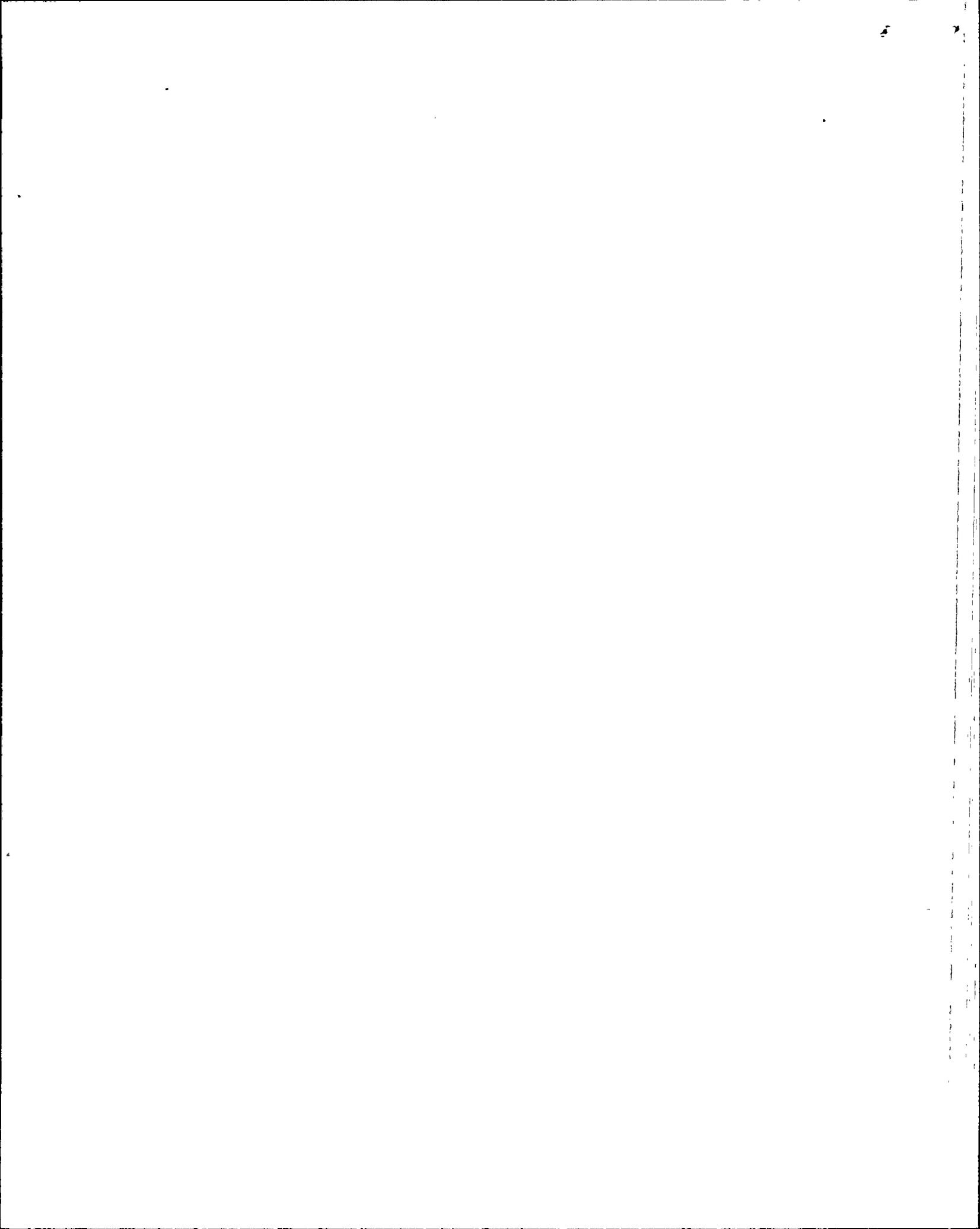
MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 doing a core reload. Refueling is interrupted due to an abnormal event. You are the LSRO. You MUST place the assembly that you have grappled in a location in the reactor vessel other than its final, analyzed core location.

Refer to the attached core reload map. An "X" indicates the position has a fuel assembly in it.

Of the following positions, which would be the proper position to place the fuel assembly you have grappled?

- a. F-1
- b. G-12
- c. T-12
- d. S-9



QUESTION 050

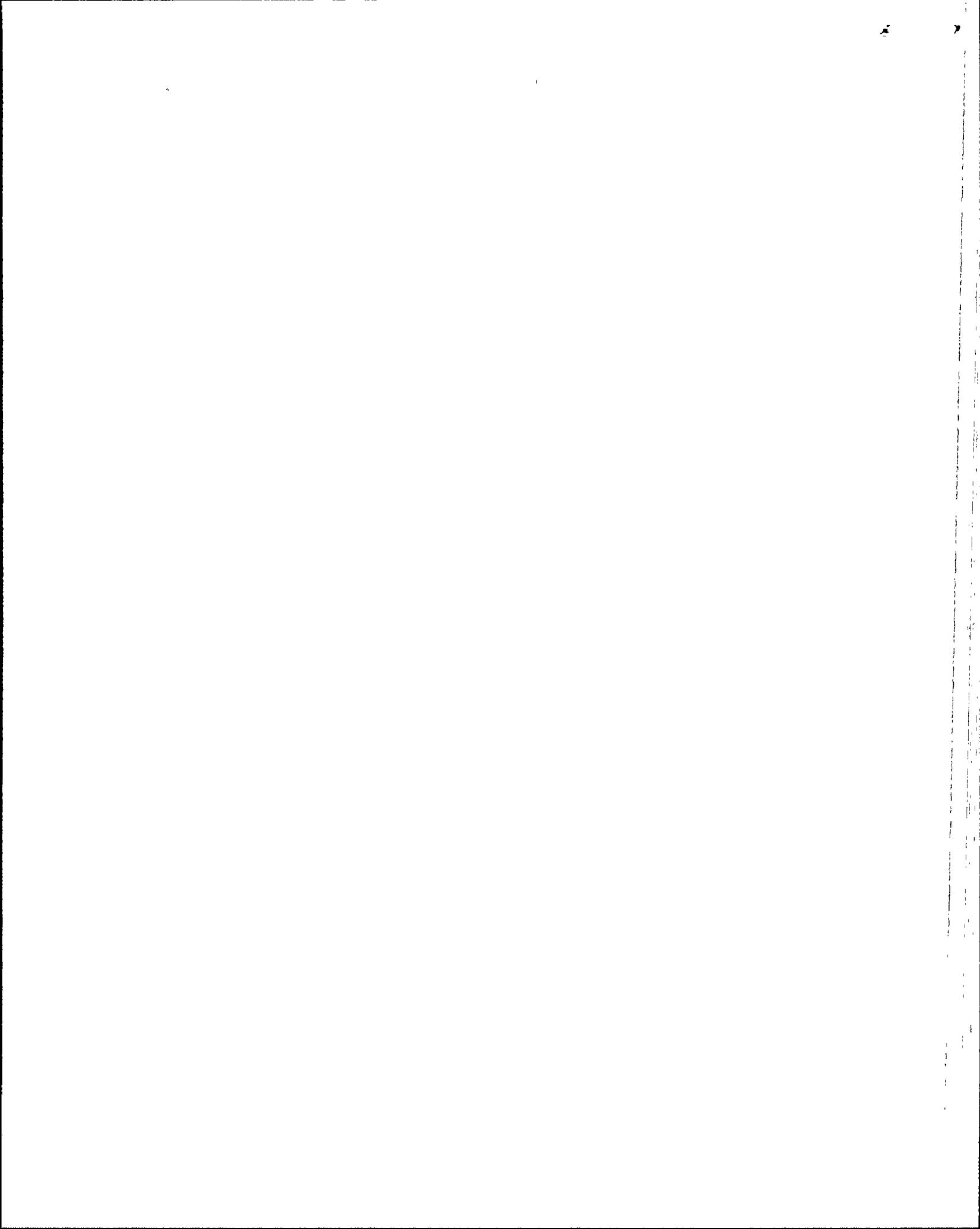
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The plant is in Mode 6 and refueling is in progress. A Loss of Shutdown Cooling occurs. You are the LSRO and the Shift Supervisor orders you to evacuate containment with all personnel not required to close containment.

What is the PRINCIPLE reason for this evacuation?

- a. To ensure core alterations cease.
- b. To minimize radiation exposure.
- c. To man facilities per the Emergency Plan.
- d. To minimize temperature rise in containment.



QUESTION 051

(1.0)

