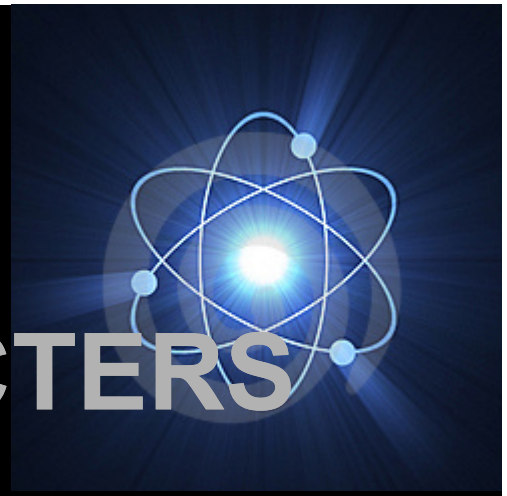


IMPLAUSIBLE DISTRACTERS
by
Sean Currie & Ron Aiello

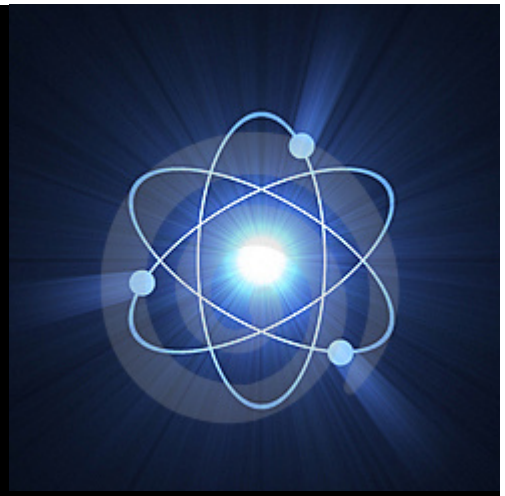
WHAT IS AN IMPLAUSIBLE DISTRACTOR?

WHY LOOK AT IMPLAUSIBLE DISTRACTORS?

Will discuss:

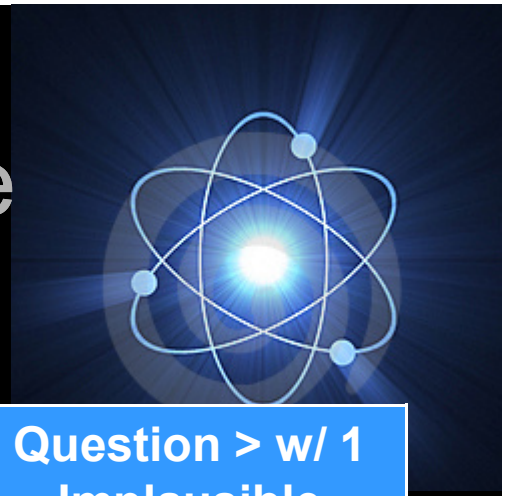
- Categories of Implausible Distracters
- Making Distracters more Plausible
- Examples of Repaired Questions
- Actual Questions with Plausible Questions with Miss Rates

Definitions



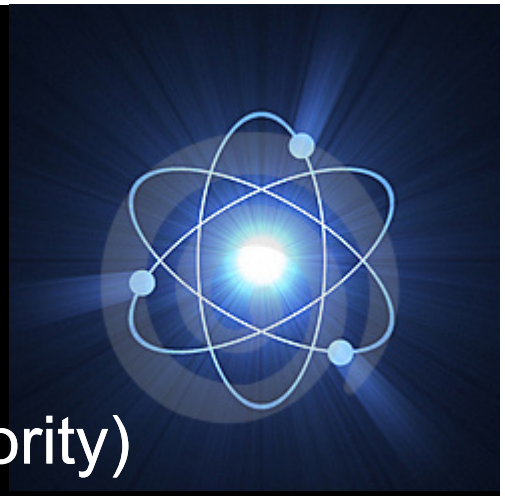
- Plausible – reasonable, worthy of belief
- Implausible – provoking disbelief

Why Look at Implausible distracters?



