科目： 192006
知能類：K1.01 [2.5/2.6]
序號： P58

Fission products that have large microscopic cross sections for capture of thermal neutrons are called...

A. breeder fuels.

B. burnable poisons.

C. fissionable fuels.

D. reactor poisons.

ANSWER: D.

分裂產物若具有龐大微觀截面以捕捉熱中子，則稱為……

A. 滋生燃料(breeder fuel)

B. 可燃性毒物

C. 可分裂燃料

D. 反應器毒素

答案：D.

科目： 192006
知能類：K1.01 [2.5/2.6]
序號： P858 (B1858)

Fission product poisons can be differentiated from other fission products in that fission product poisons...

A. have a longer half-life.

B. are stronger absorbers of thermal neutrons.

C. are produced in a larger percentage of fissions.

D. have a higher fission cross section for thermal neutrons.

ANSWER: B.

分裂產物毒素能與其它分裂產物區別，係因為分裂產物毒素……

A. 半衰期較長。

B. 是較強的熱中子吸收體。

C. 在較大的分裂百分率下產生。

D. 有較高的熱中子分裂截面。

答案：B.

科目： 192006
知能類：K1.01 [2.5/2.6]
序號： P2058 (B2061)

A fission product poison can be differentiated from all other fission products in that a fission product poison...

A. will be produced in direct proportion to the fission rate in the core.

B. will remain radioactive for thousands of years after the final reactor criticality.

C. will depress the power production in some core locations and cause peaking in others.

D. will migrate out of the fuel pellets and into the reactor coolant via pinhole defects in the clad.

ANSWER: C.

分裂產物毒素能與所有其它分裂產物區別，係因為分裂產物毒素……

A. 其生成與爐心分裂率成正比。

B. 在最終反應器臨界後數千年，仍能維持放射性。

C. 在某些爐心位置會抑制功率，在其它位置會導致尖峰功率。

D. 從燃料丸散逸出來，並穿透護套上的針孔缺陷，進入反應器冷卻水。

答案：C.

科目： 192006
知能類：K1.01 [2.5/2.6]
序號： P2158

A fission product poison can be differentiated from all other fission products in that a fission product poison...

A. will be radioactive for thousands of years.

B. is produced in a relatively large percentage of thermal fissions.

C. has a relatively high probability of absorbing a fission neutron.

D. is formed as a gas and is contained within the fuel pellets and fuel rods.

ANSWER: C.

分裂產物毒素不同於其它分裂產物的原因，在於分裂產物毒素……

A. 歷經數千年仍具放射性。

B. 在相對較高的熱分裂百分比下生成。

C. 分裂中子吸收率相對較高。

D. 以氣態生成，而存於燃料丸與燃料棒內。

答案：C.

科目： 192006
知能類：K1.01 [2.5/2.6]
序號： P2858 (B1558)

A fission product poison can be differentiated from all other fission products because a fission product poison...

A. has a higher microscopic cross section for thermal neutron capture.

B. has a longer half-life.

C. is produced in a greater percentage of thermal fissions.

D. is formed as a gas and is contained in the fuel pellets.

ANSWER: A.

分裂產物毒素能與所有其它分裂產物區別，係因為分裂產物毒素……

A. 有較高之熱中子捕獲微觀截面。

B. 半衰期較長。

C. 在較大的熱分裂百分率下所產生。

D. 形成為氣體，而存於燃料丸內。

答案：A.

科目： 192006
知能類：K1.02 [3.0/1.1]
序號： P658

Xenon-135 is considered a major fission product poison because it has a large...

A. fission cross section.

B. absorption cross section.

C. elastic scatter cross section.

D. inelastic scatter cross section.

ANSWER: B.

一般認為 Xe-135 是主要的分裂產物毒素，原因在於……

A. 擁有較大的分裂截面。

B. 擁有較大的吸收截面。

C. 擁有較大的彈性散射(elastic scatter)截面。

D. 擁有較大的非彈性散射(inelastic scatter)截面。

答案：B.

科目： 192006
知能類：K1.02 [3.0/1.1]
序號： P1858 (B1058)

Which one of the following is a characteristic of xenon-135 in a nuclear reactor core?

A. Xenon-135 is produced from the radioactive decay of barium-135.

B. Xenon-135 is primarily a resonance absorber of epithermal neutrons.

C. Thermal neutron flux level affects both the production and removal of xenon-135.

D. Thermal neutrons interact with xenon-135 primarily through scattering reactions.

ANSWER: C.

下列何者是反應器爐心中Xe-135的特性？

A. Xe-135是Ba-135的放射衰變所產生。

B. Xe-135是超熱中子的主要共振吸收物。

C. 熱中子通率位階對Xe-135的產生與移除均會造成影響。

D. 熱中子與Xe-135的交互作用主要是散射反應。

答案：C.

科目： 192006
知能類：K1.02 [3.0/1.1]
序號： P2458 (B1658)

Which one of the following exhibits the greatest microscopic cross section for absorption of a thermal neutron in an operating nuclear reactor core?

A. Uranium-235

B. Boron-10

C. Samarium-149

D. Xenon-135

ANSWER: D.

對於運轉中核子反應器爐心的熱中子吸收，下列何者具有最大微觀截面？

A. U-235

B. B-10

C. Sm-149

D. Xe-135

答案：D.

科目： 192006
知能類：K1.02 [3.0/1.1]
序號： P2658 (B256)

Compared to other poisons in the core, the two characteristics that cause Xe-135 to be a major reactor poison are its relatively _____ absorption cross section and its relatively _____ variation in concentration for large reactor power changes.

A. small; large

B. small; small

C. large; small

D. large; large

ANSWER: D.

相較於爐心中的其它毒素，使Xe-135成為反應器主要毒素的兩項特性，一是它擁有較_____的吸收截面，二是反應器功率發生大變化時，它會產生較_____的濃度變動。

A. 小；大

B. 小；小

C. 大；小

D. 大；大

答案：D.

科目： 192006
知能類：K1.03 [2.7/2.8]
序號： P59

Immediately after a reactor trip from sustained high power operation, xenon-135 concentration in the nuclear reactor will...

A. increase due to the decay of iodine already in the core.

B. decrease because xenon is produced directly from fission.

C. remain the same because the decay of iodine and xenon balance each other out.

D. decrease initially, then slowly increase due to the differences in the half-lives of iodine and xenon.

ANSWER: A.

原以高功率持續運轉的核子反應器發生急停，請問該反應器的 Xe-135 濃度，在急停後隨即……

A. 增加，因為爐內既有的碘發生衰變。

B. 降低，因為氙毒從分裂直接生成。

C. 維持不變，因為碘衰變與氙毒彼此均衡抵銷。

D. 起初降低，然後由於碘與氙的半衰期差異而緩慢增加。

答案：A.

科目： 192006
知能類：K1.03 [2.7/2.8]
序號： P358 (B362)

Xenon-135 is produced in a nuclear reactor by two primary methods. One is directly from fission, the other is from the decay of...

A. cesium-135.

B. iodine-135.

C. xenon-136.

D. iodine-136.

ANSWER: B.

核子反應器有兩種方式可產生Xe-135，一是直接來自於分裂反應，一是下列何者的衰變所致？

A. Cs-135

B. I-135

C. Xe-136

D. I-136

答案：B.

科目： 192006
知能類：K1.03 [2.7/2.8]
序號： P1359 (B458)

A nuclear reactor has been operating at full power for several weeks. Xenon-135 is being directly produced as a fission product in approximately _____% of all fissions.

A. 0.3

B. 3.0

C. 30

D. 100

ANSWER: A.

一部核子反應器於全功率下運轉數週。從分裂直接生成的Xe-135，約佔總分裂的_____%。

A. 0.3

B. 3.0

C. 30

D. 100

答案：A.

科目： 192006
知能類：K1.03 [2.7/2.8]
序號： P1559 (B859)

Which one of the following lists the production mechanisms of Xe-135 in an operating power reactor?

A. Primarily from fission, secondarily from iodine decay

B. Primarily from fission, secondarily from promethium decay

C. Primarily from iodine decay, secondarily from fission

D. Primarily from promethium decay, secondarily from fission

ANSWER: C.

下列何者為運轉中功率反應器的Xe-135產生機制？

A. 主要來自分裂，其次來自碘衰變。

B. 主要來自分裂，其次來自鉕(Pm)衰變。

C. 主要來自碘衰變，其次來自分裂。

D. 主要來自鉕衰變，其次來自分裂。

答案：C.

科目： 192006
知能類：K1.03 [2.7/2.8]
序號： P1859 (B257)

The major contributor to the production of Xe-135 in a nuclear reactor that has been operating at full power for two weeks is...

A. the radioactive decay of I-135.

B. the radioactive decay of Cs-135.

C. direct production from fission of U-235.

D. direct production from fission of U-238.

ANSWER: A.

在全功率下運轉兩週的核子反應器，其Xe-135的主要產生來源為……

A. I-135的放射衰變。

B. Cs-135的放射衰變。

C. 由U-235分裂直接生成。

D. 由U-238分裂直接生成。

答案：A.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P60

Following a reactor trip from sustained power operation, the xenon-135 removal process consists primarily of...

A. beta decay.

B. gamma decay.

C. electron capture.

D. gamma capture.

ANSWER: A.

以固定功率運轉的反應器急停後，Xe-135 的移除過程主要由下列何者構成？

A. 貝他衰變

B. 伽瑪衰變

C. 電子捕獲

D. 伽瑪捕捉

答案：A.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P460 (B462)

Reactor power is increased from 50% to 60% in 1 hour. The most significant contributor to the initial change in core xenon reactivity is the increase in xenon...

A. production from fission.

B. decay to cesium.

C. absorption of neutrons.

D. production from iodine decay.

ANSWER: C.

反應器功率在1小時內從50%增至60%。爐心氙反應度的最初變化，主要源自增加的氙……

A. 從分裂反應產生。

B. 衰變成銫而產生。

C. 吸收中子而產生。

D. 從碘衰變產生。

答案：C.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P859

In a shut down nuclear reactor, which decay chain describes the primary means of removing xenon-135?

A. Xe-135 $\xrightarrow{\beta^+}$ Cs-135

B. Xe -135 $\xrightarrow{n}$ Xe-134

C. Xe -135 $\xrightarrow{\alpha}$ Te-131

D. Xe -135 $\xrightarrow{\beta+}$ I-135

ANSWER: A.