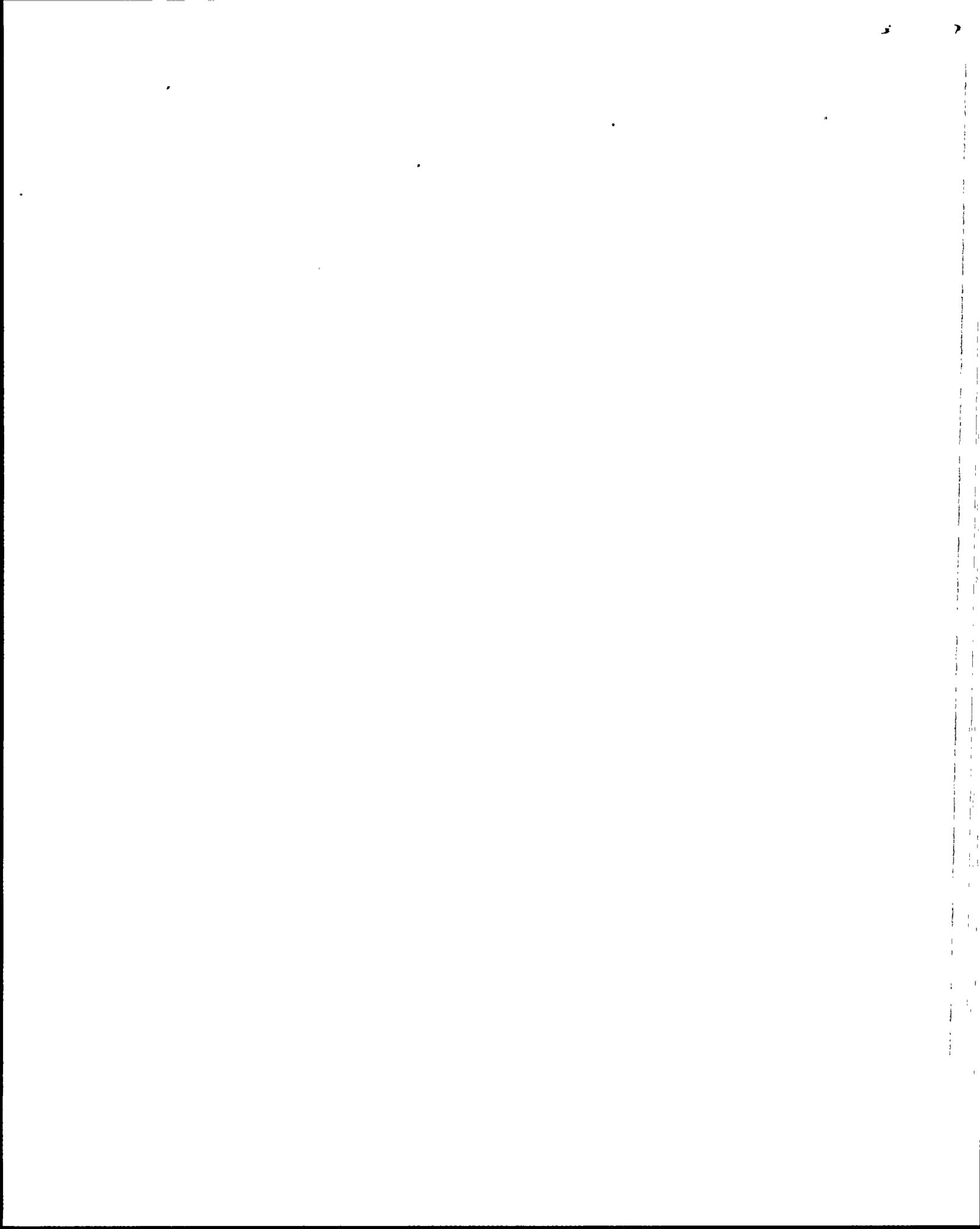
MULTIPLE CHOICE (Select the correct answer)

If boron concentration in the RCS and the fuel transfer canal falls below the minimum value, while in core reload (Mode 6), the operators are directed to initiate emergency boration.

One method utilized, to emergency borate, is a gravity feed from the Refueling Water Tank (RWT) through CH-HV-536 to the charging pumps. The operator is instructed that the RWT level is required to be above 73 %.

What is the DIRECT reason for this level requirement?

- a. The suction line for CH-HV-536 enters the RWT at 73 % level.
- b. When RWT level is below 73 % a charging pump low suction trip may occur.
- c. Boric Acid Makeup (BAM) pumps trip at 73 %.
- d. When RWT level is below 73 % a charging pump low suction trip from 3 pump operations may occur.



QUESTION 052

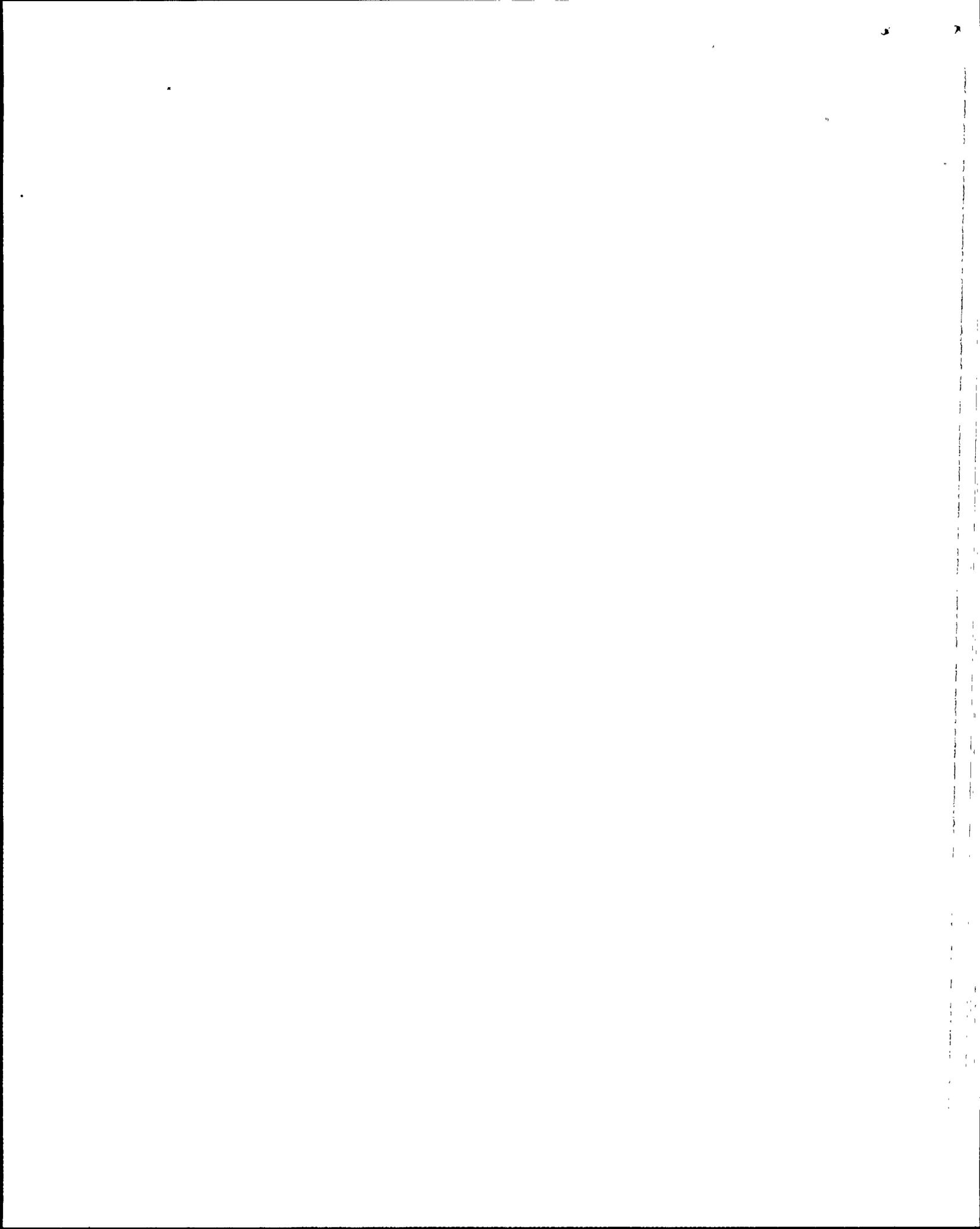
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 and a core reload is in progress. You are the LSRO and have just lowered a new fuel assembly into its core position. You receive a slack cable indication.

How do you perform Z-coordinate verification of the fuel assembly?

- a. Your refueling machine operator computes the difference between actual and expected hoist positions.
- b. Control Room personnel compute the difference between actual and expected hoist positions.
- c. The fuel assembly is ungrappled and visual verification made.
- d. Two independent verifications of core position are made.



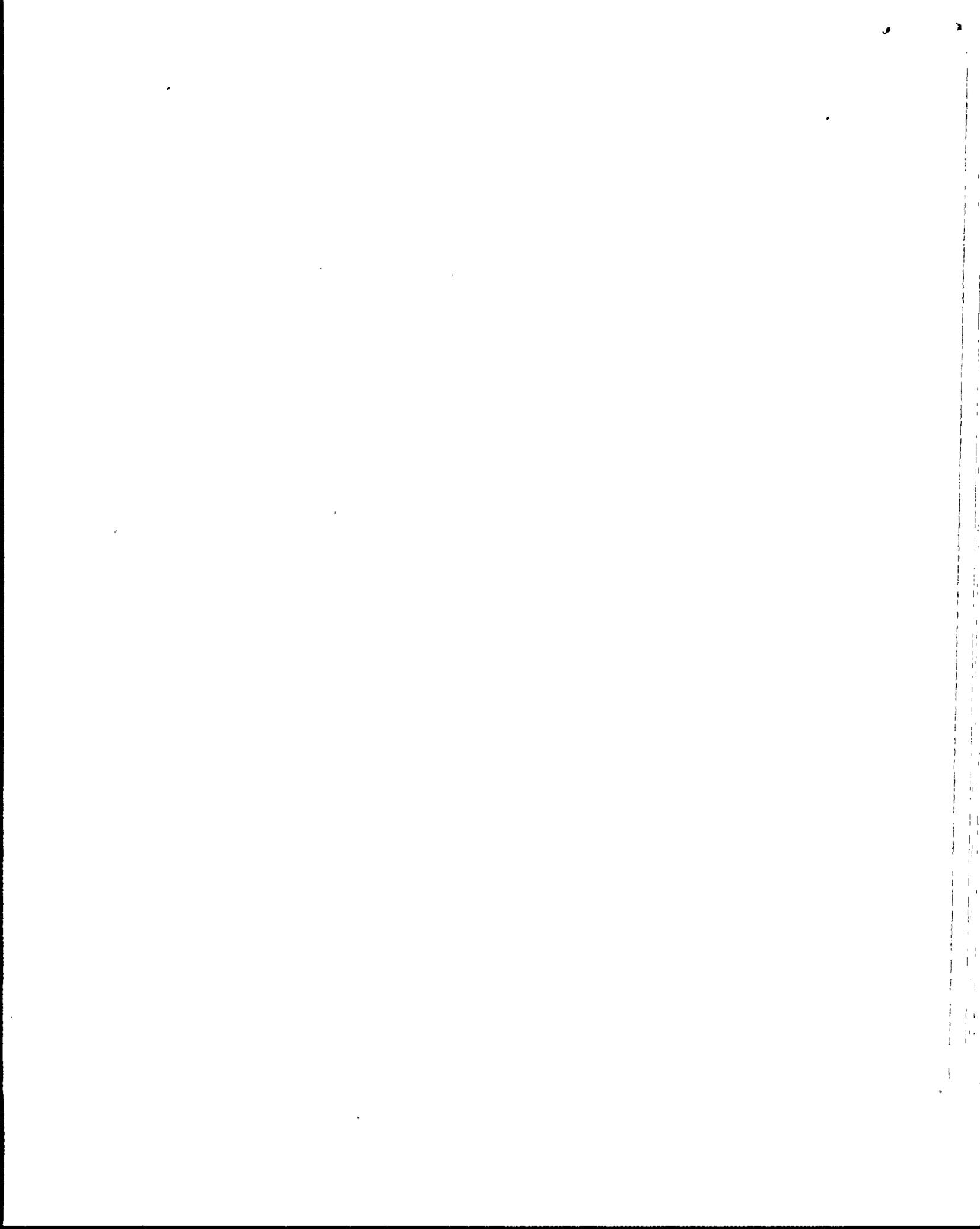
QUESTION 053

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the outer CEA guide tube arrangement?