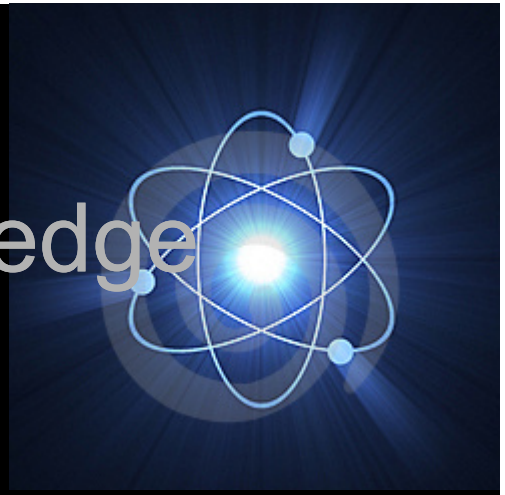
Plant	Questions Sampled	Question w/ 1 Implausible Distracter	Question > w/ 1 Implausible Distracter
A	100	10	5
B	100	19	1
C	100	10	5
D	100	26	8
E	100	9	3
F	100	6	1
G	100	8	4
H	100	19	11
TOTAL	800	107	38
		13%	5%

Categories



A. Requires Minimal Plant Knowledge (Majority)
B. Fails Common Sense Test
C. Double Distracters (1 of 2 Taken Twice) with 2 Distracters Having LOD = 1
D. Physics Not Correct
E. Distracters Conflict With Information In Question Stem
F. Distracters Not Independent From Each Other
G. Use of a Distracter About a Plant Process That Does Not Exist
H. Psychometric Imbalance – Cueing or Improper Counterbalance in multi-part answers

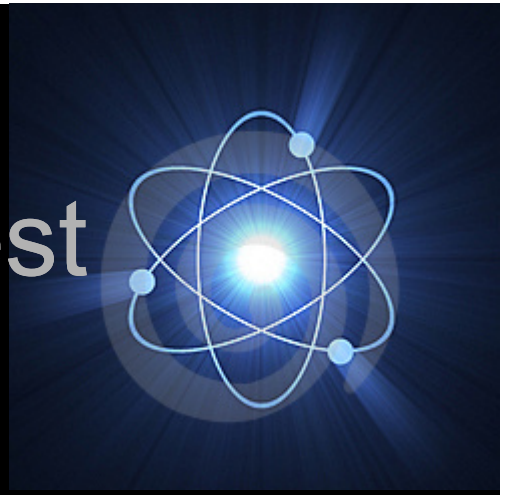
Require Minimal Plant Knowledge



Which of the following will cause the RHR pumps to start during a design basis LOCA?

A. low drywell pressure
B. high reactor water level
C. high drywell pressure
D. MSIVs in the NOT OPEN position

Fails Common Sense Test



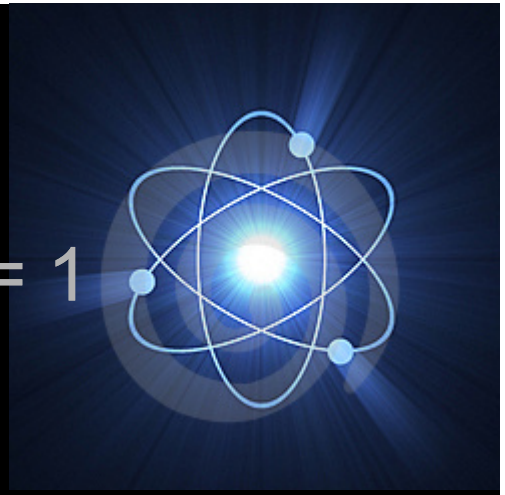
Given the following conditions:

- Reactor Power is 100%
- Pressurizer level is 56% and rising
- Pressurizer pressure is 2235 psig and slowly rising
- Letdown flow isolates
- Charging flow rises
- Annunciator 32B, PZR 17% HTRS OFF, alarms
- Annunciator 32C, PZR LO LEV DEV, alarms
- All containment parameters are normal

Which ONE (1) of the following has occurred?

A. Reactor Coolant System Leak.
B. **Pressurizer Level Channel Failure.**
C. Loss of Charging.
D. Letdown Line Break.

Double Distracter
(1 of 2 Taken Twice) with LOD = 1



Given the following plant conditions:

- Reactor power is 100%
- Pressurizer pressure channel I, 429, has been removed from service for surveillance testing with its' associated bi-stables tripped
- Pressurizer pressure channel IV, 449, fails LOW

Which ONE of the following describes the result of these conditions?