在一停機的核子反應器中，下列哪項衰變鏈描述了移除 Xe-135 的主要途徑？

A. Xe -135 $\xrightarrow{\beta^+}$ Cs-135

B. Xe -135 $\xrightarrow{n}$ Xe-134

C. Xe -135 $\xrightarrow{\alpha}$ Te-131

D. Xe -135 $\xrightarrow{\beta+}$ I-135

答案：A.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P1059 (B359)

Xenon-135 undergoes radioactive decay to...

A. iodine-135.

B. cesium-135.

C. tellurium-135.

D. lanthanum-135.

ANSWER: B.

Xe-135進行放射衰變而成為……

A. I-135

B. Cs-135

C. Te-135(碲)

D. La-135(鑭)

答案：B.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P2558 (B2558)

Nuclear reactors A and B are operating at steady-state 100% power with equilibrium core Xe135. The reactors are identical except that reactor A is operating at the end of core life (EOL) and reactor B is operating at the beginning of core life (BOL).

Which reactor core has the greater concentration of Xe-135?

A. Reactor A (EOL) due to the smaller 100% power thermal neutron flux.

B. Reactor A (EOL) due to the larger 100% power thermal neutron flux.

C. Reactor B (BOL) due to the smaller 100% power thermal neutron flux.

D. Reactor B (BOL) due to the larger 100% power thermal neutron flux.

ANSWER: C.

核子反應器A與B以100%穩態功率運轉，爐心內的Xe-135已達到平衡。兩部反應器完全相同，唯反應器A在爐心壽命末期(EOL)，而反應器B在爐心壽命初期(BOL)。

下列哪部反應器爐心有較大的Xe-135濃度？

A. 反應器A(EOL)，因為其100%功率之熱中子通率較小。

B. 反應器A(EOL)，因為其100%功率之熱中子通率較大。

C. 反應器B(BOL)，因為其100％功率之熱中子通率較小。

D. 反應器B(BOL)，因為其100％功率之熱中子通率較大。

答案：C.

科目： 192006
知能類：K1.04 [2.8/2.8]
序號： P2659 (B3358)

A nuclear power plant has been operating at 100% power for several months. Which one of the following describes the relative contributions of beta decay and neutron capture to Xe-135 removal from the reactor core?

A. Primary - neutron capture; secondary - beta decay.

B. Primary - beta decay; secondary - neutron capture.

C. Beta decay and neutron capture contribute equally.

D. Not enough information is given to make a comparison.

ANSWER: A.

核能電廠在100%功率下運轉數月。下列何者正確描述了貝他衰變與中子捕獲，對於從反應器爐心移除Xe-135的相關貢獻程度？

A. 主要 - 中子捕獲；次要 - 貝他衰變。

B. 主要 - 貝他衰變；次要 - 中子捕獲。

C. 貝他衰變與中子捕獲的貢獻相同。

D. 資訊不足無法比較。

答案：A.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P61 (B58)

A nuclear reactor has been operating at 50% power for one week when power is ramped in 4 hours to 100% power. Which one of the following describes the new equilibrium xenon concentration?

A. The new equilibrium xenon value will be twice the 50% value.

B. The new equilibrium xenon value will be less than twice the 50% value.

C. The new equilibrium xenon value will be more than twice the 50% value.

D. The new equilibrium xenon value will remain the same because it is independent of power.

ANSWER: B.

一部核子反應器在50%功率下運轉一週，此時在4小時內提升至100%功率。下列何者正確描述了新的氙毒平衡濃度？

A. 等於50%時的兩倍。

B. 小於50%時的兩倍。

C. 大於50%時的兩倍。

D. 維持不變，因為與功率無關。

答案：B.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P660 (B658)

A nuclear reactor has been operating at 100% power for one week when power is ramped in 4 hours to 50%. Which one of the following describes the new equilibrium core xenon-135 concentration?

A. Remains the same because it is independent of power

B. More than one-half the 100% value

C. Less than one-half the 100% value

D. One-half the 100% value

ANSWER: B.

一部核子反應器在100%功率下運轉一週，此時功率在4小時內減至50%。下列何者正確描述了新的Xe-135平衡濃度？

A. 維持不變，因為與功率無關。

B. 大於100%時的一半。

C. 小於100%時的一半。

D. 等於100%時的一半。

答案：B.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P1158 (B1160)

A nuclear reactor has been operating at 25% power for 24 hours following a 2-hour power reduction from steady-state full power. Which one of the following describes the current status of core xenon-135 concentration?

A. At equilibrium

B. Decreasing toward an upturn

C. Decreasing toward an equilibrium value

D. Increasing toward a peak value

ANSWER: C.

一部核子反應器從穩態全功率經過2小時的降載後，以25%功率運轉24小時。下列何者正確描述了目前爐心的Xe-135濃度？

A. 處於平衡。

B. 朝向谷值減小。

C. 朝向一平衡值減小。

D. 朝向一峰值增加。

答案：C.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P1459 (B259)

Following a two-week shutdown, a nuclear reactor is taken critical and ramped to full power in 6 hours. How long will it take to achieve an equilibrium xenon condition after the reactor reaches full power?

A. 70 to 80 hours

B. 40 to 50 hours

C. 8 to 10 hours

D. 1 to 2 hours

ANSWER: B.

一部核子反應器於停機兩週後達到臨界，並在6小時內提升至全功率。該反應器到達全功率後，需要多少時間才能達到氙毒平衡狀態？

A. 70到80小時

B. 40到50小時

C. 8到10小時

D. 1到2小時

答案：B.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P2159 (B2659)

Which one of the following indicates that core Xe-135 is in equilibrium?

A. Xe-135 production and removal rates are momentarily equal five hours after a power increase.

B. A reactor has been operated at 80% power for five days.

C. Xe-135 is being produced equally by fission and I-135 decay.

D. A reactor is currently operating at 100% power.

ANSWER: B.

下列何者指出爐心的Xe-135處於平衡狀態？

A. 功率增加後5小時，Xe-135的產生與移除率暫時相等。

B. 反應器在80%功率下運轉五天。

C. 由分裂產生的Xe-135與I-135衰變之數量相等。

D. 反應器目前在100%功率下運轉。

答案：B.

科目： 192006
知能類：K1.05 [3.1/3.1]
序號： P2859 (B2760)

Nuclear reactors A and B are operating at steady-state 100% power with equilibrium core Xe-135. The reactors are identical except that reactor A is operating near the end of core life and reactor B is operating near the beginning of core life.

Which reactor is experiencing the most negative reactivity from equilibrium core Xe-135?

A. Reactor A due to a greater concentration of equilibrium core Xe-135.

B. Reactor A due to lower competition from the fuel for thermal neutrons.

C. Reactor B due to a greater thermal neutron flux in the core.

D. Reactor B due to a smaller accumulation of stable fission product poisons.

ANSWER: B.

核子反應器A與B在100%穩態功率下運轉，爐心的Xe-135已達到平衡。兩部反應器完全相同，唯反應器A接近爐心壽命末期，而反應器B接近爐心壽命初期。

下列哪部反應器基於Xe-135平衡濃度而造成最大的負反應度？

A. 反應器A，因為爐心Xe-135的平衡濃度較大。

B. 反應器A，因為燃料對熱中子的利用較低。

C. 反應器B，因為爐心的熱中子通率較大。

D. 反應器B，因為穩定分裂產物毒素的累積量較小。

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P259

A nuclear reactor has been operating at 50% power for one week when power is quickly ramped (over 4 hours) to 100%. How will the xenon-135 concentration in the core respond?

A. Decrease initially, then build to a new equilibrium concentration in 8 to 10 hours

B. Increase steadily to a new equilibrium concentration in 20 to 30 hours

C. Decrease initially, then build to a new equilibrium concentration in 40 to 50 hours

D. Increase steadily to a new equilibrium concentration in 70 to 80 hours

ANSWER: C.

一部核子反應器以 50%功率運轉一週，此時，功率(於 4 小時內)迅速攀升至 100%。爐心的 Xe-135 濃度對此將如何反應？

A. 先降低，再於 8 至 10 小時內建立新的平衡濃度。

B. 持續增加，並於 20 至 30 小時內增至新的平衡濃度。

C. 先降低，再於 40 至 50 小時內建立新的平衡濃度。

D. 持續增加，並於 70 至 80 小時內增至新的平衡濃度。

答案：C.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P659

A nuclear reactor has been operating at a steady-state power level for 15 hours following a rapid power reduction from 100% to 50% using boration for reactivity control. Which one of the following describes the current core xenon concentration?

A. Increasing

B. Decreasing

C. At equilibrium

D. Oscillating

ANSWER: B.

一部核子反應器加入硼酸以控制反應度，讓功率從 100%迅速降至 50%後，以穩態功率運轉 15 小時。下列何者說明了爐心目前的氙毒濃度？

A. 增加中

B. 降低中

C. 處於平衡

D. 來回振盪

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P959

A nuclear reactor was operating for 42 weeks at a stable reduced power level when a reactor trip occurred. The reactor was returned to critical after 12 hours and then ramped to 60% power in 6 hours.

How much time at steady state 60% power will be required to reach equilibrium xenon?

A. 20 to 30 hours

B. 40 to 50 hours

C. 70 to 80 hours

D. Unable to determine without knowledge of previous power history

ANSWER: B.

一部核子反應器以較低功率穩態運轉 42 週，此時發生急停。該反應器在 12 小時後恢復臨界，其功率在 6 小時內攀升至 60%。

請問該反應器將以 60%穩態功率運轉多久，才能讓氙毒達到平衡？

A. 20 至 30 小時

B. 40 至 50 小時

C. 70 至 80 小時

D. 缺乏先前的功率資料而無從判斷。

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P1258

A nuclear reactor has been operating at 100% power for one week when power is ramped in 4 hours to 25% power. The new equilibrium core xenon-135 level will be _____ the initial 100% equilibrium value.

A. the same as

B. about 80% of

C. about 50% of

D. less than 25% of

ANSWER: C.