- a. 6 outer guide tubes, rewidened at the top.
- b. 4 outer guide tubes, rewidened at the top.
- c. 4 outer guide tubes, rewidened at the bottom.
- d. 6 outer guide tubes, rewidened at the bottom.



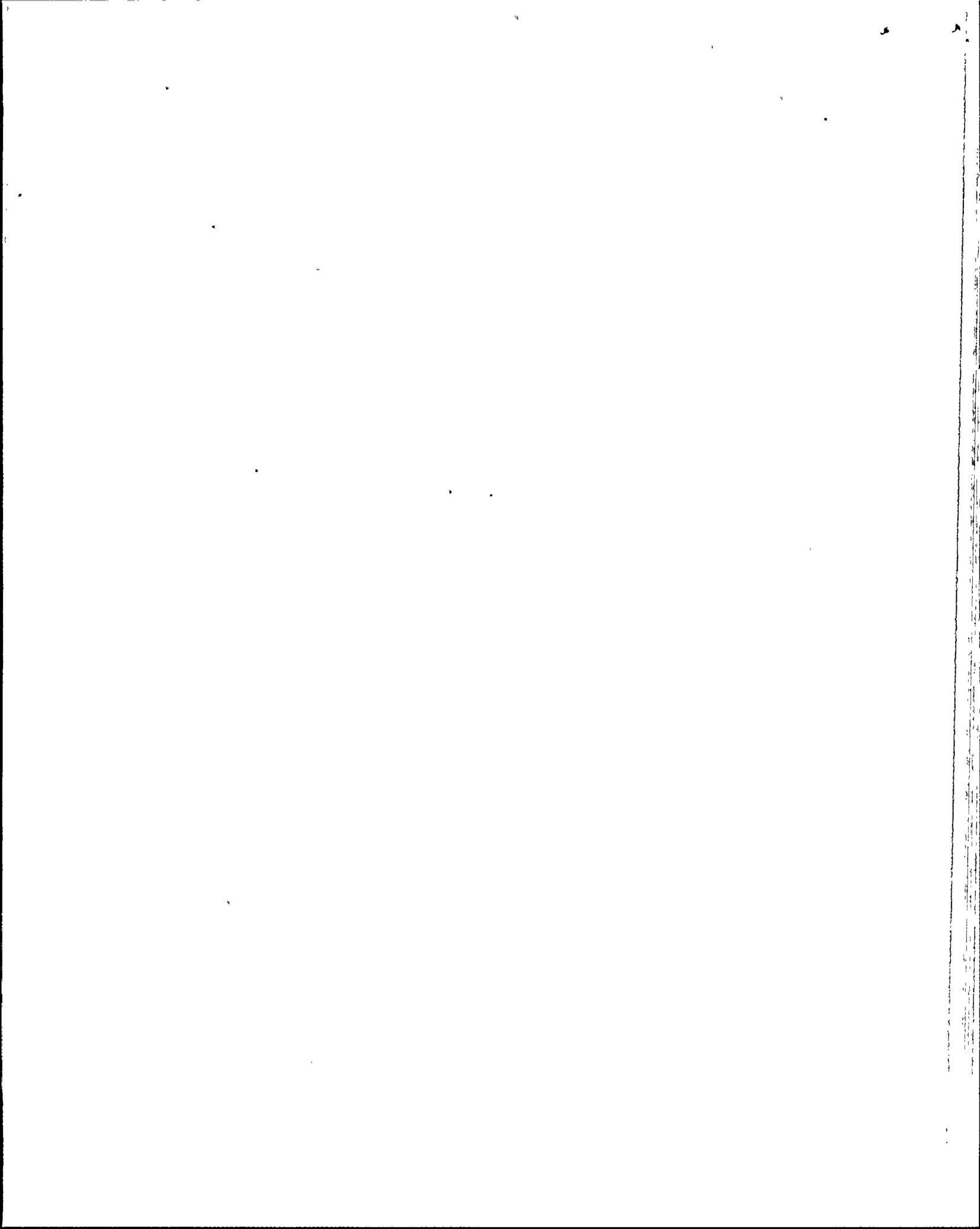
QUESTION 054

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the number of fingers that part length and full length CEAs have?

- | Part Length | Full Length |
|-------------|-------------|
| a. 4        | 12 or 4     |
| b. 12       | 12 or 4     |
| c. 12       | 12 or 6     |
| d. 4        | 12 or 6 .   |



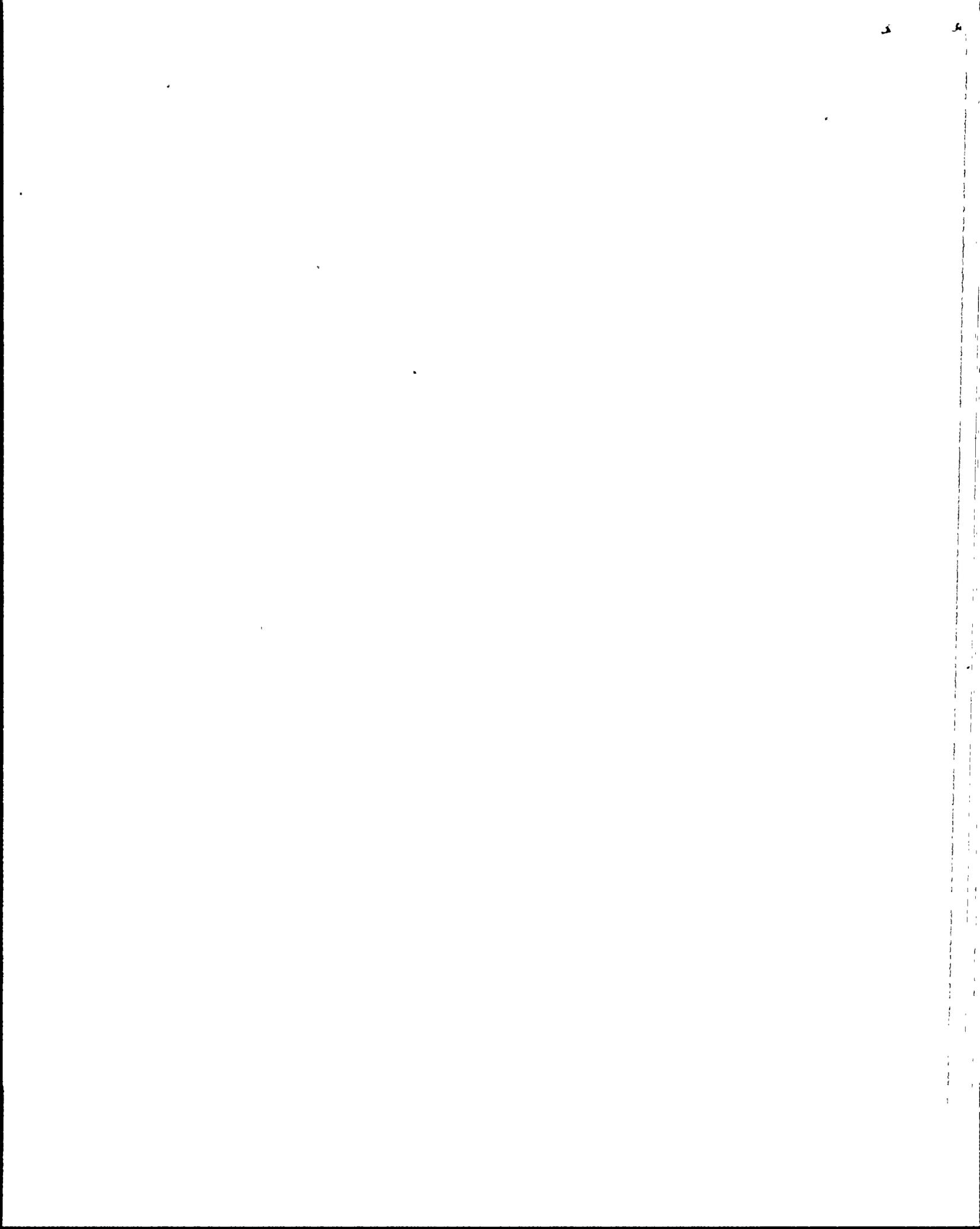
QUESTION 055

(1.0)

MULTIPLE CHOICE (Select the correct answer)

The normal containment cooling is provided by Containment HVAC. Which of the following describes the normal containment cooling equipment?

- a. Two 100 % capacity ACUs on 120 foot level of containment.
- b. Four 50 % capacity ACUs on 120 foot level of containment.
- c. Two 100 % capacity ACUs on 140 foot level of containment.
- d. Four 50 % capacity ACUs on 140 foot level of containment.