A Reactor trip, but NO Safety Injection
Pzr PORV PR-2A remains closed

B Reactor trip and Safety Injection
Pzr PORV PR-2A remains closed

C Reactor trip but NO Safety Injection
Pzr PORV PR-2A opens

D Reactor trip and Safety Injection
Pzr PORV PR-2A opens

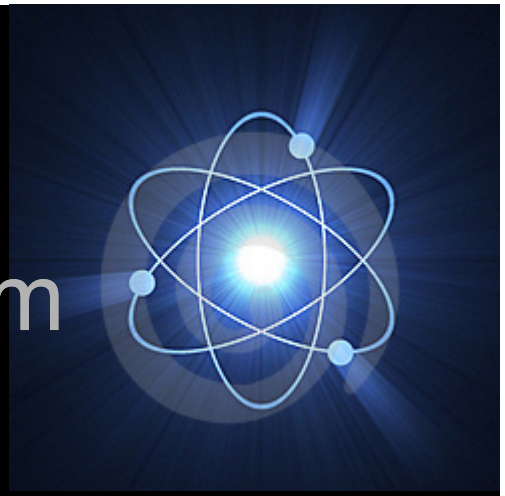
Physics not Correct

Torus water temperature rises from 75 F to 95 F over several weeks due to summer heat.

Which of the following describes the effect of the rise in torus water temperature?

A. The *INCREASE in torus airspace* would result in LOWER post-LOCA peak drywell pressure.
B. The *DECREASE in torus water level* would result in LOWER available NPSH for the ECCS pumps.
C. **The DECREASE in torus airspace would result in HIGHER post-LOCA peak drywell pressure.**
D. The INCREASE in torus water level would result in HIGHER available NPSH for the ECCS pumps.

Distracters Conflict with Information in Question Stem



The plant is operating at 100% power.

A failure of the governor/pressure regulator occurs *which causes the turbine control valves to fully open.*

Given the above conditions, which one of the following RPS functions will scram the reactor?

A. **Main Steam Isolation Valve Closure**
B. APRM flux – Upscale
C. Low RPV water level
D. *Turbine Control Valve Closure*

Distracters Not Independent From Each Other (Subsets)

A fully qualified Radiation Worker was escorting a male visitor with no previous exposure through the Reactor Building when they inadvertently walked through a High radiation area.

Assuming no previous exposure, RP personnel read the dosimeters for the individuals and calculated that they received the following radiation exposure:

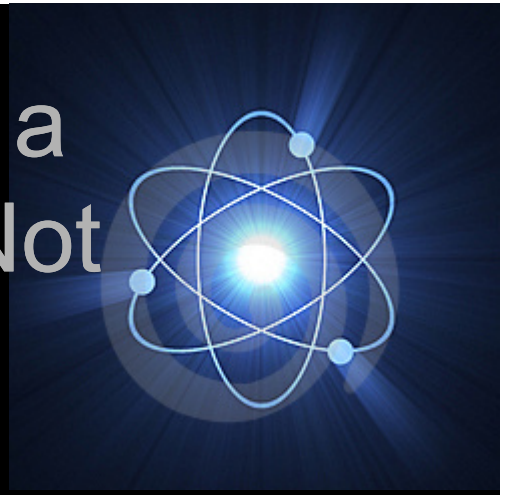
- Chest 800 mrem
- Hands 1060 mrem
- Eye Lens 510 mrem
- Internal 550 mrem

Which exposure limit has been exceeded?

A. Both exceeded Federal TEDE limits.
B. **Both exceeded administrative TEDE limits.**
C. The male visitor exceeded the federal TEDE limit.
D. *The fully qualified Radiation Worker exceeded the federal TEDE limit.*

Distracters B & D are not plausible because they are a subset of distracter A. If distracter A were correct, then distracters B & D would also be correct.

Use of a Distracter About a Plant Process That does Not Exist



IMD is about to commence a surveillance test, with the following:

- The surveillance test will cause a TECH SPEC-REQUIRED plant instrument to be INOPERABLE for the duration of the test
- Performance of the surveillance test does NOT require an LCO ACTION entry

Which ONE of the following describes a CRS required action, PRIOR to IMD beginning the surveillance test?