一部核子反應器以 100%功率運轉一週，其功率於 4 小時內降至 25%。爐心 Xe-135 的新平衡濃度，相較於原先在 100%功率時的平衡值……

A. 兩者相同。

B. 前者約為後者的 80%。

C. 前者約為後者的 50%。

D. 前者低於後者的 25%。

答案：C.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P1360 (B1960)

A nuclear reactor has been operating at a steady-state power level for 15 hours following a rapid power reduction from 100% to 50%. Which one of the following describes the current core xenon concentration?

A. Increasing toward a peak

B. Decreasing toward an upturn

C. Increasing toward equilibrium

D. Decreasing toward equilibrium

ANSWER: D.

一部核子反應器從100%功率快速降至50%後，以穩態功率運轉15小時。下列何者正確描述了爐心目前的氙毒濃度？

A. 朝向峰值增加。

B. 朝向谷值(upturn)減小。

C. 朝平衡方向增加。

D. 朝平衡方向減小。

答案：D.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P1659

A nuclear reactor was operating for 24 weeks at a constant power level when a reactor trip occurred. The reactor was returned to critical after 12 hours and then ramped to 80% power in 6 hours.

Approximately how much time at steady state 80% power will be required to reach equilibrium core xenon-135?

A. 10 to 20 hours

B. 40 to 50 hours

C. 70 to 80 hours

D. Cannot determine without knowledge of previous power history

ANSWER: B.

一部核子反應器以固定功率運轉 24 週，此時發生急停。該反應器於 12 小時後恢復臨界，功率於 6 小時內攀升至 80%。

該反應器約以 80%穩態功率運轉多久，才能讓爐心的 Xe-135 達到平衡？

A. 10 至 20 小時

B. 40 至 50 小時

C. 70 至 80 小時

D. 缺乏之前的功率資料而無從判斷。

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P1960 (B1262)

A nuclear reactor has been operating at 100% power for two weeks when power is decreased to 10% in 1 hour. Immediately following the power decrease, core xenon-135 concentration will _____ for a period of _____.

A. decrease; 4 to 6 hours

B. increase; 4 to 6 hours

C. decrease; 8 to 11 hours

D. increase; 8 to 11 hours

ANSWER: D.

一部核子反應器在100%功率下運轉兩週，在1小時內降低至10%功率。緊接著功率下降後，爐心Xe-135的濃度將_____並持續_____。

A. 降低；4至6小時

B. 增加；4至6小時

C. 降低；8至11小時

D. 增加；8至11小時

答案：D.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2060

A nuclear reactor is initially operating at 50% of rated power with equilibrium core xenon-135. Power is increased to 100% over a one hour period and average reactor coolant temperature is adjusted to 588°F using manual rod control. Rod control is left in manual and no subsequent operator actions are taken.

Considering only the reactivity effects of core xenon-135 changes, which one of the following describes the average reactor coolant temperature 8 hours after the power change is completed?

A. Greater than 588°F and decreasing slowly

B. Greater than 588°F and increasing slowly

C. Less than 588°F and decreasing slowly

D. Less than 588°F and increasing slowly

ANSWER: A.

一部核子反應器起初以 50%額定功率運轉，爐心 Xe-135 已達到平衡。之後，其功率在 1 小時內增至 100%，並以控制棒手動調整反應器冷卻水平均溫度至 588°F。控制棒維持在手動模式，運轉員沒有採取後續行動。

如果僅考慮爐心 Xe-135 的變化造成的反應度效應，下列何者說明了在功率變化完成 8 小時後，反應器冷卻水平均溫度的狀態？

A. 高於 588°F 且緩慢降低。

B. 高於 588°F 且緩慢上升。

C. 低於 588°F 且緩慢降低。

D. 低於 588°F 且緩慢上升。

答案：A.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2061 (B2063)

A nuclear reactor had been operating at 100% power for two weeks when power was reduced to 10% over a one hour period. In order to maintain plant parameters stable during the next 24 hours, which one of the following incremental control rod manipulations will be required?

A. Withdraw rods slowly during the entire period.

B. Withdraw rods slowly at first, then insert rods slowly.

C. Insert rods slowly during the entire period.

D. Insert rods slowly at first, then withdraw rods slowly.

ANSWER: B.

一部核子反應器以 100%功率運轉兩週，此時，其功率在 1 小時內降至 10%。為了讓電廠參數在往後 24 小時內維持不變，需要以下列何種方式操作控制棒？

A. 在整個期間緩慢抽出控制棒。

B. 先緩慢抽出控制棒，再慢慢插入。

C. 在整個期間緩慢插入控制棒。

D. 先緩慢插入控制棒，再慢慢抽出。

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2160

A nuclear reactor had been operating at 50% power for two weeks when power was increased to 100% over a 3-hour period. In order to maintain reactor power stable during the next 24 hours, which one of the following incremental control rod manipulations will be required?

A. Withdraw rods slowly during the entire period

B. Withdraw rods slowly at first, then insert rods slowly

C. Insert rods slowly during the entire period

D. Insert rods slowly at first, then withdraw rods slowly

ANSWER: D.

一部核子反應器以 50%功率運轉兩週，此時，其功率在 3 小時內增至 100%。為了讓反應器功率在往後 24 小時內維持不變，需要以下列何種方式操作控制棒？

A. 在整個期間緩慢抽出控制棒。

B. 先緩慢抽出控制棒，再慢慢插入。

C. 在整個期間緩慢插入控制棒。

D. 先緩慢插入控制棒，再慢慢抽出。

答案：D.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2359 (B2660)

Which one of the following explains why core Xe-135 oscillations are a concern in a nuclear reactor?

A. They can adversely affect core power distribution and can prevent a reactor startup following a reactor trip.

B. They can adversely affect core power distribution and can require operation below full rated power.

C. They can cause rapid reactor power changes during power operation and can prevent a reactor startup following a reactor trip.

D. They can cause rapid reactor power changes during power operation and can require operation below full rated power.

ANSWER: B.

下列何者能解釋為何在核子反應器中，爐心的Xe-135振盪甚為重要？

A. 它們對爐心功率分佈有不利影響，並在反應器急停後，使反應器難以啟動。

B. 它們對爐心功率分佈有不利影響，並迫使反應器在低於全額定功率下運轉。

C. 它們能導致反應器功率在運轉期間迅速變化，並阻礙反應器於急停後啟動。

D. 它們能導致反應器功率在運轉期間迅速變化，迫使反應器在低於全額定功率下運轉。

答案：B.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2360 (B2361)

A nuclear reactor had been operating at 70% power for two weeks when power was increased to 100% over a 2-hour period. To offset Xe-135 reactivity changes during the next 12 hours, which one of the following incremental control rod manipulations will be required?

A. Withdraw rods slowly during the entire period.

B. Withdraw rods slowly at first, then insert rods slowly.

C. Insert rods slowly during the entire period.

D. Insert rods slowly at first, then withdraw rods slowly.

ANSWER: D.

一部核子反應器於70%功率下運轉兩週，功率在2小時內增加至100%。為了補償爐心Xe-135在之後12小時內的反應度變化，需要以下列何種方式操作控制棒？

A. 在整個階段當中緩慢抽出控制棒。

B. 最初緩慢抽出控制棒，然後緩慢插入控制棒。

C. 在整個階段當中緩慢插入控制棒。

D. 最初緩慢插入控制棒，然後緩慢抽出控制棒。

答案：D.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2559 (B2561)

A nuclear reactor is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 50% over a 2 hour period and average reactor coolant temperature is adjusted to 572°F using manual rod control. Rod control is left in Manual and no subsequent operator actions are taken.

Considering only the reactivity effects of core xenon-135 changes, which one of the following describes the average reactor coolant temperature 10 hours after the power change is completed?

A. Greater than 572°F and decreasing slowly

B. Greater than 572°F and increasing slowly

C. Less than 572°F and decreasing slowly

D. Less than 572°F and increasing slowly

ANSWER: D.

核子反應器起初以100%功率運轉，爐心的Xe-135已達成平衡。功率在2小時內減至50%，並手動操作控制棒將反應器冷卻水平均溫度調整至572°F。已知控制棒仍為手動模式，運轉員沒有採取任何後續動作。

僅考慮爐心內Xe-135改變所產生的反應度效應下，下列何者正確描述了在功率變化完成經10小時後的反應器冷卻水平均溫度？

A. 高於572°F並緩慢降低。

B. 高於572°F並緩慢上升。

C. 低於572°F並緩慢降低。

D. 低於572°F並緩慢上升。

答案：D.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P2760

A nuclear reactor is initially operating at 80% power with equilibrium core xenon-135. Power is increased to 100% over a 2-hour period and average reactor coolant temperature is adjusted to 585°F using manual rod control. Rod control is left in Manual and no subsequent operator actions are taken.

Considering only the reactivity effects of core xenon-135 changes, which one of the following describes the average reactor coolant temperature 24 hours after the power change is completed?

A. Greater than 585°F and decreasing slowly

B. Greater than 585°F and increasing slowly

C. Less than 585°F and decreasing slowly

D. Less than 585°F and increasing slowly

ANSWER: C.

核子反應器起初以80%功率運轉，爐心Xe-135已達成平衡，其功率在2小時內增至100%，並手動操作控制棒將反應器冷卻水平均溫度調整至585°F。已知控制棒仍為手動模式，運轉員沒有採取任何後續動作。

如果僅考慮爐心Xe-135變化而產生的反應度效應，下列何者正確描述了在功率變化完成24小時後，反應器冷卻水平均溫度的狀態？

A. 高於585°F並緩慢降低。

B. 高於585°F並緩慢上升。

C. 低於585°F並緩慢降低。

D. 低於585°F並緩慢上升。

答案：C.

科目： 192006
知能類：K1.06 [3.2/3.4]
序號： P3460

A nuclear reactor is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 40% over a 2 hour period and average reactor coolant temperature is adjusted to 562°F using manual rod control. Rod control is left in Manual and no subsequent operator actions are taken.

If only the reactivity effects of core xenon-135 changes are considered, which one of the following describes the status of the average reactor coolant temperature 2 hours after the power change is completed?

A. Greater than 562°F and decreasing slowly

B. Greater than 562°F and increasing slowly

C. Less than 562°F and decreasing slowly

D. Less than 562°F and increasing slowly

ANSWER: C.