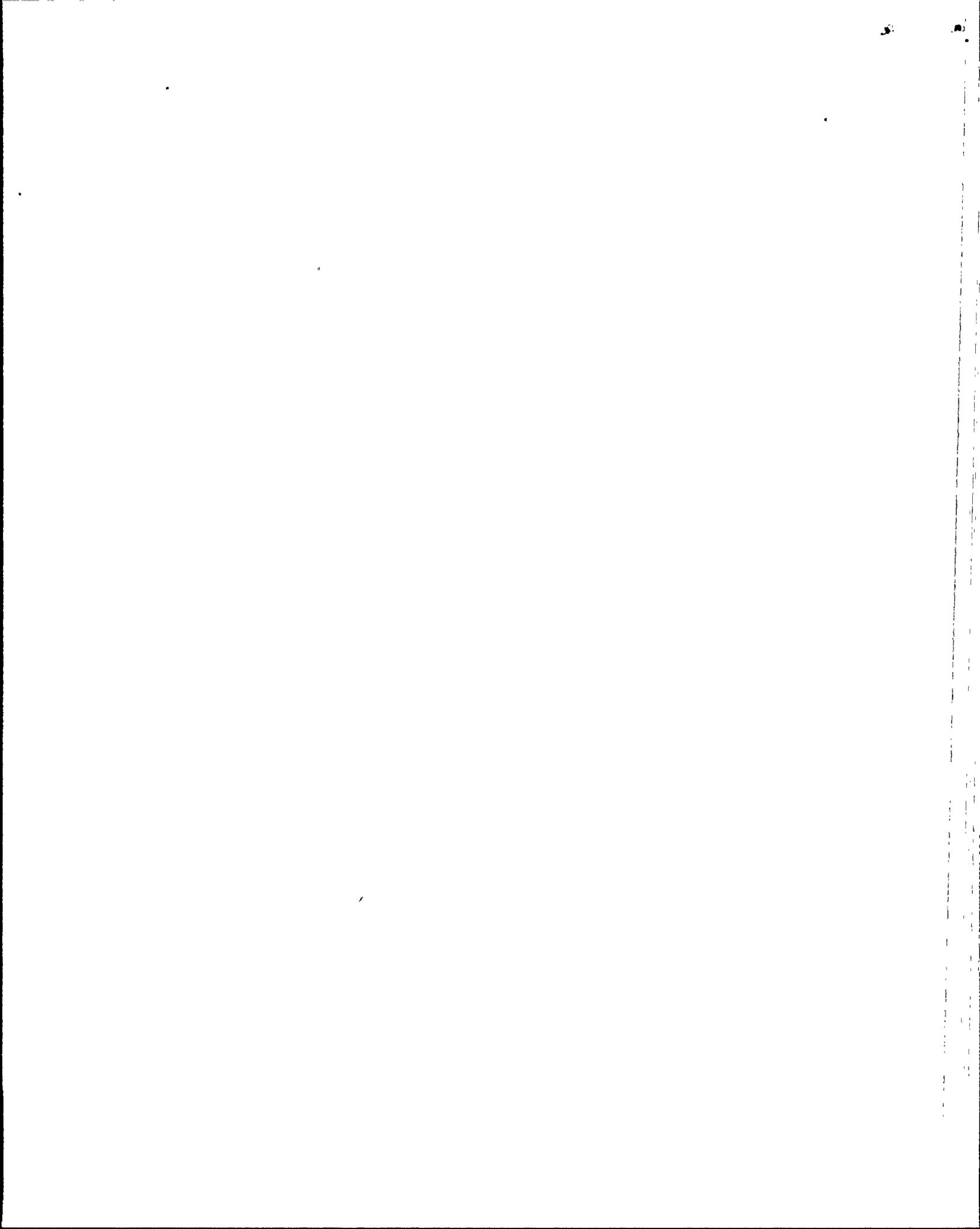
QUESTION 056

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Which of the following describes the flow path for Containment Vent with high (greater than 14 inches water) Containment pressure?

- a. Through the Power Access Purge exhaust components with no fans and through flow orifice CP-F044.
- b. Through the Refueling Purge exhaust components with no fans and through flow orifice CP-F044.
- c. Through the Power Access Purge exhaust components with no fans and Power Access Purge vent valve CP-PV-43.
- d. Through the Refueling Purge exhaust components with no fans and Refueling Purge exhaust valve CP-UV-2B.



QUESTION 057

(1.0)

MULTIPLE CHOICE (Select the correct answer)

Containment pressure is normally provided to the Control Room for indication and to the Plant Protection System.

If a Containment Isolation Actuation Signal (CIAS) is received, is this pressure signal still reliable and why?

- a. Yes, because the pressure transmitters are inside containment.
- b. Yes, because the pressure sensing lines do not isolate.
- c. No, because the pressure transmitters are not Environmentally Qualified.
- d. No, because the pressure sensing lines isolate.



QUESTION 058

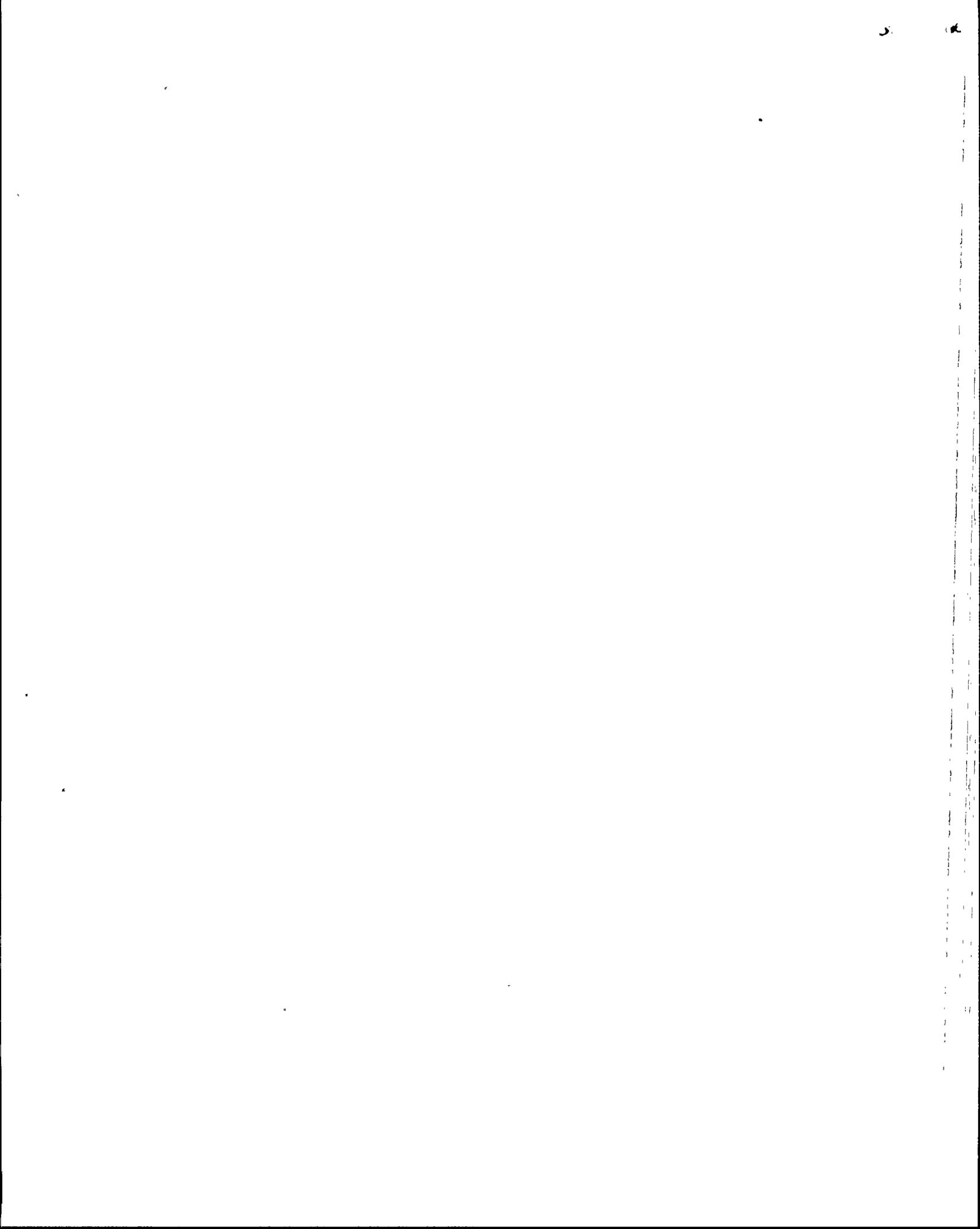
(1.0)

MULTIPLE CHOICE (Select the correct answer)

The unit is in Mode 6 with a core offload in progress. You are the LSRO. You have an irradiated fuel assembly grappled and are in the transfer canal area. Spent fuel pool level is decreasing rapidly. The Shift Supervisor directs you to place the assembly in a water trap area.

In which of the following areas should you place the fuel assembly?

- a. Reinsert the assembly in its designated core location.
- b. Place the assembly in a storage rack.
- c. Place the assembly in the upender and lower to horizontal.
- d. Place the assembly in a deep area of the pool and lower to just above the floor.