A. *Direct the RO to hang an Adverse Condition Monitoring Tag* on the annunciator window associated with the instrument.

B. Direct IMD to hang an Equipment Status Tag (EST) on the instrument, and the RO to hang a Miniature EST in the Control Room.

C. Identify the Technical Specification required action in the event the instrument is still INOPERABLE when the Short Duration Time Clock (SDTC) expires.

D. Identify the Maximum Out of Service Time (MOST) for the instrument and direct IMD to notify the control room if the test is still in progress within 30 minutes of the MOST.

Psychometric Imbalance
Cueing or Improper Counterbalance in multi-part answers

Unit 1 is at 100% power with the following conditions:

At 10:00:

- PT-950, CTMT PRESS, has failed **HIGH**.
- The appropriate Tech Spec actions of T.S. 3.3.2, Engineered Safety Feature Actuation System (ESFAS) Instrumentation, have been completed.
- SPRAY ACTUATION BYPASS CH I TEST light is illuminated on the BYPASS & PERMISSVE panel.

At 10:30:

- PT-953, CTMT PRESS, fails **HIGH**.

Which one of the following automatic actuations, if any, will occur?

A. Safety Injection
B. **No automatic actuations**
C. Safety Injection and MSIV isolation
D. Safety Injection, MSIV isolation, Phase B and Ctmt Spray actuation

Making Distracters More Plausible

Distracter Analysis

Which one of the following is the greatest hockey player of all time?

A. Wayne Gretzky
B. Sidney Crosby
C. Bobby Orr
D. Alex Ovenchkin

Making Distracters More Plausible

During a small break LOCA with a resultant loss of subcooling margin, why are the reactor coolant pumps (RCPs) secured?

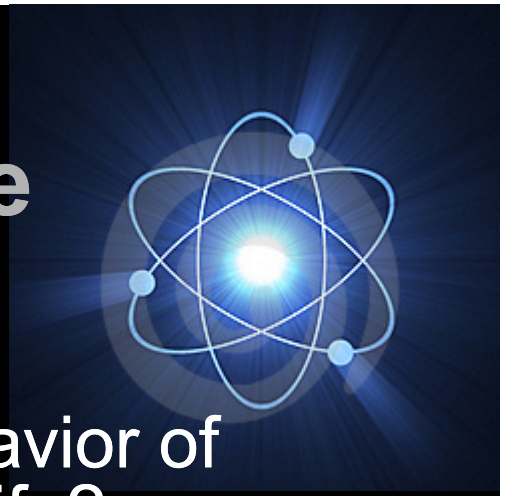
A. to prevent pump damage resulting from operation under two-phase conditions

B. to prevent core damage resulting from rapid phase separation upon subsequent loss of RCS flow

C. to reduce RCS pressure by removing the pressure head developed by the RCPs

D. to remove heat being added to the RCS by the operating RCPs

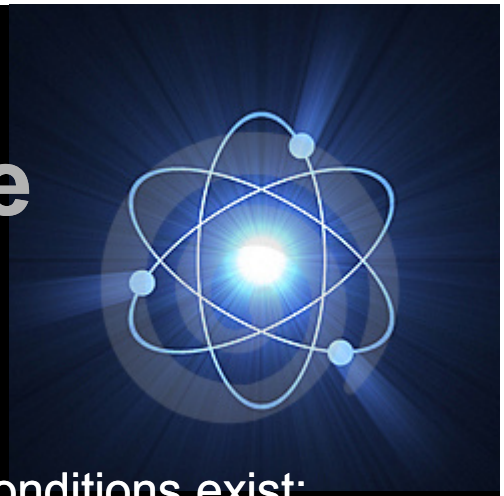
Making Distracters More Plausible



Which of the following describes the behavior of equilibrium xenon reactivity over core life?

A. It decreases because of the increased fuel burnup.
B. It decreases because of the decrease in plutonium-xenon yield.
C. It increases because of the increased thermal flux.
D. **It increases because of the decrease in boron concentration**.