核子反應器起初以100%功率運轉，爐心Xe-135已達成平衡，其功率在2小時內降至40%，並手動操作控制棒將反應器冷卻水平均溫度調整至562°F。已知控制棒仍為手動模式，運轉員沒有採取任何後續動作。

如果僅考慮爐心Xe-135變化而產生的反應度效應，下列何者正確描述了在功率變化完成2小時後，反應器冷卻水平均溫度的狀態？

A. 高於562°F並緩慢降低。

B. 高於562°F並緩慢上升。

C. 低於562°F並緩慢降低。

D. 低於562°F並緩慢上升。

答案：C.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P260 (B459)

Two identical nuclear reactors have been operating at a constant power level for one week. Reactor A is at 50% power and reactor B is at 100% power.

If both reactors trip/scram at the same time, Xe-135 will peak first in reactor _____ and the highest Xe-135 reactivity peak will occur in reactor _____.

A. A; B

B. A; A

C. B; B

D. B; A

ANSWER: A.

兩部相同反應器在固定功率下運轉一週。反應器A在50%功率，而反應器B在100%功率下運轉。

若兩部反應器同時發生急停，反應器_____的Xe-135先達到峰值，而最高的Xe-135反應度峰值將發生在反應器_____。

A. A；B

B. A；A

C. B；B

D. B；A

答案：A.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P1159 (B1761)

Two identical nuclear reactors have been operating at a constant power level for one week. Reactor A is at 100% power and reactor B is at 50% power.

If both reactors trip/scram at the same time, Xe-135 will peak first in reactor _____ and the highest Xe-135 reactivity peak will occur in reactor _____.

A. A; B

B. A; A

C. B; B

D. B; A

ANSWER: D.

兩部相同反應器在固定功率下運轉一週。反應器A在100%功率，反應器B在50%功率下運轉。

若兩部反應器同時發生急停，則反應器_____將先出現Xe-135峰值，而最高的Xe-135反應度峰值將出現在反應器_____。

A. A；B

B. A；A

C. B；B

D. B；A

答案：D.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P1358 (B1361)

A nuclear reactor has been operating at 75% power for two months. A manual reactor trip is required for a test. The trip will be followed immediately by a reactor startup with criticality scheduled to occur 12 hours after the trip.

The greatest assurance that xenon reactivity will permit criticality during the startup will be attained if the reactor is operated at _____ power for 48 hours prior to the trip and if criticality is rescheduled for _____ hours after the trip.

A. 100%; 8

B. 100%; 16

C. 50%; 8

D. 50%; 16

ANSWER: D.

核子反應器在75%功率下運轉兩個月，基於測試之需而以手動方式急停。急停後需要立即啟動反應器，並預計在急停後12小時達到臨界。

若此反應器在急停前於_____功率下運轉48小時，同時再度預定於急停後_____小時臨界，最能確保氙毒反應度不影響反應器在啟動期間達到臨界。

A. 100%；8

B. 100%；16

C. 50%；8

D. 50%；16

答案：D.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P1561 (B1561)

Select the combination below that completes the following statement.

The amount of control rod withdrawal needed to compensate for peak core xenon-135 negative reactivity will be smallest after a reactor scram from equilibrium _____ reactor power at the _____ of core life.

A. 20%; beginning

B. 20%; end

C. 100%; beginning

D. 100%; end

ANSWER: A.

請選出適當選項以完成下列敘述。

核子反應器在爐心壽命_____時，從_____平衡功率發生急停後，為了補償爐心Xe-135峰值的負反應度所需的控制棒抽出量最小。

A. 初期，20%

B. 末期，20%

C. 初期，100%

D. 末期，100%

答案：A.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P1660

Select the combination below that completes the following statement.

The amount of control rod withdrawal needed to compensate for peak core xenon-135 negative reactivity will be greatest after a reactor scram from equilibrium _____ reactor power at the _____ of core life.

A. 20%; beginning

B. 20%; end

C. 100%; beginning

D. 100%; end

ANSWER: D.

請選出適當組合以完成下列敘述。

核子反應器在爐心壽命_____時，從_____平衡功率發生急停後，補償爐心Xe-135峰值的負反應度所需的控制棒抽出量最大。

A. 初期，20%

B. 末期，20%

C. 初期，100%

D. 末期，100%

答案：D.

科目： 192006
知能類：K1.07 [3.4/3.4]
序號： P3860 (B3861)

A nuclear reactor has been operating at 80% power for two months. A manual reactor trip is required for a test. The trip will be followed by a reactor startup with criticality scheduled to occur 24 hours after the trip.

The greatest assurance that xenon reactivity will permit criticality during the reactor startup will be attained if the reactor is operated at _____ power for 48 hours prior to the trip and if criticality is rescheduled for _____ hours after the trip.

A. 60%; 18

B. 60%; 30

C. 100%; 18

D. 100%; 30

ANSWER: B.

核子反應器已在80%功率下運轉兩個月，為了測試之需而以手動方式急停。急停後進行反應器啟動，並預計在急停24小時後達到臨界。

若此反應器在急停前於_____功率下運轉48小時，同時若再度預定於急停後_____小時臨界，最能確保氙毒反應度不影響反應器在啟動期間達到臨界。

A. 60%；18

B. 60%；30

C. 100%；18

D. 100%；30

答案：B.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P62

Slow changes in axial power distribution in a nuclear reactor that has operated at a steady-state power for a long time can be caused by xenon...

A. peaking.

B. override.

C. burnup.

D. oscillation.

ANSWER: D.

一部以穩態功率長期運轉的核子反應器，若其軸向功率分佈出現緩慢變化，這可能是下列何者造成？

A. 氙毒形成峰值(peaking)

B. 氙毒補償(override)

C. 氙毒燃耗

D. 氙毒振盪

答案：D.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P261

Xenon oscillations that tend to dampen themselves toward equilibrium over time are _____ oscillations.

A. converging

B. diverging

C. diffusing

D. equalizing

ANSWER: A.

隨著時間降至平衡點的氙毒振盪，稱為_____振盪。

A. 收斂

B. 發散

C. 擴散

D. 平衡

答案：A.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P372

Which one of the following occurrences can cause reactor power to fluctuate between the top and bottom of the core when steam demand is constant?

A. Steam generator level transients

B. Iodine spiking

C. Xenon oscillations

D. Inadvertent boron dilution

ANSWER: C.

下列何者能在蒸汽需求維持不變時，造成反應器功率於爐心頂部與底部之間波動？

A. 蒸汽產生器水位暫態(level transients)

B. 碘突然增減(iodine spiking)

C. 氙毒振盪

D. 不慎稀釋硼酸

答案：C.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P463 (N/A)

A nuclear reactor has been operating at 100% power for several weeks with a symmetrical axial power distribution that is peaked at the core midplane. Reactor power is reduced to 50% using boration to control reactor coolant temperature while maintaining control rods fully withdrawn.

During the power reduction, the axial power distribution will...

A. shift toward the top of the core.

B. shift toward the bottom of the core.

C. peak at the top and the bottom of the core.

D. remain symmetrical and peaked at the core midplane.

ANSWER: A.

一部核子反應器以 100%功率運轉數週，其軸向功率分佈對稱，並於爐心中間平面達到峰值。加入硼酸以控制反應器冷卻水溫度，藉此將反應器功率降至 50%，同時讓控制棒維持完全抽出狀態。

降低功率時，軸向功率分佈將……

A. 朝爐心頂部移動。

B. 朝爐心底部移動。

C. 於爐心頂部及底部達到峰值。

D. 維持對稱，並於爐心中間平面達到峰值。

答案：A.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P563 (N/A)

A nuclear reactor is operating at 100% power at the beginning of core life with equilibrium core xenon-135. Reactor power is reduced, within a 2 hour period, to 50%. Control rods are maintained fully withdrawn. The following parameter values are given:

	PRIOR TO POWER CHANGE	AFTER POWER CHANGE
Reactor power:	100%	50%
Reactor coolant system boron concentration:	740 ppm	820 ppm
Control rod position:	Fully Withdrawn	Fully Withdrawn

What is the effect on power distribution in the core during the first 4 hours following the power reduction?

A. Power production in the top of the core increases relative to the bottom of the core.

B. Power production in the top of the core decreases relative to the bottom of the core.

C. There is no relative change in power distribution in the core.

D. It is impossible to determine without additional information.

ANSWER: A.

一部核子反應器以 100%功率運轉，目前處於爐心壽命初期，爐心 Xe-135 已達到平衡。該反應器功率於 2 小時內降至 50%。已知控制棒維持完全抽出狀態，此時的參數值如下：

	功率變化前	功率變化後
反應器功率：	100%	50%
反應器冷卻水系統硼濃度：	740 ppm	820 ppm
控制棒位置：	完全抽出	完全抽出

爐心功率分佈在功率降低後 4 小時內有何影響？

A. 相對於爐心底部，爐心頂部產生的功率增加。

B. 相對於爐心底部，爐心頂部產生的功率降低。

C. 爐心功率分佈沒有相對變化。

D. 缺乏額外資料而無從判斷。

答案：A.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P761

When a nuclear reactor experiences xenon oscillations, the most significant shifts in power generation occur between the _____ of the core.

A. top and bottom

B. adjacent quadrants

C. center and periphery

D. opposite quadrants

ANSWER: A.

核子反應器發生氙毒振盪時，爐心_____之間將產生最顯著的功率移動情形。

A. 頂部與底部

B. 鄰近象限

C. 中央與四週

D. 相對象限(opposite quadrant)

答案：A.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P763 (N/A)

A nuclear reactor has been operating at 80% power for several weeks with power production equally distributed axially above and below the core midplane. Reactor power is increased to 100% using boron dilution to control reactor coolant temperature while maintaining control rods fully withdrawn.

During the power increase, axial power distribution will...

A. shift toward the top of the core.

B. shift toward the bottom of the core.

C. remain evenly distributed above and below the core midplane.

D. peak at the top and the bottom of the core.

ANSWER: B.

核子反應器以 80%功率運轉數週，其產生功率沿軸向均勻分佈於爐心中間平面上下。此時稀釋硼酸來控制反應器冷卻水溫度，使反應器功率增加至 100%，同時讓控制棒維持完全抽出。

在功率增加期間，軸向功率分佈將……

A. 朝爐心頂部移動。

B. 朝爐心底部移動。

C. 仍然均勻分佈在爐心中間平面上下區域。

D. 於爐心頂部及底部達到峰值。

答案：B.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P961

Which one of the following will cause reactor power to fluctuate slowly between the top and bottom of the core with steady state steam demand?