QUESTION 059

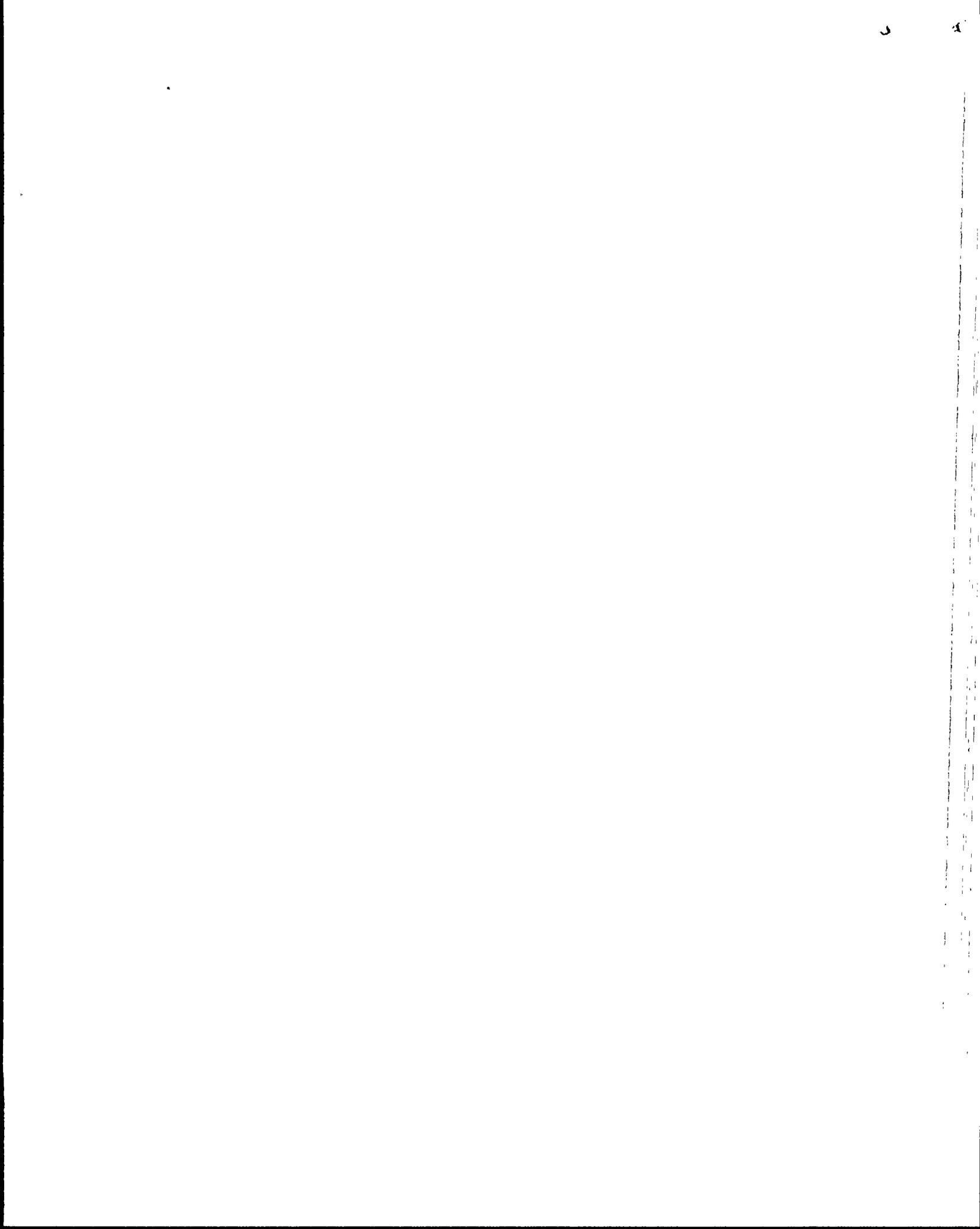
(1.0)

MULTIPLE CHOICE (Select the correct answer)

Complete the following with the answers provided.

The site fire team is a minimum of \_\_\_\_\_ members, NOT to include \_\_\_\_\_.

- a. Five; Shift Supervisor, STA, nor three crew members necessary for safe shutdown.
- b. Seven; Shift Supervisor nor STA.
- c. Three; Shift Supervisor, STA, nor three crew members necessary for safe shutdown.
- d. Three; Shift Supervisor nor STA.



QUESTION 060

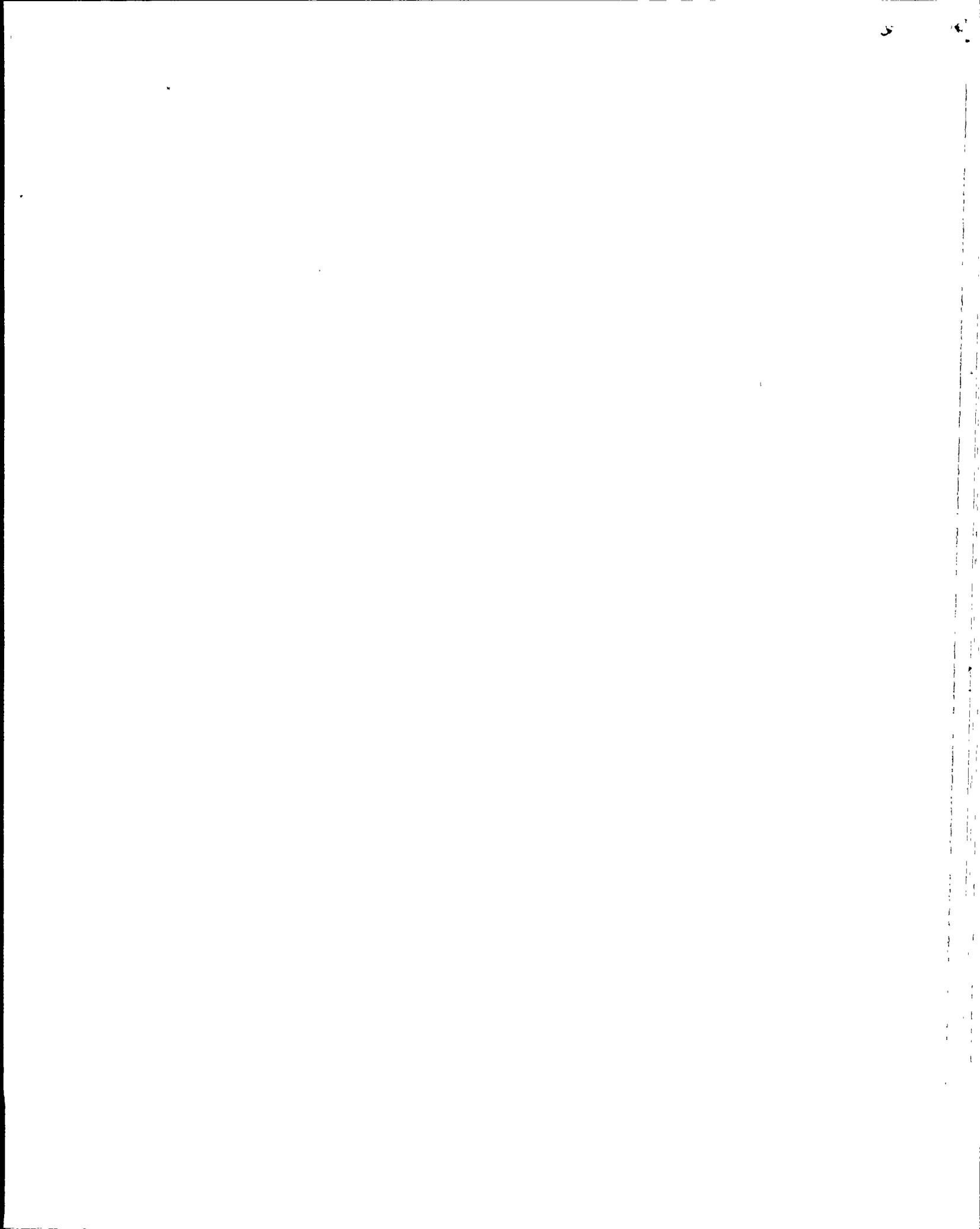
(1.0)

MULTIPLE CHOICE (Select the correct answer)

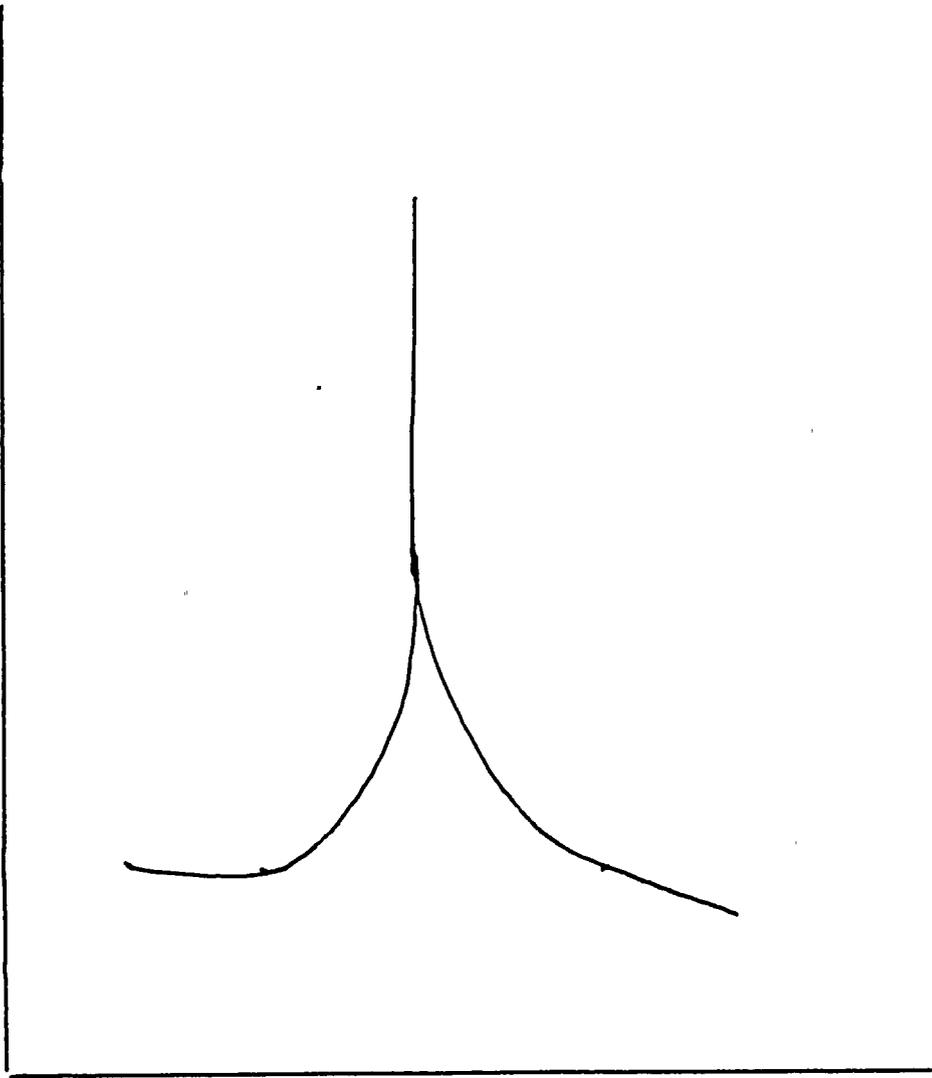
The following question concerns the Fuel Transfer System.

Which of the following describes how to complete a stopped auto transfer sequence and why? (The sequence was stopped before completing the transfer)

- a. Complete through individual manual commands because auto cannot be restarted.
- b. Complete through individual manual commands because carriage location will be reset in the auto mode.
- c. Complete by restarting in auto to preserve interlocks.
- d. Complete by restarting in auto to preserve proper sequence.