Making Distracters More Plausible

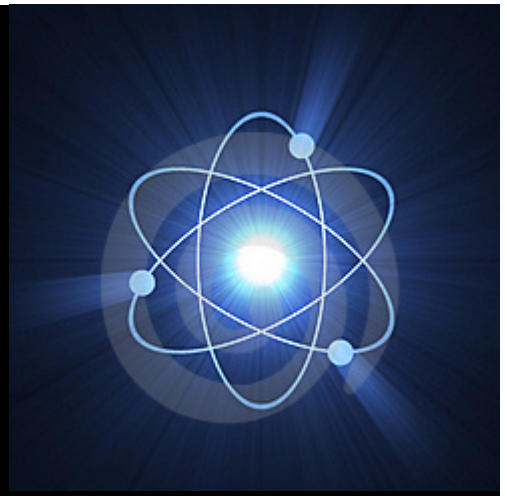


Preparations are being made for refueling and the following conditions exist:

- The refueling cavity is filled with the transfer tube gate valve open.
- The SFP LO LEVEL and CTMT SUMP LEVEL HIGH annunciators are in alarm.

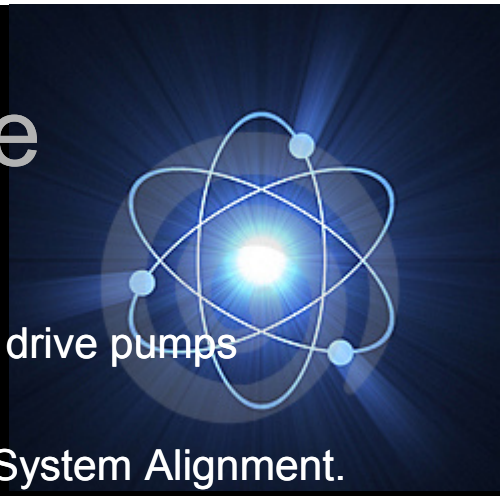
Which ONE of the following is the required Operator action in response to these conditions?

A. *Verify alarms by checking the containment sump level recorder and spent fuel level indication.*
B. **Sound the containment evacuation alarm**.
C. Initiate containment ventilation isolation.
D. Initiate control room ventilation isolation.



Examples of Repaired Multiple Choice Questions

One of Two taken twice



Westinghouse: System 061 Auxiliary/Emergency Feedwater

K2.02 Knowledge of bus power supply to the following: AFW electric drive pumps

- The plant is operating at 100% power with all systems in Normal System Alignment.
- EDG #1 is on clearance for a lube oil change-out AND maintenance has just removed all lube oil from the crankcase.
- An inadvertent reactor trip occurs COINCIDENT with a loss of offsite power.
- All SG levels "Shrink" to 10% NR as a result of the trip
- All systems function as design

Based on these conditions:

- Which motor driven auxiliary feed pump will be running AND which electrical bus will be providing the power to the pump?

A. "A" AFW pump powered from 480V Bus 8N
B. "A" AFW pump powered from 4KV Bus 2AE
C. "B" AFW pump powered from 480V Bus 9P
D. **"B" AFW pump powered from 4KV Bus 2DF**

Improved Question

- The plant is operating at **25**% power with all systems in NSA.
- EDG #1 is on clearance for a lube oil change-out AND maintenance has just removed all lube oil from the crankcase.
- An inadvertent reactor trip occurs COINCIDENT with a loss of offsite power.
- All SG levels “Shrink” to **25**% NR as a result of the trip
- All systems function as design
- No operator actions have occurred

Based on these conditions:

Which auxiliary feed pump(**s**) will be running ?

A. NO AFW pumps
B. ALL AFW pumps
C. ONLY the “B” AFW pump
D. BOTH the Steam Driven AFW pump AND “B” AFW pump

One of Two taken twice

GE BWR-4: Refueling Accidents

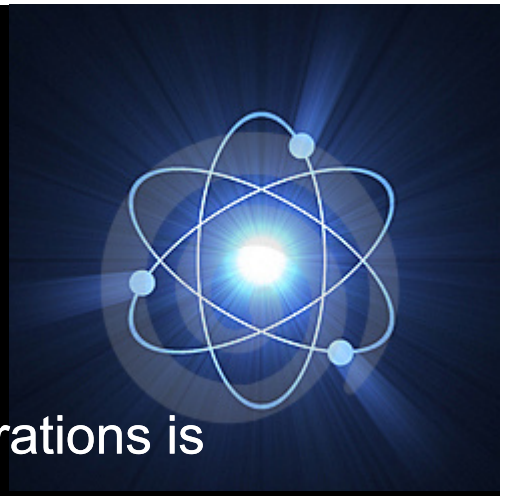
AK1.01 – Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS: Radiation Accidents

With the plant in MODE 5, **REFUELING**

Which **ONE** of the following is the **MINIMUM** acceptable Water Level above the Reactor Vessel Flange, **AND** the reason for that limit?