A. Feedwater variations

B. Dropped center control rod

C. Xenon oscillation

D. Samarium oscillation

ANSWER: C.

如果蒸汽需求固定不變，下列何者將導致反應器功率在爐心頂部與底部之間緩慢波動？

A. 飼水變化

B. 中央控制棒掉落

C. 氙毒振盪

D. 釤振盪

答案：C.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P1160

Xenon-135 oscillations take about _____ hours to get from maximum xenon-135 negative reactivity to minimum xenon-135 negative reactivity.

A. 40 to 50

B. 24 to 28

C. 12 to 14

D. 6 to 7

ANSWER: C.

Xe-135 振盪通常從最高 Xe-135 負反應度改變至最低 Xe-135 負反應度所需的時間，約為_____小時。

A. 40 至 50

B. 24 至 28

C. 12 至 14

D. 6 至 7

答案：C.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P2764 (N/A)

A nuclear reactor is operating at 80% power at the beginning of core life with equilibrium core xenon-135. Reactor power is increased, over a 2-hour period, to 100%. The following information is provided:

	PRIOR TO POWER CHANGE	AFTER POWER CHANGE
Reactor power:	80%	100%
Reactor coolant system boron concentration:	780 ppm	760 ppm
Control rod position:	Fully Withdrawn	Fully Withdrawn

What is the effect on power distribution in the core during the first 4 hours following the power increase?

A. Power production in the top of the core increases relative to the bottom of the core.

B. Power production in the top of the core decreases relative to the bottom of the core.

C. There is no relative change in power distribution in the core.

D. It is impossible to determine without additional information.

ANSWER: B.

一部核子反應器以 80%功率運轉，其處於爐心壽命初期，且 Xe-135 已達到平衡。該反應器功率於 2 小時內增至 100%。目前已知下列資料：

	功率變化前	功率變化後
反應器功率：	80%	100%
反應器冷卻水系統硼濃度：	780 ppm	760 ppm
控制棒位置：	完全抽出	完全抽出

請問爐心功率分佈在功率增加後 4 小時內發生何種影響？

A. 相對於爐心底部，爐心頂部產生的功率增加。

B. 相對於爐心底部，爐心頂部產生的功率降低。

C. 爐心功率分佈沒有相對變化。

D. 缺乏額外資料而無從判斷。

答案：B.

科目： 192006
知能類：K1.08 [3.3/3.4]
序號： P3060 (B3061)

A nuclear reactor has been operating at full power for one month following a refueling outage with core axial neutron flux distribution peaked in the bottom half of the core. An inadvertent reactor scram occurs. The reactor is restarted, with criticality occurring 6 hours after the scram. Reactor power is increased to 60% over the next 4 hours and stabilized.

How will core axial neutron flux distribution be affected during the 1-hour period immediately following the return to 60% power?

The core axial neutron flux peak will be located _____ in the core than the pre-scram peak location, and the flux peak will be moving _____.

A. higher; downward

B. higher; upward

C. lower; downward

D. lower; upward

ANSWER: A.

核子反應器於更換燃料大修後，以全功率運轉一個月，其爐心軸向中子通率分佈在爐心下半部達到尖峰。反應器此時突然發生急停，重新啟動該反應器，並於急停後 6 小時達到臨界。反應器功率於之後 4 小時內增至 60%。

該反應器恢復至 60%功率後的 1 小時內，爐心軸向中子通率分佈有何種影響？

此時的爐心軸向中子通率尖峰位置，將_____急停前的尖峰位置，通率尖峰將_____移動。

A. 高於；向下

B. 高於；向上

C. 低於；向下

D. 低於；向上

答案：A.

科目： 192006
知能類：K1.09 [3.0/3.1]
序號： P353 (B355)

A nuclear power plant is being returned to operation following a refueling outage. Fuel preconditioning requires reactor power to be increased from 10% to full power gradually over a one week period.

During this slow power increase, most of the positive reactivity added by the operator is required to overcome the negative reactivity from...

A. fuel burnup.

B. xenon buildup.

C. fuel temperature increase.

D. moderator temperature increase.

ANSWER: B.

核能電廠在更換燃料大修後重新恢復運轉。因燃料預調節要求反應器功率在一週內，從10%逐漸增加到全功率。

在功率緩慢增加期間，運轉員所加入之大部分的正反應度，乃是為了克服來自於何處的負反應度？

A. 燃料燃耗。

B. 氙毒累積。

C. 燃料溫度增加。

D. 緩和劑溫度增加。

答案：B.

科目： 192006
知能類：K1.09 [3.0/3.1]
序號： P1263

A nuclear reactor has been shut down for seven days to perform maintenance. A reactor startup is performed and power is ramped to 50% over a 5-hour period.

When power reaches 50%, the magnitude of core xenon negative reactivity will be...

A. increasing toward a peak.

B. increasing toward equilibrium.

C. decreasing toward equilibrium.

D. decreasing toward a valley.

ANSWER: B.

一部核子反應器停機 7 天以進行維修，之後啟動反應器，其功率於 5 小時內攀升至 50%。

反應器功率達到 50%時，爐心氙毒的負反應度強度將……

A. 朝尖峰增加。

B. 朝平衡值增加。

C. 朝平衡值降低。

D. 朝谷底(valley)降低。

答案：B.

科目： 192006
知能類：K1.09 [3.0/3.1]
序號： P1661

A nuclear reactor has been shut down for 5 days to perform maintenance. A reactor startup is performed and power is ramped to 75% over a 16 hour period.

When power reaches 75%, the concentration of core xenon-135 will be...

A. decreasing toward an upturn.

B. increasing toward a peak value.

C. decreasing toward an equilibrium value.

D. increasing toward an equilibrium value.

ANSWER: D.

一部核子反應器停機 5 天以進行維修，之後啟動反應器，其功率於 16 小時內攀升至 75%。

反應器功率達到 75%時，爐心的 Xe-135 濃度將……

A. 朝谷值(upturn)降低。

B. 朝峰值增加。

C. 朝平衡值降低。

D. 朝平衡值增加。

答案：D.

科目： 192006
知能類：K1.10 [3.1/3.2]
序號： P128

A nuclear reactor startup is being performed 5 hours after a reactor scram from 100% equilibrium power. The nuclear power plant is being returned to rated power at 2.0%/minute instead of the normal rate of 0.5%/minute.

At the faster rate of power increase, the minimum amount of core xenon will occur _____ and the amount of equilibrium core xenon will be _____.

A. sooner; the same

B. sooner; smaller

C. later; the same

D. later; smaller

ANSWER: A.

一部核子反應器以 100%平衡功率運轉時急停，5 小時後再度啟動，恢復額定功率時，以每分鐘 2.0%的速率取代每分鐘 0.5%的正常速率。

若以較快速率提升功率時，爐心最小氙毒量將_____發生，其平衡量將_____。

A. 較快；維持相同

B. 較快；較小

C. 較慢；維持相同

D. 較慢；較小

答案：A.

科目： 192006
知能類：K1.10 [3.1/3.2]
序號： P1062

A nuclear reactor has been operating at 100% power for eight weeks when a reactor trip occurs. The reactor is critical 6 hours later and power is increased to 100% over the next 6 hours.

What is the status of core xenon-135 concentration when power reaches 100%?

A. Increasing toward an equilibrium value.

B. Burning out faster than it is being produced.

C. Increasing toward a peak value.

D. At equilibrium.

ANSWER: B.

一部核子反應器以 100%功率運轉八週，此時發生急停。該反應器於 6 小時後達到臨界，其功率再於之後 6 小時增至 100%。

反應器功率達到 100%時，爐心的 Xe-135 濃度狀態為何？

A. 朝平衡值增加。

B. 燃耗速度較產生速度快。

C. 朝峰值增加。

D. 處於平衡。

答案：B.

科目： 192006
知能類：K1.10 [3.1/3.2]
序號： P1262

Xenon poisoning in a nuclear reactor core is most likely to prevent a reactor startup following a reactor shutdown from _____ power at the _____ of core life.

A. high; beginning

B. low; beginning

C. high; end

D. low; end

ANSWER: C.

核子反應器爐心的氙毒，在反應器處於爐心壽命_____的_____功率狀態時，最有可能阻礙反應器從停機後啟動。

A. 初期；高

B. 初期；低

C. 末期；高

D. 末期；低

答案：C.

科目： 192006
知能類：K1.10 [3.1/3.2]
序號： P4631

A nuclear power plant startup is in progress 5 hours after a reactor trip from 100% equilibrium power. The power plant is currently at 10% power and being returned to 100% power at 0.25% per minute instead of the normal rate of 0.5% per minute.

At the slower rate of power increase, the maximum amount of core xenon-135 will occur _____ than normal; and the amount of equilibrium core xenon-135 at 100% power will be _____.

A. sooner; the same

B. sooner; smaller

C. later; the same

D. later; smaller

ANSWER: C.

一部核子反應器以 100%平衡功率運轉時急停，5 小時後再度啟動，目前功率為 10%，正常功率增加率為每分鐘 0.5%，現改以每分鐘 0.25%的速率恢復至 100%功率。

若以較慢速率提升功率時，爐心最大氙毒量的發生時間將_____於平常，在 100%功率時的平衡量將_____。

A. 快；相同

B. 快；較小

C. 慢；相同

D. 慢；較小

答案：C.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P63

A nuclear reactor that has been operating at rated power for two weeks is quickly reduced in power to 50%. Xenon-135 will reach a new equilibrium condition in _____ hours.

A. 8 to 10

B. 20 to 25

C. 30 to 35

D. 40 to 50

ANSWER: D.

一部核子反應器以額定功率運轉兩週，如今迅速降至 50%功率。Xe-135 將於_____小時達到新平衡狀態。

A. 8 至 10

B. 20 至 25

C. 30 至 35

D. 40 至 50

答案：D.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P263

A nuclear reactor that has been operating at rated power for about two weeks is reduced in power to 50%. What happens to the Xe-135 concentration in the core?