$\sigma_a$



Neutron Kinetic Energy

QUESTION 14



## REACTIVITY CONTROL SYSTEMS

### BORATED WATER SOURCES - OPERATING

#### LIMITING CONDITION FOR OPERATION

3.1.2.6 Each of the following borated water sources shall be OPERABLE:

- a. The spent fuel pool with:
  1. A minimum borated water volume as specified in Figure 3.1-2, and
  2. A boron concentration of between 4000 ppm and 4400 ppm boron, and
  3. A solution temperature between 60°F and 180°F.
- b. The refueling water tank with:
  1. A minimum contained borated water volume as specified in Figure 3.1-2, and
  2. A boron concentration of between 4000 and 4400 ppm of boron, and
  3. A solution temperature between 60°F and 120°F.

APPLICABILITY: MODES 1, 2,\* 3,\* and 4\*.

#### ACTION:

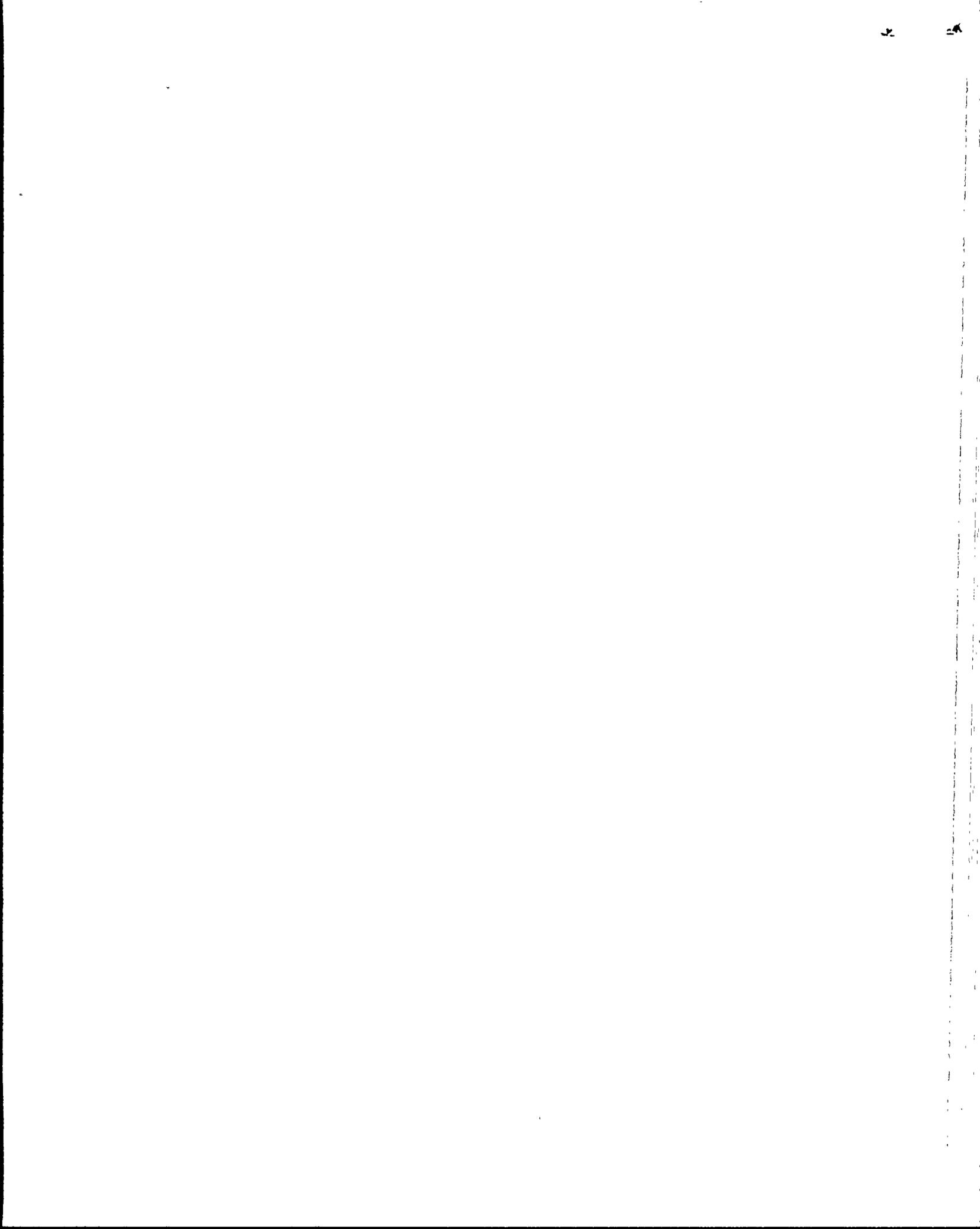
- a. With the above required spent fuel pool inoperable, restore the pool to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the above required spent fuel pool to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.
- b. With the refueling water tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

#### SURVEILLANCE REQUIREMENTS

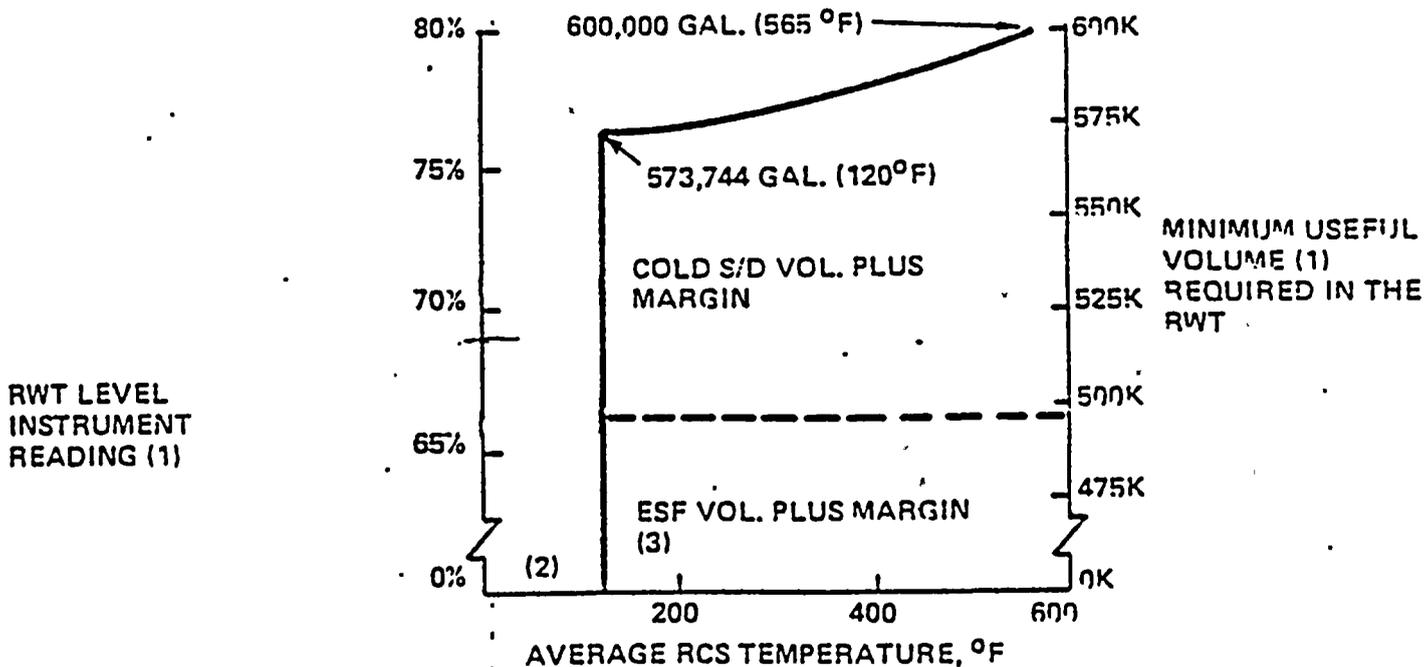
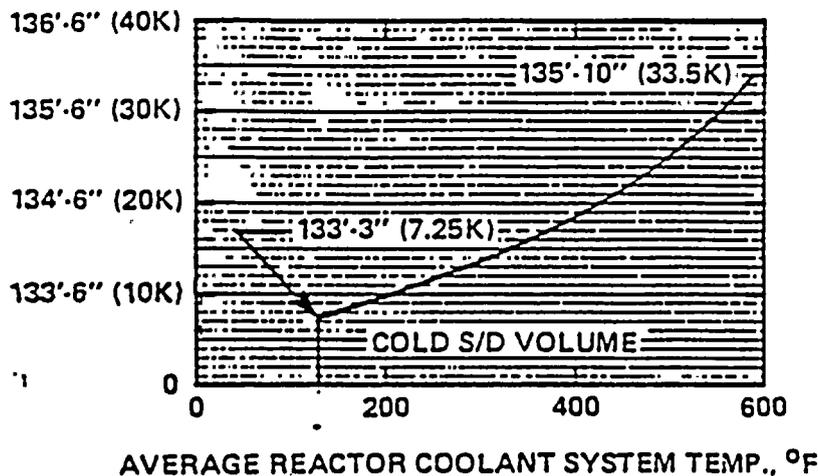
4.1.2.6 Each of the above required borated water sources shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
  1. Verifying the boron concentration in the water, and
  2. Verifying the contained borated water volume of the water source.
- b. At least once per 24 hours by verifying the refueling water tank temperature when the outside air temperature is outside the 60°F to 120°F range.
- c. At least once per 24 hours by verifying the spent fuel pool temperature when irradiated fuel is present in the pool.

\* See Special Test Exception 3.10.7.