A. **20.5 feet provides adequate Iodine absorption following an accident.**
B. 20.5 feet provides adequate shielding of personnel during core alterations.
C. *26.5 feet* provides adequate Iodine absorption following an accident.
D. *26.5 feet provides* adequate shielding of personnel during core alterations

Improved Question



With the plant in MODE 5, REFUELING, with Core Alterations is progress.

Which **ONE** of the following is the **MINIMUM** acceptable Water Level above the Reactor Vessel Flange, and the reason for that limit?

A. **20.5 feet provides adequate Iodine absorption following an accident.**
B. 20.5 feet provides adequate shielding of personnel during core alterations.
C. 22.0 feet provides adequate Iodine absorption following an accident.
D. 22.0 feet provides adequate shielding of personnel during core alterations.

The following are examples Actual Questions with Plausible Questions with Miss Rates

Example 1
Actual Questions with Plausible Distracters and Miss Rates

RO, B&W
KA
SYS026
A2.04
KA description
Ability to (a) predict the impacts of the failure of spray pump(s) or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations (CFR: 41.5 / 43.5 /45.3 / 45.13)

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%

Current conditions:

- Large Break LOCA occurs
- 1A RBS pump did NOT start

1) The RB Spray system _(1)_ perform its safety function.

1) EOP Enclosure 5.1 (ES Actuation) directs the RO to _(2)_.

Which ONE of the following completes the statements above?

A. 1. can
2. immediately start the 1A RBS pump

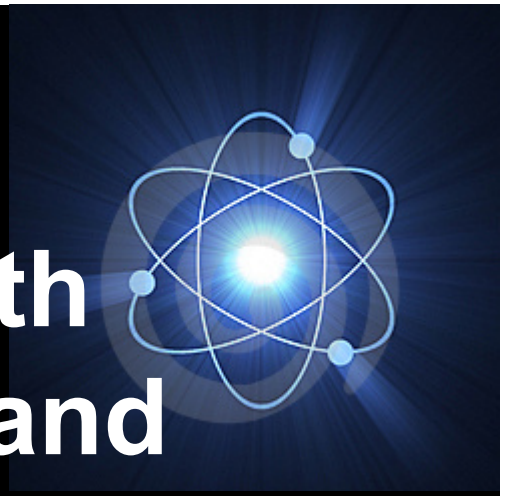
B. 1. can
2. notify the SRO to evaluate starting the 1A RBS Pump

C. 1. can NOT
2. immediately start the 1A RBS pump

D. 1. can NOT
2. notify the SRO to evaluate starting the 1A RBS pump

B is correct
1 picked Distracter A
1 Picked Distracter D

Example 2
Actual Questions with Plausible Distracters and Miss Rates



RO, B&W
KA
SYS073
A2.02
KA description
Ability to (a) predict the impacts of detector failure or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations (CFR:41.5 / 43.5 / 45.3 / 45.13)

Given the following Unit 1 conditions:

Initial conditions:

- Reactor power = 100%
- 1A GWD tank release in progress
- 1RIA-38 OOS

Current conditions:

- Loss of power to RM-80 skid of 1RIA-37
- 1SA8/B9 RM PROCESS MONITOR RADIATION HIGH in alarm
- 1SA8/B10 RM PROCESS MONITOR FAULT in alarm

1GWD-4 (A GWD TANK DISCHARGE) will __(1)__.

The GWD tank release may __(2)__ in accordance with OP/1-2/A/1104/018 (GWD System).

Which ONE of the following completes the statements above?