A. There will be no change because iodine concentration is constant.

B. Xenon will initially build up, then decrease to a new equilibrium value.

C. Xenon will initially decrease, then build up to a new equilibrium value.

D. Xenon will steadily decrease to a new equilibrium value.

ANSWER: B.

一部核子反應器以額定功率運轉兩週，如今迅速降至 50%功率。爐心的 Xe-135 濃度將如何變化？

A. 碘濃度維持不變，所以沒有變化。

B. 氙毒先累增再降至新平衡值。

C. 氙毒先降低再累增至新平衡值。

D. 氙毒將持續降至新平衡值。

答案：B.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P1860 (B2259)

Which one of the following describes the change in core xenon-135 concentration immediately following a power increase from equilibrium conditions?

A. Initially decreases due to the increased rate of xenon-135 radioactive decay.

B. Initially decreases due to the increased absorption of thermal neutrons by xenon-135.

C. Initially increases due to the increased xenon-135 production from fission.

D. Initially increases due to the increased iodine-135 production from fission.

ANSWER: B.

下列何者正確描述了從平衡狀態增加功率後，爐心內Xe-135的濃度變化？

A. 起初減少，因為Xe-135放射衰變率增加。

B. 起初減少，因為Xe-135的熱中子吸收增加。

C. 起初增加，因為分裂而生的Xe-135增加。

D. 起初增加，因為由分裂而生的碘-135增加。

答案：B.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P2261 (B2761)

A nuclear reactor has been operating at steady-state 50% power for 12 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?

A. Increasing toward a peak

B. Decreasing toward an upturn

C. Increasing toward equilibrium

D. Decreasing toward equilibrium

ANSWER: D.

核子反應器從100%穩態功率下降1小時後，在50%穩態功率下運轉12小時。下列何者正確描述了目前爐心Xe-135的濃度？

A. 朝向峰值增加。

B. 朝向谷值(upturn)減少。

C. 朝向平衡增加。

D. 朝向平衡減小。

答案：D.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P2762 (B2763)

A nuclear reactor that had been operating at 100% power for about two months was shutdown over a 2-hour period. Following the shutdown, core xenon-135 will reach a long-term steady-state concentration in _____ hours.

A. 8 to 10

B. 20 to 25

C. 40 to 50

D. 70 to 80

ANSWER: D.

一部核子反應器於100%功率下運轉兩個月，然後在2小時內停機。在停機之後，爐心內Xe-135將在_____小時後達到長期穩態濃度。

A. 8至10

B. 20至25

C. 40至50

D. 70至80

答案：D.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P2961 (B2960)

A nuclear reactor has been operating at steady-state 30% power for 3 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?

A. Increasing toward a peak

B. Decreasing toward an upturn

C. Increasing toward equilibrium

D. Decreasing toward equilibrium

ANSWER: A.

一部核子反應器從100%穩態功率下降1小時後，在30%穩態功率下運轉3小時。下列何者正確描述了目前爐心Xe-135的濃度？

A. 朝向峰值增加。

B. 朝向谷值(upturn)減少。

C. 朝向平衡增加。

D. 朝向平衡減少。

答案：A.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P3261

A nuclear power plant is initially operating at equilibrium 100% power in the middle of a fuel cycle. The operators decrease main generator load while adding boric acid to the RCS over a period of 30 minutes. At the end of this time period, reactor power is 70% and average reactor coolant temperature is 575°F. All control rods remain fully withdrawn and in manual control.

Given:

Total reactivity added by operator = -3.3×10^{-3} ΔK/K
Total power coefficient = -1.1×10^{-4} ΔK/K/% power

Assuming no additional RCS boration occurs and no other operator actions are taken, what will average reactor coolant temperature be after an additional 60 minutes?

A. 575°F and stable

B. Less than 575°F and increasing

C. Less than 575°F and decreasing

D. Less than 575°F and stable

ANSWER: C.

核能電廠起初以 100%平衡功率運轉，並處於燃料週期中期。運轉員在減少主發電機負載量的同時，於 30 分鐘內加入硼酸至 RCS。此段時間結束時，反應器功率為 70%，反應器冷卻水平均溫度為 575°F，控制棒仍然完全抽出且為手動控制。

已知：

運轉員加入的總反應度 = -3.3×10^{-3} ΔK/K
總功率係數 =-1.1×10^{-4} ΔK/K/% power

假設不再加入硼酸至 RCS，運轉員亦無採取其他行動，請問再過 60 分鐘後的反應器冷卻水溫度為多少？

A. 575°F 並達到穩定。

B. 低於 575°F 並持續增加。

C. 低於 575°F 並持續降低。

D. 低於 575°F 並達到穩定。

答案：C.

科目： 192006
知能類：K1.11 [3.1/3.1]
序號： P3362 (B2559)

A nuclear reactor has been operating at 70% power for 26 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?

A. At equilibrium

B. Increasing toward a peak

C. Decreasing toward an upturn

D. Decreasing toward equilibrium

ANSWER: D.

一部核子反應器從100%穩態功率下降1小時後，在70%功率下運轉26小時。下列何者正確描述了目前爐心Xe-135的濃度？

A. 處於平衡。

B. 朝向峰值增加。

C. 朝向谷值(upturn)減少。

D. 朝向平衡減少。

答案：D.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P360

Compare a nuclear reactor that has been operating at 50% power for several days when a reactor trip occurs, to a reactor that had been operating at full power prior to the trip. For the 50% power reactor, xenon would peak _____ and the peak xenon reactivity would be
_____.

A. earlier; the same

B. at the same time; the same

C. earlier; less negative

D. at the same time; less negative

ANSWER: C.

請比較以 50%功率運轉數天的核子反應器急停情形，以及原以全功率運轉的反應器急停情形。對以 50%功率運轉的反應器而言，其氙毒將_____抵達峰值，氙毒反應度峰值將_____。

A. 提前；相同

B. 同時；相同

C. 提前：為較小負值(less negative)

D. 同時；為較小負值(less negative)

答案：C.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P663

Following a reactor trip, negative reactivity from xenon initially increases due to...

A. xenon production from the decay of iodine-135.

B. xenon production from the spontaneous fission of uranium.

C. the reduction of xenon removal by decay.

D. the reduction of xenon removal by recombination.

ANSWER: A.

反應器急停後，氙毒產生的負反應度將先增加，因為……

A. 氙毒為碘-135 衰變而產生。

B. 氙毒為鈾自發分裂而產生。

C. 衰變移除的氙毒量減少。

D. 重新結合而移除的氙毒量減少。

答案：A.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P863 (B2262)

Twenty-four hours after a reactor trip from a long-term, steady-state, rated-power run, the core xenon-135 concentration will be approximately...

A. the same as at the time of the trip and decreasing.

B. the same as at the time of the trip and increasing.

C. 50% lower than at the time of the trip and decreasing.

D. 50% higher than at the time of the trip and increasing.

ANSWER: A.

反應器在長期穩態100%額定功率下運轉後發生急停，之後24小時爐心的Xe-135濃度大約……

A. 與急停時相等，並且逐漸減小。

B. 與急停時相等，並且逐漸增加。

C. 較急停時小50％，並且逐漸減小。

D. 較急停時大50％，並且逐漸增加。

答案：A.

科目： 192006
知能類：K1.12 [3.1/3.1]
知能類：K1.13 [2.9/3.0]
序號： P963

A nuclear reactor has been operating at full power for several days when it is shut down rapidly (within 2 hours) for maintenance. How will core xenon reactivity change?

A. Peak in 2 to 4 hours and then decay to near zero in about 1 day.

B. Peak in 2 to 4 hours and then decay to near zero in 3 to 4 days.

C. Peak in 6 to 10 hours and then decay to near zero in about 1 day.

D. Peak in 6 to 10 hours and then decay to near zero in 3 to 4 days.

ANSWER: D.

一部核子反應器以全功率運轉數天，基於維修而在 2 小時內迅速停機。請問爐心的氙毒反應度有何變化？

A. 於 2 至 4 小時到達峰值，再於 1 天左右衰變至近於零。

B. 於 2 至 4 小時到達峰值，再於 3 至 4 天衰變至近於零。

C. 於 6 至 10 小時到達峰值，再於 1 天左右衰變至近於零。

D. 於 6 至 10 小時到達峰值，再於 3 至 4 天衰變至近於零。

答案：D.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P1063 (B2159)

A nuclear reactor has been operating at 100% power for three weeks when a reactor trip occurs. Which one of the following describes the concentration of Xe-135 in the core 24 hours after the trip?

A. At least 2 times the concentration at the time of the trip and decreasing

B. Less than 1/2 the concentration at the time of the trip and decreasing

C. At or approaching a peak value

D. Approximately the same as at the time of the trip

ANSWER: D.

一部核子反應器在100%功率下運轉三週，此時反應器發生急停。下列何者正確描述了在急停24小時後，爐心內的Xe-135濃度？

A. 至少是急停時的兩倍，並且逐漸減小。

B. 不到急停時的二分之一，並且逐漸減小。

C. 位於或接近峰值。

D. 大約與急停時相等。

答案：D.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P2262 (B2461)

Fourteen hours after a reactor trip from 100% power equilibrium xenon conditions, the amount of core xenon-135 will be...

A. lower than 100% equilibrium xenon, and will have added a net positive reactivity since the trip.

B. lower than 100% equilibrium xenon, and will have added a net negative reactivity since the trip.

C. higher than 100% equilibrium xenon, and will have added a net positive reactivity since the trip.

D. higher than 100% equilibrium xenon, and will have added a net negative reactivity since the trip.

ANSWER: D.

反應器在100%功率平衡氙毒狀況下發生急停，之後14小時爐心內Xe-135的含量將會……

A. 小於100%平衡氙毒，並且自急停之後加入淨正反應度。

B. 小於100%平衡氙毒，並且自急停之後加入淨負反應度。

C. 大於100%平衡氙毒，並且自急停之後加入淨正反應度。

D. 大於100%平衡氙毒，並且自急停之後加入淨負反應度。

答案：D.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P2363

How does core xenon-135 change immediately following a reactor trip from equilibrium 100% power operation?

A. Decreases due to xenon removal by decay.

B. Decreases due to the reduction in xenon production directly from fission.

C. Increases due to xenon production from the decay of iodine-135.

D. Increases due to xenon production from the spontaneous fission of uranium.

ANSWER: C.