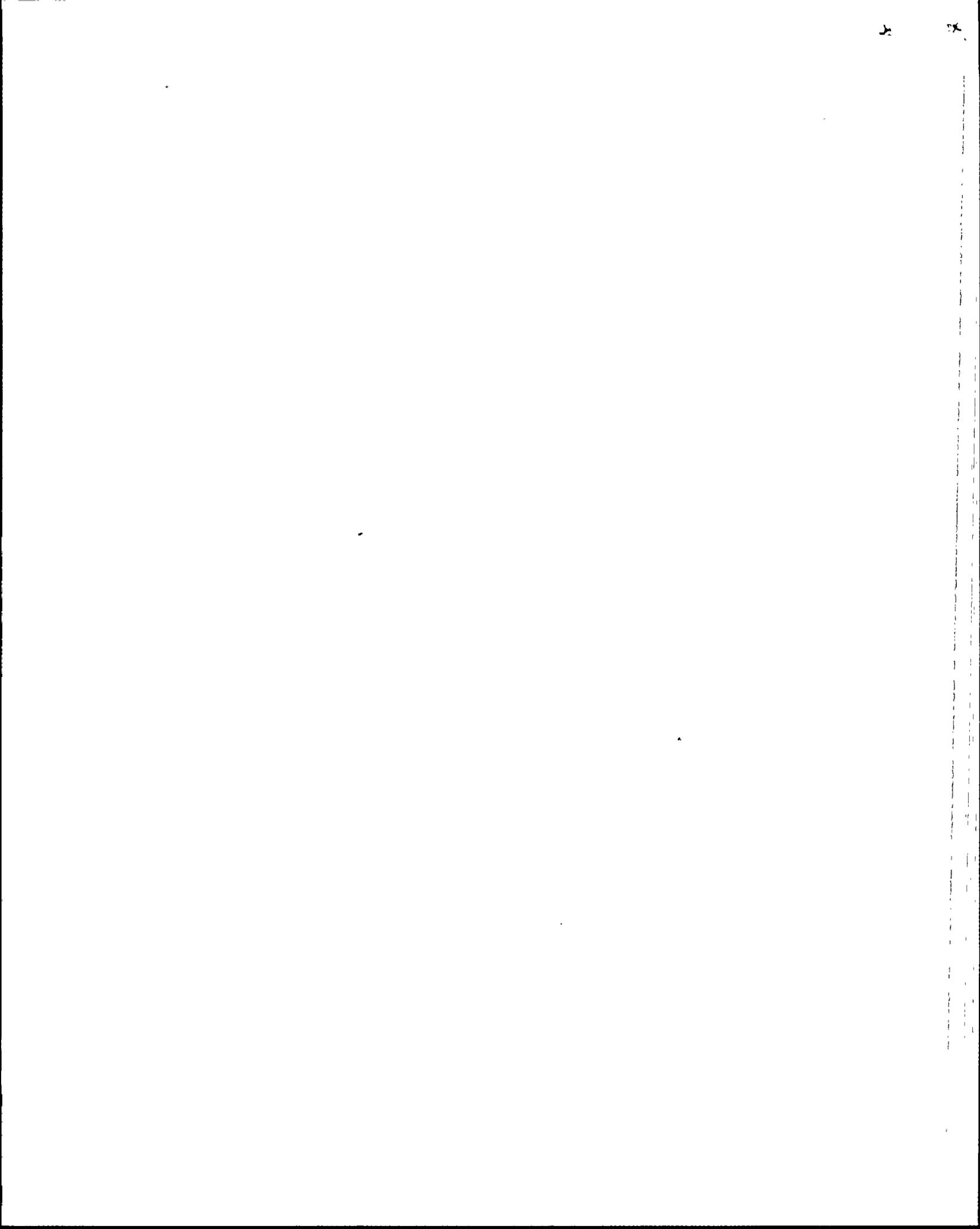
# FOR INFORMATION ONLY

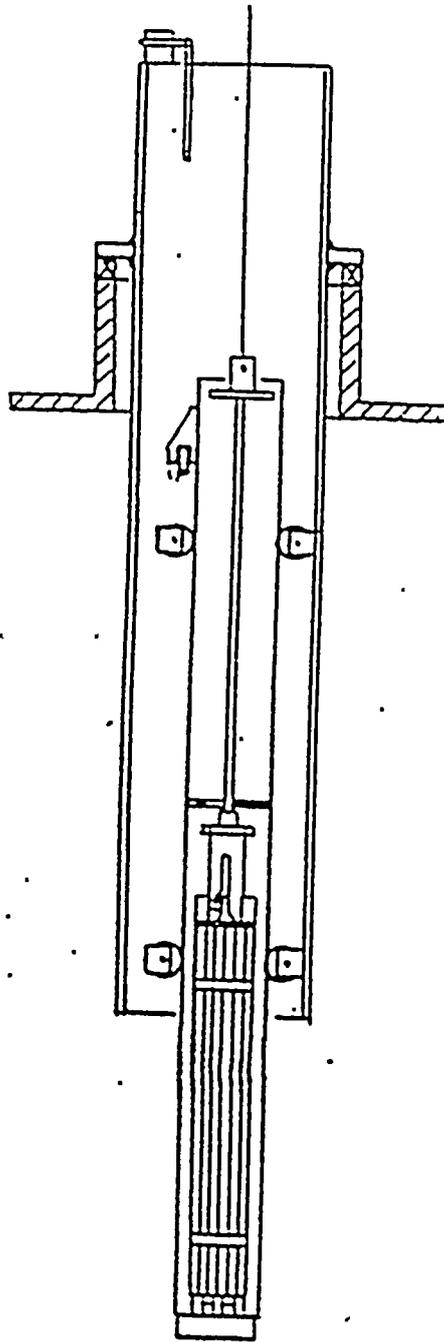


- (1) THE TANK LEVEL AND VOLUME SHOWN ARE THE USEFUL LEVEL AND VOLUME ABOVE THAT IN THE TANK WHICH IS REQUIRED FOR VORTEX CONSIDERATIONS
- (2) DURING MODE 5 AND 6 ONE OF THESE BORATED SOURCES SHALL CONTAIN A MINIMUM OF 33,500 GALLONS
- (3) THIS VOLUME IS NOT REQUIRED DURING MODE 6