A. 1. remain open
   2. continue as long as 1RIA-37 is re-energized within one hour

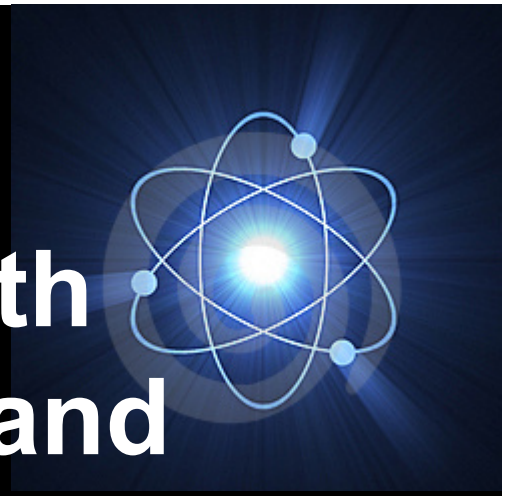
B. 1. automatically close
   2. be re-initiated as long as 1RIA-37 is re-energized within one hour

C. 1. remain open
   2. continue as long as two independent samples agree prior to restarting the release

D. 1. automatically close
   2. be re-initiated as long as two independent samples agree prior to restarting the release

D is correct
1 picked Distracter B
1 picked Distracter C

Example 3
Actual Questions with Plausible Distracters and Miss Rates



RO, W
KA
SYS033
A1.02
KA description
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Spent Fuel Pool Cooling System operating the controls including radiation monitoring systems (CFR: 41.5 / 45.5)

Given the following events and conditions associated with the Unit 1 SFP:

- A Lo-Lo alarm is received for OAC point M1A0004 (SFP Level)
- The operators read (-)2.1 ft SFP level and steady on the main control board
- The operating KF pump has tripped
- An NEO reports a large leak in the auxiliary building but the leak has now slowed to a trickle

For the event described above, the leak must be associated with the KF pump ___(1)___ piping and ___(2)___ would be utilized to monitor increasing radiation levels associated with the loss of SFP level.

Which ONE (1) of the following completes the statement above?

A. 1. discharge
2. 1EMF-42 (U-1 Spent Fuel Bldg Vent)

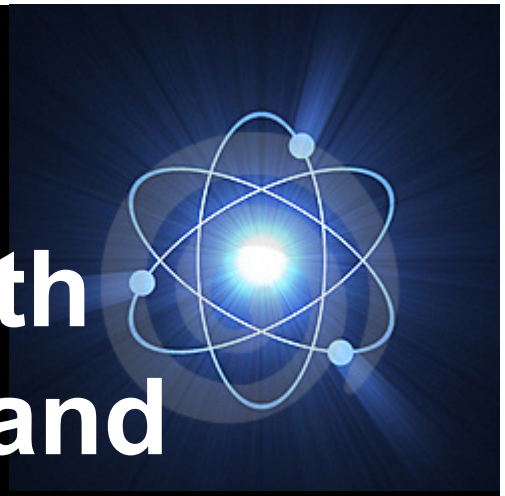
B. 1. discharge
2. 1EMF-17 (Spent Fuel Bldg Refuel Brdg)

C. 1. suction
2. 1EMF-42 (U-1 Spent Fuel Bldg Vent)

D. 1. suction
2. 1EMF-17 (Spent Fuel Bldg Refuel Brdg)

B is correct
5 picked Distracter A
1 picked Distracter C
5 picked Distracter D

Example 4
Actual Questions with Plausible Distracters and Miss Rates



RO, W
KA
APE024
AK2.04
KA description
Knowledge of the interrelations between Emergency Boration and the Pumps (CFR 41.7/45.7)

Given the following conditions on Unit 1:

* An ATWS has occurred
* The crew has entered FR-S.1 (Response to Nuclear Generation/ATWS)
* During the initiation of emergency boration, the following indications are noted:

- Charging Flow = 47 GPM
- Letdown Flow = 75 GPM
- NC system pressure is 2300 PSIG
- 1A NV pump is ON with suction aligned to the VCT
- 1A and 1B BAT pumps are ON
- 1NV-265B (Boric Acid To NV Pumps) is open
- 1NV-244A (Chrg Line Cont Isol) is open
- 1NV-245B (Chrg Line Cont Isol) is open

In accordance with FR-S.1, the MINIMUM required emergency boration flow is __(1)___ and if that flow is NOT met the Operator will ___(2)___ .

Which ONE (1) of the following completes the statement above?