反應器從 100%平衡功率運轉下急停後，爐心的 Xe-135 將隨即發生何種變化？

A. 減少，因為衰變移除氙毒。

B. 減少，因為從分裂直接產生的氙毒變少。

C. 增加，因為碘-135 衰變而產生氙毒。

D. 增加，因為鈾自發分裂而產生氙毒。

答案：C.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P2662 (B2662)

Given:
- A nuclear reactor had been operating at 100% power for six weeks when a reactor trip occurred.
- A reactor startup was performed and criticality was reached 16 hours after the trip.
- Two hours later, the reactor is steady at 30% power with control rods in Manual.

If no operator actions are taken over the next hour, average reactor coolant temperature will _____ because core Xe-135 concentration is _____.

A. increase; decreasing

B. increase; increasing

C. decrease; decreasing

D. decrease; increasing

ANSWER: A.

已知：

- 核子反應器以100%功率運轉六週，此時發生急停。
- 反應器啟動，並於急停16小時後達到臨界。
- 2小時後，反應器於30%功率達到穩定，控制棒為手動操作。

若在之後1小時內，運轉員未採取任何動作，則反應器冷卻水平均溫度將_____，因為爐心的Xe-135濃度正在_____。

A. 增加；減小

B. 增加；增加

C. 減小；減小

D. 減小；增加

答案：A.

科目： 192006
知能類：K1.12 [3.1/3.1]
序號： P2862 (B1462)

A nuclear reactor has been operating at 100% power for two months when a reactor scram occurs. Four hours later, the reactor is critical and stable at 10% power.

Which one of the following operator actions is required to maintain reactor power at 10% over the next 18 hours?

A. Add positive reactivity during the entire period

B. Add negative reactivity during the entire period

C. Add positive reactivity, then negative reactivity

D. Add negative reactivity, then positive reactivity

ANSWER: C.

一部核子反應器在100%穩態功率下運轉兩個月後急停。4小時後，反應器達到臨界，功率穩定在10%。

運轉員需要採取下列哪項動作，才能在接下來的18小時內，讓反應器功率維持在10%？

A. 在整個期間加入正反應度。

B. 在整個期間加入負反應度。

C. 先加入正反應度，再加入負反應度。

D. 先加入負反應度，再加入正反應度。

答案：C.

科目： 192006
知能類：K1.13 [2.9/3.0]
序號： P562

After a reactor shutdown from equilibrium core xenon conditions, the maximum xenon -135 negative reactivity (height of the xenon peak) is _____ preshutdown equilibrium power level.

A. independent of

B. exactly proportional to

C. inversely proportional to

D. dependent on but not exactly proportional to

ANSWER: D.

反應器從爐心氙毒平衡狀態下停機，Xe-135 的最高負反應度(氙毒尖峰高度)，與停機前的平衡功率_____。

A. 無關

B. 成正比

C. 成反比

D. 有關，但不是成正比

答案：D.

科目： 192006
知能類：K1.13 [2.9/3.0]
序號： P1760

A nuclear power plant was shut down following three months of operation at full power. The shutdown occurred over a 3 hour period with a constant rate of power decrease.

Which one of the following describes the reactivity added by core xenon during the shutdown?

A. Xenon buildup added negative reactivity.

B. Xenon buildup added positive reactivity.

C. Xenon burnout added negative reactivity.

D. Xenon burnout added positive reactivity.

ANSWER: A.

核能電廠以全功率運轉 3 個月後停機。停機期間為 3 小時，功率以固定速率持續降低。

下列何者描述了爐心氙毒在停機期間加入的反應度？

A. 氙毒累積而加入負反應度。

B. 氙毒累積而加入正反應度。

C. 氙毒燃耗而加入負反應度。

D. 氙毒燃耗而加入正反應度。

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P262

Four hours after a reactor trip from equilibrium full power operation, a reactor is taken critical and power is immediately stabilized for critical data. To maintain a constant reactor power, the operator must add _____ reactivity because core Xe-135 concentration is _____.

A. positive; increasing

B. positive; decreasing

C. negative; increasing

D. negative; decreasing

ANSWER: A.

反應器從平衡全功率運轉下急停，在 4 小時後達到臨界，其功率隨即穩定於臨界數值。為了讓反應器功率維持不變，運轉員必須加入_____反應度，因為爐心的 Xe-135 濃度正在_____。

A. 正；增加

B. 正；減少

C. 負；增加

D. 負；減少

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P361 (B1862)

A nuclear power plant has been operating at 100% power for two months when a reactor scram occurs. Shortly after the reactor scram a reactor startup is commenced. Six hours after the scram, reactor power is at 2%. To maintain power stable at 2% over the next hour, the operator must add...

A. positive reactivity because core xenon-135 is building up.

B. negative reactivity because core xenon-135 is building up.

C. positive reactivity because core xenon-135 is decaying away.

D. negative reactivity because core xenon-135 is decaying away.

ANSWER: A.

一部核子反應器於100%功率下運轉兩個月，此時發生急停。急停後不久，反應器即開始啟動，急停6小時後，反應器功率為2%。為了在之後1小時內維持功率穩定於2%，運轉員必須加入……

A. 正反應度，因為爐心Xe-135正在累積。

B. 負反應度，因為爐心Xe-135正在累積。

C. 正反應度，因為爐心Xe-135正在衰變。

D. 負反應度，因為爐心Xe-135正在衰變。

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P561 (B562)

Following a seven day shutdown, a reactor startup is performed and the nuclear power plant is taken to 100% power over a 16-hour period. After reaching 100% power, what type of reactivity will the operator need to add to compensate for core xenon-135 changes over the next 24 hours?

A. Negative only

B. Negative, then positive

C. Positive only

D. Positive, then negative

ANSWER: C.

反應器在停機7天後啟動，並在16小時後達到100%功率。達到100%功率後，為補償之後24小時爐心Xe-135的變化，運轉員將需要加入何種反應度？

A. 只有負反應度。

B. 負反應度，然後正反應度。

C. 只有正反應度。

D. 正反應度，然後負反應度。

答案：C.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P1462 (B1461)

A nuclear reactor has been operating at 100% power for two weeks. Power is then decreased over a 1-hour period to 10%.

Assuming manual rod control, which one of the following operator actions is required to maintain a constant reactor coolant temperature at 10% power during the next 24 hours?

A. Add negative reactivity during the entire period

B. Add positive reactivity during the entire period

C. Add positive reactivity, then negative reactivity

D. Add negative reactivity, then positive reactivity

ANSWER: C.

一部核子反應器在100%功率下運轉兩週，其功率在1小時內降至10%。

假設以手動操作控制棒，請問運轉員得採取下列何種行動，才能在往後24小時內，讓10%功率的反應器冷卻水溫度保持不變？

A. 在整個期間中加入負反應度。

B. 在整個期間中加入正反應度。

C. 先加入正反應度，然後加入負反應度。

D. 先加入負反應度，然後加入正反應度。

答案：C.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P1762 (B1763)

A nuclear reactor startup is being conducted and criticality has been achieved 15 hours after a reactor scram from long term operation at full power. After 1 additional hour, reactor power is stabilized at 10^{-4}% power and all control rod motion is stopped.

Which one of the following describes the response of reactor power over the next 2 hours without any further operator actions?

A. Power increases toward the point of adding heat due to the decay of Xe-135.

B. Power increases toward the point of adding heat due to the decay of Sm-149.

C. Power decreases toward the shutdown neutron level due to the buildup of Xe-135.

D. Power decreases toward the shutdown neutron level due to the buildup of Sm-149.

ANSWER: A.

一部核子反應器以全功率運轉後發生急停，然後進行啟動並在急停後15小時達到臨界。臨界1小時後，反應器功率穩定於10^{-4}%功率，同時所有控制棒均停止動作。

下列何者正確描述了運轉員沒有採取任何動作下，在其後2小時反應器功率的反應？

A. 功率朝著加熱點(POAH)增加，因為Xe-135的衰變。

B. 功率朝著加熱點(POAH)增加，因為Sm-149的衰變。

C. 功率朝著停機中子量減小，因為Xe-135的累積。

D. 功率朝著停機中子量減小，因為Sm-149的累積。

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P2260

A nuclear reactor is initially shut down with no xenon in the core. Over the next four hours, the reactor is made critical and power level is increased to the point of adding heat. The shift supervisor has directed that power be maintained constant at this level for 12 hours for testing.

To accomplish this objective, control rods will have to be...

A. inserted periodically for the duration of the 12 hours.

B. withdrawn periodically for the duration of the 12 hours.

C. inserted periodically for 4 to 6 hours, then withdrawn periodically.

D. withdrawn periodically for 4 to 6 hours, then inserted periodically.

ANSWER: B.

一部核子反應器起初於爐心無氙下停機。經過 4 小時後，該反應器到達臨界，功率增至加熱點(POAH)。值班主任指示基於測試之需，此功率必須維持 12 小時不變。

為了達成此目標，必須……

A. 在 12 小時內，定時插入控制棒。

B. 在 12 小時內，定時抽出控制棒。

C. 定時插入 4 至 6 小時，然後定時抽出。

D. 定時抽出 4 至 6 小時，然後定時插入。

答案：B.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P2561

A nuclear reactor is initially shut down with no xenon in the core. A reactor startup is performed and 4 hours later power level is at 25%. The shift supervisor has directed that reactor power and reactor coolant temperature be maintained constant at this level for 12 hours.

To accomplish this, control rods will have to be...

A. withdrawn periodically for the duration of the 12 hours.

B. inserted periodically for the duration of the 12 hours.

C. withdrawn periodically for 4 to 6 hours, then inserted periodically.

D. inserted periodically for 4 to 6 hours, then withdrawn periodically.

ANSWER: A.

一部核子反應器起初於爐心無氙下停機，接著啟動反應器，其功率於 4 小時後達到 25%。值班主任指示在往後 12 小時內，反應器功率和冷卻水溫度必須維持不變。

為了達成此目標，必須……

A. 在 12 小時內，定時抽出控制棒。

B. 在 12 小時內，定時插入控制棒。

C. 定時抽出 4 至 6 小時，然後定時插入。

D. 定時插入 4 至 6 小時，然後定時抽出。

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P2863

A nuclear reactor is operating at 100% power immediately following a one-hour power ascension from steady-state 70% power. To keep reactor coolant system temperature stable over the next two hours, the operator must _____ control rods or _____ reactor coolant boron concentration.