FIGURE 3.1-2  
MINIMUM BORATED WATER VOLUMES

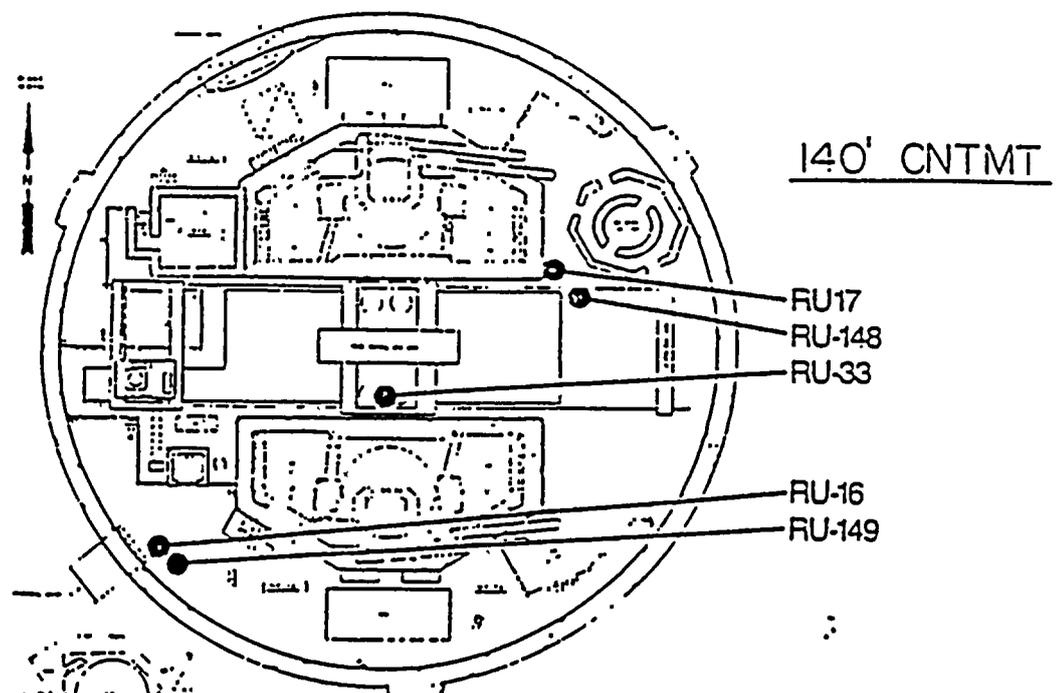
QUESTION 24



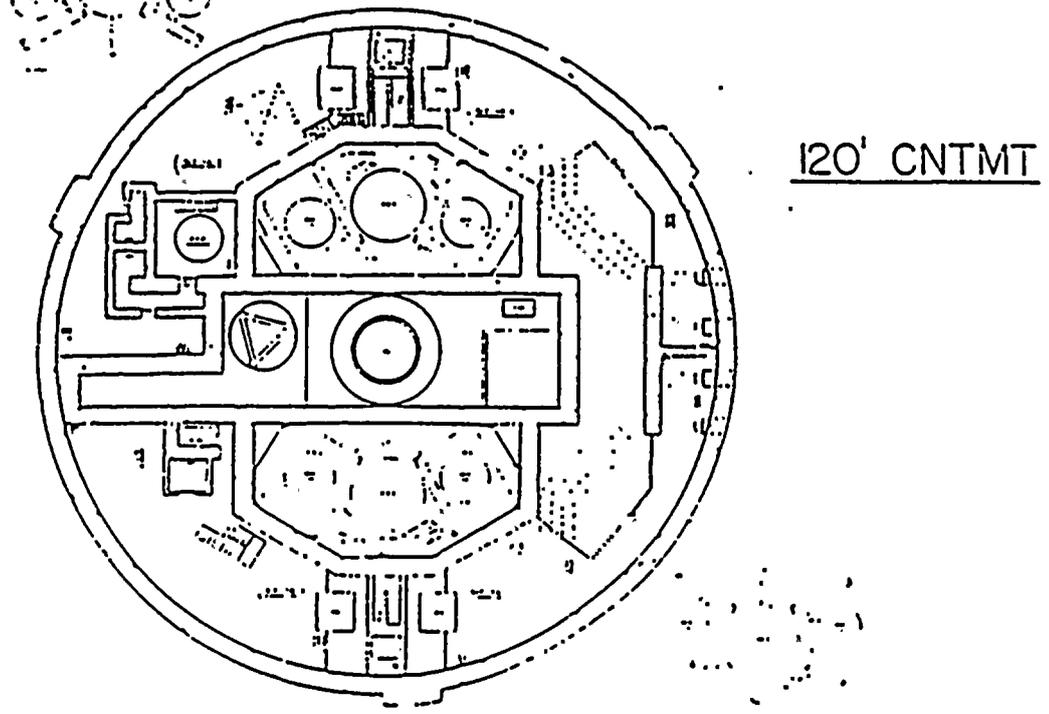


QUESTION 29





140' CNTMT



120' CNTMT

QUESTION 45



CORE RELOADING

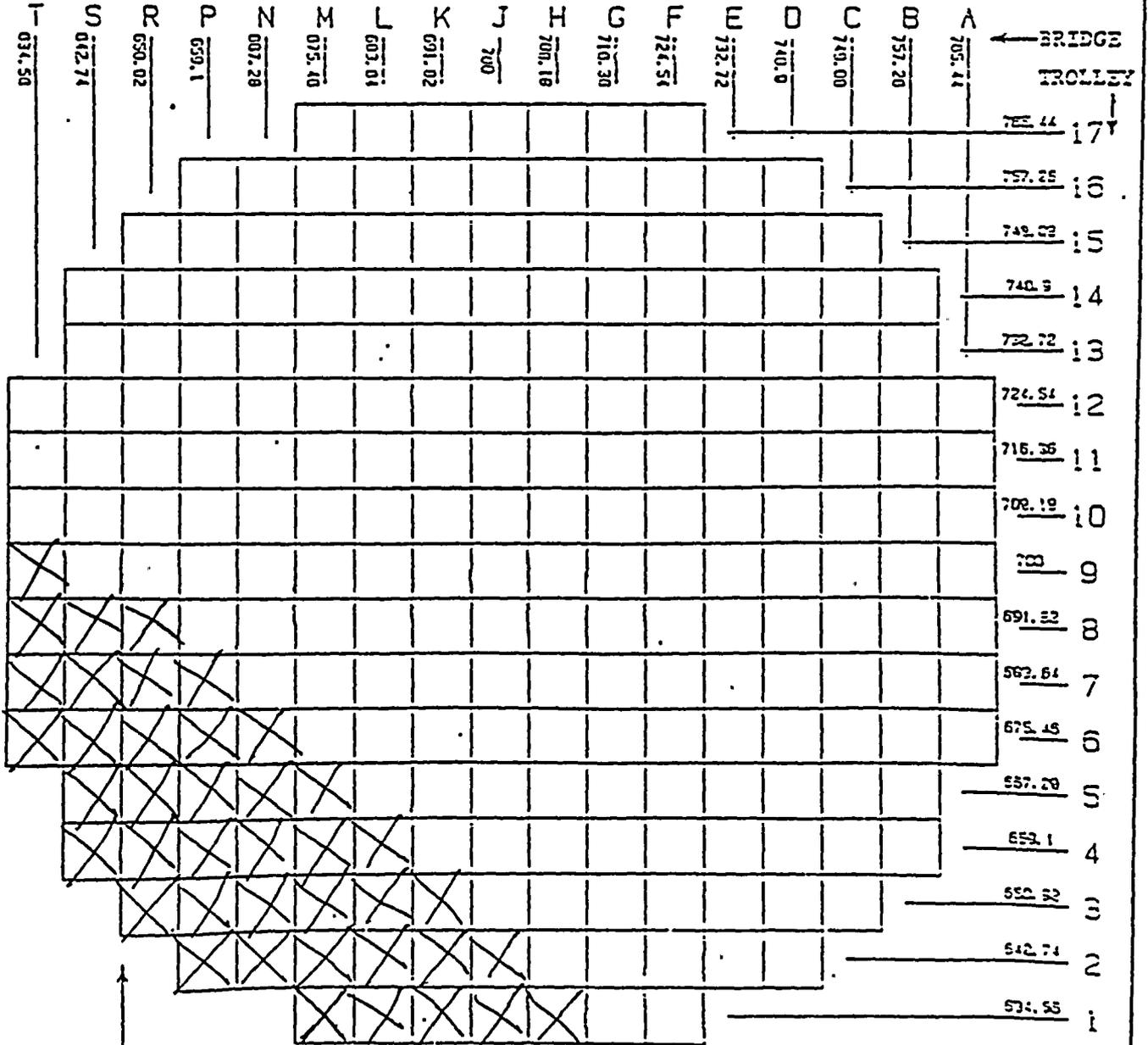
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Revision

1

Appendix D Page 1 of 3

NOMINAL BRIDGE AND TROLLEY COORDINATES



PLANT  
NORTH

QUESTION 49



RECEIVED  
NRC  
REGION V

**Arizona Public Service Company**  
PALO VERDE NUCLEAR GENERATING STATION  
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

102-02277-JML/TRB/PJC  
September 17, 1992

SEP 23 AIO :20

JAMES M. LEVINE  
VICE PRESIDENT  
NUCLEAR PRODUCTION

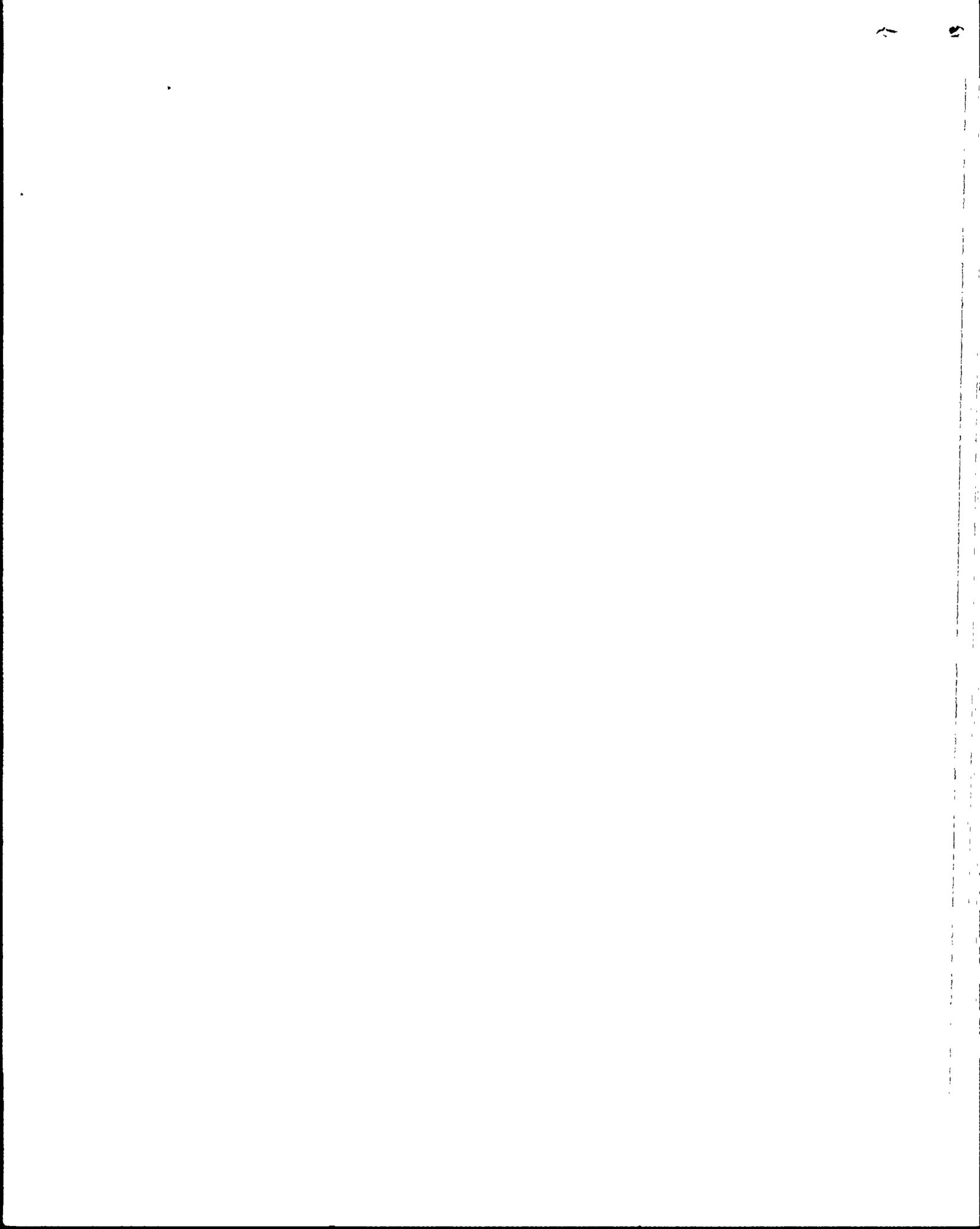
Mr. John B. Martin  
Regional Administrator, Region V  
U. S. Nuclear Regulatory Commission  
1450 Maria Lane, Suite 210  
Walnut Creek, CA 94956-5358

Dear Mr. Martin:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2, and 3  
Docket Nos. STN 50-528/529/530  
Senior Operator Limited to Fuel Handling  
Licensing Examination  
File: 92-005-419.06; 92-056-026**

Arizona Public Service Company (APS) is providing the following information in accordance with the guidance of Examiner Standard ES-201, "PRE-EXAMINATION ACTIVITIES," (NUREG-1021, Revision 6, dated June 1, 1990):

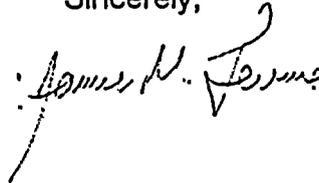
1. APS has reviewed the "Nuclear Regulatory Commission Senior Operator Limited to Fuel Handling (LSRO) Licensing Examination," administered to PVNGS LSRO candidates on September 14, 1992, and has no comments on the written examination.
2. The Pre-Examination and Post-Examination Security Agreements executed by those APS employees allowed access to the NRC prepared examination material prior to and/or during the examination are being provided to the Chief Examiner following completion of the examination in accordance with the guidance of ES-201.



Mr. John B. Martin  
U. S. Nuclear Regulatory Commission  
Senior Operator Limited to Fuel Handling  
Licensing Examination  
Page 2

Please contact Paula Coffin at (602) 393-5868 with any questions.

Sincerely,



JML/TRB/PJC/mh

cc: W. F. Conway (9082)  
L. F. Miller  
T. R. Meadows  
J. Russell  
R. M. Cross  
J. A. Sloan

NRC Resolution of Facility Comments: No changes to the Examination or Answer Key were made.