A. 1. 30 GPM
   2. increase charging flow

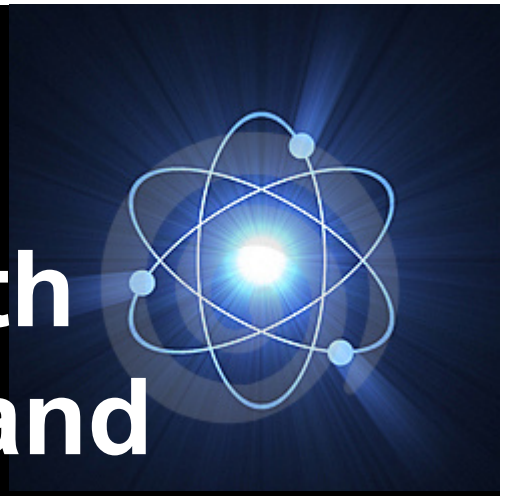
B. 1. 60 GPM
   2. increase charging flow

C. 1. 30 GPM
   2. align the NV pump suction to the FWST

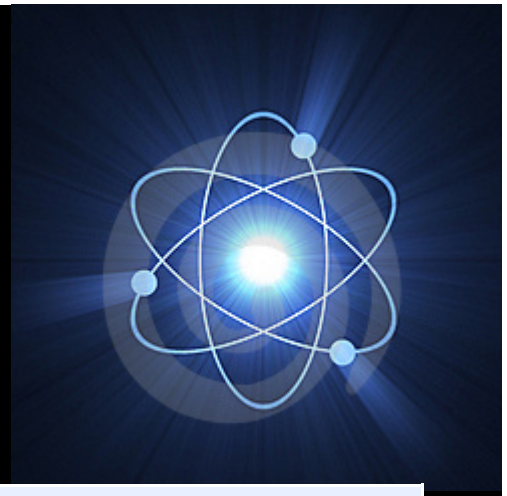
D. 1. 60 GPM
   2. align the NV pump suction to the FWST

C is correct
2 picked Distracter A
4 picked Distracter B
2 picked Distracter D

Example 5
Actual Questions with Plausible Distracters and Miss Rates



RO, W
KA
APE033
AA1.03
KA description
Ability to operate and / or monitor Manual restoration of power as it applies to the Loss of Intermediate Range Nuclear Instrumentation (CFR 41.7 / 45.5 / 45.6)



Given the following conditions on Unit 1:

- Unit is currently at 35% RTP
- A unit shutdown is in progress
- Intermediate Range Channel N35 fails
- N35 Level Trip Bypass switch has been placed in “BYPASS” in accordance
- with AP-16 (Malfunction of Nuclear Instrumentation)
- N35 Instrument Power fuses and Control Power fuses have been removed for Troubleshooting

Which ONE (1) of the following describes the actions required to prevent a Reactor Trip and the MINIMUM power level at which those actions must be performed if the unit shutdown is continued?

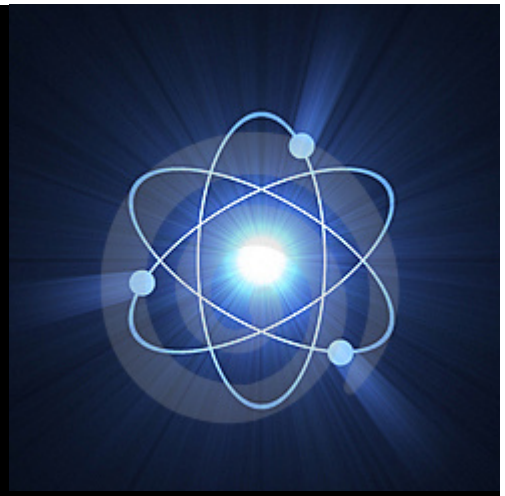
A. N35 Control Power fuses ONLY must be installed or a Reactor Trip will occur when power decreases to less than 10% RTP.

B. N35 Control Power fuses ONLY must be installed or a Reactor Trip will occur when power decreases to less than 25% RTP.

C. N35 Control Power fuses AND Instrument Power fuses must be installed or a Reactor Trip will occur when power decreases to less than 10% RTP.

D. N35 Control Power fuses AND Instrument Power fuses must be installed or a Reactor Trip will occur when power decreases to less than 25% RTP.

A is correct
3 picked Distracter B
3 picked Distracter C
2 picked Distracter D



Questions