A. insert; increase

B. insert; decrease

C. withdraw; increase

D. withdraw; decrease

ANSWER: A.

核子反應器在 1 小時內，從 70%穩態功率迅速增至 100%功率運轉。為了讓反應器冷卻水系統的溫度在往後 2 小時內維持不變，運轉員必須_____控制棒或_____反應器冷卻水硼濃度。

A. 插入；增加

B. 插入；降低

C. 抽出；增加

D. 抽出；降低

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P2963 (B2964)

A nuclear reactor is operating at 60% power immediately after a one-hour power increase from equilibrium 40% power. To keep RCS T-avg stable over the next two hours, the operator must _____ control rods or _____ reactor coolant boron concentration.

A. insert; increase

B. insert; decrease

C. withdraw; increase

D. withdraw; decrease

ANSWER: A.

一部核子反應器在1小時內，從40%平衡功率增至60%功率運轉。為了在之後2小時內，讓RCS平均溫度(T-avg)維持不變，運轉員必須_____控制棒或_____反應器冷卻水硼濃度。

A. 插入；增加

B. 插入；減少

C. 抽出；增加

D. 抽出；減少

答案：A.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P3063

A nuclear power plant is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 75% over a 1-hour period and then stabilized. The operator then adjusts control rod height as necessary to maintain average reactor coolant temperature constant.

What will be the rod position and directional trend 30 hours after the power change?

A. Above the initial 75% power position and inserting slowly

B. Above the initial 75% power position and withdrawing slowly

C. Below the initial 75% power position and inserting slowly

D. Below the initial 75% power position and withdrawing slowly

ANSWER: C.

核能電廠起初以 100%功率運轉，爐心 Xe-135 已達成平衡。功率於 1 小時內降至 75%並穩定。運轉員接著視必要調整控制棒高度，讓反應器冷卻水平均溫度維持不變。

請問在功率改變後 30 小時，控制棒位置與方向的趨勢為何？

A. 高於初期 75%功率的位置，並緩慢插入。

B. 高於初期 75%功率的位置，並緩慢抽出。

C. 低於初期 75%功率的位置，並緩慢插入。

D. 低於初期 75%功率的位置，並緩慢抽出。

答案：C.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P3563 (B3563)

A nuclear power plant had been operating at 100% power for two months when a reactor trip occurred. Soon afterward, a reactor startup was performed. Twelve hours after the trip, the startup has been paused with reactor power at 2%.

To maintain reactor power and reactor coolant temperature stable over the next hour, the operator must add _____ reactivity because core xenon-135 concentration will be _____.

A. positive; increasing.

B. negative; increasing.

C. positive; decreasing.

D. negative; decreasing.

ANSWER: D.

核能電廠在100%功率下運轉兩個月，此時發生反應器急停。反應器隨即進行啟動，並於達到2%功率處暫停啟動，此時距上次急停12小時。

為了讓反應器功率及冷卻水溫度，在之後1小時內維持不變，運轉員必須加入_____反應度，因為爐心的Xe-135濃度將_____。

A. 正；增加

B. 負；增加

C. 正；減少

D. 負；減少

答案：D.

科目： 192006
知能類：K1.14 [3.2/3.3]
序號： P3863

A nuclear power plant is initially operating at steady-state 100% reactor power in the middle of a fuel cycle. The operators then slowly decrease main generator load to 90% while adding boric acid to the RCS. After the required amount of boric acid is added, reactor power is 90% and average reactor coolant temperature is 582°F. All control rods remain fully withdrawn and in manual control.

Assuming no other operator actions are taken, which one of the following describes the average reactor coolant temperature after an additional 60 minutes?

A. Higher than 582°F and increasing slowly.

B. Higher than 582°F and decreasing slowly.

C. Lower than 582°F and increasing slowly.

D. Lower than 582°F and decreasing slowly.

ANSWER: D.

核能電廠起初以反應器功率 100%下穩態運轉，並處於燃料週期中期。運轉員接著緩慢降低主發電機負載至 90%，同時將硼酸加入 RCS。加入所需硼酸量之後，反應器功率為 90%，反應器冷卻水平均溫度為 582°F。所有控制棒仍為完全抽出，並採手動操作。

假設運轉員沒有採取其他行動，下列何者描述了反應器冷卻水平均溫度在 60 分鐘後的情形？

A. 高於 582°F 且緩慢增加。

B. 高於 582°F 且緩慢降低。

C. 低於 582°F 且緩慢增加。

D. 低於 582°F 且緩慢降低。

答案：D.

科目/題號：192006/1 (2016 新增)
知能類：K1.07〔3.4/3.4〕
序號：P6031

A reactor trip occurred one hour ago following several months of operation at 100 percent power. Reactor coolant temperature is being maintained at 550°F and the source range count rate is currently 400 cps. If no operator action is taken, how will the source range count rate respond during the next 24 hours? (Assume a constant source neutron flux.)
A. The count rate will remain about the same.
B. The count rate will decrease for the entire period.
C. The count rate will initially decrease and then increase.
D. The count rate will initially increase and then decrease.
ANSWER: C.

反應器在 100%功率運轉數個月後，於 1 小時前發生反應器跳脫。反應器冷卻水溫度維持在 550℉，而源階中子計數率目前是 400cps。假若運轉員未採取任何行動，則在未來 24 小時源階中子計數率的反應為何？(假設中子源之通量為定值)
A.計數率將維持約相同
B.計數率在整個期間將減少
C.計數率將先減少然後增加
D.計數率將先增加然後減少

答案： C

科目/題號：192006/2 (2016新增)
知能類：K1.09 [3.0/3.1]
序號：P5631 (B5631)

A reactor has been shut down for 7 days to perform maintenance. A reactor startup is performed, and power level is increased to 50 percent over a two-hour period.
Ten hours after reactor power reaches 50 percent, the magnitude of xenon-135 negative reactivity will be...
A. increasing toward a downturn.
B. increasing toward an equilibrium value.
C. decreasing toward an equilibrium value.
D. decreasing toward an upturn.
ANSWER: B.

一反應器已停機七天以進行維修後，反應器執行啟動，並在兩小時內提升至50%功率。當反應器功率達50%後10小時，氙-135的負反應度將會_____。
A.由增加變反轉向降低
B.增加到一個平衡值
C.降低到一個平衡值
D.由降低變反轉向增加

答案： B

科目/題號：192006/3 (2016 新增)
知能類：K1.09〔3.0/3.1〕
序號：P6931

A nuclear power plant was operating at 100 percent power for 3 months near the beginning of a fuel cycle when a reactor trip occurred. Eighteen hours later, the reactor is critical at the point of adding heat with normal operating reactor coolant temperature and pressure. Power level will be raised to 100 percent over the next 3 hours.
During this power level increase, most of the positive reactivity added by the operator will be required to overcome the negative reactivity from...
A. fuel burnup.
B. xenon-135 buildup.
C. fuel temperature increase.
D. moderator temperature increase.
ANSWER: C.

當反應器發生跳脫時，已在接近燃料週期初期以 100%功率運轉 3 個月。在 18 小時後，反應器於加熱點臨界且維持正常冷卻水溫度和壓力。其後 3 小時，功率提升至 100%。當此功率提升期間，運轉所必須加入之正反應度主要克服的負反應度是來自…？
A.燃料燃耗
B.氙-135 毒逐漸增加
C.燃料溫度增加
D.緩和劑溫度增加

答案： C

科目/題號：192006/4 (2016新增)
知能類：K1.14 [3.2/3.3]
序號：P6831 (B6831)

A reactor has been shut down for 7 days following 2 months of steady-state 100 percent power operation. A reactor startup is then performed and the reactor is taken to 100 percent power over a 12-hour period. After 100 percent power is reached, what incremental control rod positioning will be needed to compensate for xenon-135 changes over the next 24 hours?
A. Withdraw rods slowly during the entire period.
B. Withdraw rods slowly at first, and then insert rods slowly.
C. Insert rods slowly during the entire period.
D. Insert rods slowly at first, and then withdraw rods slowly.
ANSWER: A.

一反應器於100%穩定狀態運轉兩個月後，已停機七天。然後此反應器執行啟動，並在12小時期間將反應器功率提升到100%。在達到100%功率後，於未來24小時必須抽出多少控制棒以補償氙-135的改變量？
A.在整個期間緩慢抽棒
B.首先緩慢抽棒，然後緩慢插棒
C.在整個期間緩慢插棒
D.首先緩慢插棒，然後緩慢抽棒

答案： A

科目/題號：192006/5 (2016新增)
知能類：K1.14 [3.2/3.3]
序號：P7431 (B7431)

A nuclear power plant was initially operating at steady-state 100 percent power at the end of a fuel cycle (EOC) when the plant was shut down for refueling. After refueling, the reactor was restarted and the plant is currently operating at steady-state 100 percent power at the beginning of a fuel cycle (BOC). Assume the average energy released by each fission did not change.
Compared to the equilibrium xenon-135 concentration at 100 percent power just prior to the refueling, the current equilibrium xenon-135 concentration is…
A. greater, because the higher fission rate at BOC produces xenon-135 at a faster rate.
B. greater, because the lower thermal neutron flux at BOC removes xenon-135 at a slower rate.
C. smaller, because the lower fission rate at BOC produces xenon-135 at a slower rate.
D. smaller, because the higher thermal neutron flux at BOC removes xenon-135 at a faster rate.
ANSWER: B.

一座核能電廠起初在燃料週期末期(EOC)100%功率穩定運轉，電廠為更換燃料而停機。更換燃料後，反應器再啟動，目前在燃料週期初期(BOC)以100%功率穩定運轉。假設每一分裂所釋出能量不變。與更換燃料前100%功率氙-135平衡濃度相比目前氙-135平衡濃度…
A.較大，因為在燃料週期初期較高分裂率,以較快速率產生氙-135
B.較大，因為在燃料週期初期較低熱中子通量以較低速率移除氙-135
C.較小，因為在燃料週期初期較低分裂率,以較慢速率產生氙-135
D.較小，因為在燃料週期初期較高熱中子通量以較快速率移除氙-135

答案： B