科目： 293009
知能類： K1.01 [2.1/2.5]
序號： B1092 (N/A)

In a reactor operating at full power, the fuel bundle with the highest power always has the...
A. greatest critical power ratio.
B. greatest radial peaking factor.
C. smallest linear heat generation rate.
D. smallest maximum average planar linear heat generation rate.
ANSWER: B

一反應爐以全功率運轉，具有最高功率的燃料束通常有
A. 臨界熱功率比的最大值
B. 徑向尖峰因素的最大值
C. 單位長度發熱率的最小值
D. 最大平面單位長度平均發熱率的最小值
答案： B.

科目： 293009
知能類： K1.01 [2.1/2.5]
序號： B1592

The radial peaking factor of a bundle is defined as...
A. core average bundle power
   individual bundle power
B. peak nodal power
   core average nodal power
C. core average nodal power
   peak nodal power
D. individual bundle power
   core average bundle power
ANSWER: D

燃料束的徑向尖峰因子可以定義為
A. 爐心平均燃料束功率/個別燃料束功率
B. 尖峰節點功率/爐心平均節點功率
C. 爐心平均節點功率/尖峰節點功率
D. 個別燃料束功率/爐心平均燃料束功率
答案： D.

科目： 293009
知能類： K1.01 [2.1/2.5]
序號： B2392

In a reactor operating at full power, the fuel bundle with the lowest power always has the smallest...
A. critical power ratio.
B. radial peaking factor.
C. axial peaking factor.
D. critical heat flux.
ANSWER: B

一反應爐在全功率下運轉，具有最低功率之燃料束通常有最小之
A. 臨界熱功率比
B. 徑向尖峰因子
C. 軸向尖峰因子
D. 臨界熱通量
答案： B.

科目： 293009
知能類： K1.01 [2.1/2.5]
序號： B3492

A reactor is operating at 80% of rated thermal power with the radial power distribution peaked in the center of the core. Reactor power is then decreased to 60% over the next two hours by:
• reducing reactor recirculation flow rate by 10%, and
• partially inserting a group of centrally-located deep control rods
Compared with the previous operation at 80%, when power is stabilized at 60%, the value of the core maximum radial peaking factor will be _____; and the primary contributor to the change in the value of the core maximum radial peaking factor will be the change in _____.
A. smaller; recirculation flow
B. smaller; control rod position
C. larger; recirculation flow
D. larger; control rod position
ANSWER: B

一反應爐在80％額定熱功率下運轉，其徑向功率分佈尖峰位於爐心之中央。反應爐功率於其後兩小時間降低至60％，方式為
• 降低反應爐再循環流量10％，與
• 部分插入一群位於中央之深控制棒
與原本在80％下運轉相比，當功率穩定於60％，爐心最大徑向尖峰因子的值將_____；而對於此最大徑向尖峰因子變化的主要影響因素是_____的變化。
A. 較小；再循環流
B. 較小；控制棒位置
C. 較大；再循環流
D. 較大；控制棒位置
答案： B.

科目： 293009
知能類： K1.01 [2.1/2.5]
K1.02 [2.2/2.6]
序號： B2592

A reactor is operating at steady-state 80% reactor power near the beginning of a fuel cycle with core power distribution peaked radially at the center of the core and axially in the bottom half of the core. Only reactor recirculation flow rate adjustments are used to maintain a constant reactor power over the next two months. Neglecting any change in reactor poison distribution, during the next two months the maximum radial peaking factor will _____, and the maximum axial peaking factor will _____.

A. increase; decrease
B. increase; increase
C. decrease; decrease
D. decrease; increase
ANSWER: C

一反應爐於燃料週期開始時，在穩態80%反應爐功率下運轉，其爐心功率分佈徑向尖峰位於爐心中央，而軸向尖峰位於爐心下半部。在未來兩個月中，只調整再循環流量以維持固定之反應爐功率。忽略任何反應爐毒素分佈之變化，在未來兩個月中最大徑向尖峰因子將_____，而最大軸向尖峰因子將_____。

A. 增加；減小
B. 增加；增加
C. 減小；減小
D. 減小；增加
答案： C.

科目： 293009
知能類： K1.01 [2.1/2.5]
序號： B2892

In a reactor operating at full power, the fuel bundle with the greatest radial peaking factor always has the...
A. greatest power.
B. greatest critical power ratio.
C. smallest linear heat generation rate.
D. smallest maximum average planar linear heat generation rate.
ANSWER: A

一反應爐以全功率運轉，具有最高徑向尖峰因子的燃料束通常有
A. 功率的最大值
B. 臨界熱功率比的最大值
C. 單位長度發熱率的最小值
D. 最大平面單位長度平均發熱率的最小值
答案： A.

科目： 293009
知能類： K1.01 [2.1/2.5]
K1.02 [2.2/2.6]
序號： B2992 (N/A)

A reactor is operating at 40% of rated thermal power with power distribution peaked both radially and axially in the center of the core. Reactor power is then increased to 70% over the next two hours using only reactor recirculation flow rate adjustments for reactivity control. Neglecting any effect from reactor poisons, when power is stabilized at 70%, the location of the maximum core radial peaking factor will _____ of the core and the location of the maximum core axial peaking factor will _____ of the core.
A. move away from the center; move toward the bottom
B. move away from the center; move toward the top
C. remain near the center; move toward the bottom
D. remain near the center; move toward the top
ANSWER: D

一反應爐在40%額定熱功率下運轉，其徑向與軸向功率分佈尖峰均位於爐心之中央。於其後兩小時期間，只利用調整反應爐再循環流量做反應度控制而提昇至70%功率。忽略任何反應爐毒素之影響，當功率穩定於70%，最大徑向尖峰的位置將_____，最大軸向尖峰的位置將向爐心_____。
A. 遠離爐心；底部移動
B. 遠離爐心；頂部移動
C. 維持在爐心中央附近；底部移動
D. 維持在爐心中央附近；頂部移動
答案： D.

科目： 293009
知能類： K1.02 [2.2/2.6]
序號： B892

The axial peaking factor for a node of a fuel bundle is defined as...
A. core average bundle power
   peak nodal power
B. peak nodal power
   core average bundle power
C. bundle average nodal power
   nodal power
D. nodal power
   bundle average nodal power
ANSWER: D

一燃料束節點之軸向尖峰因子定義為
A. 爐心平均燃料束功率/尖峰節點功率
B. 尖峰節點功率/爐心平均燃料束功率
C. 燃料束平均節點功率/節點功率
D. 節點功率/燃料束平均節點功率
答案： D.

科目： 293009
知能類： K1.03 [2.1/2.5]
序號： B1492

The ratio of the highest pin heat flux in a node to the average pin heat flux in the same node is called the _____ peaking factor.
A. local
B. radial
C. axial
D. total
ANSWER: A

一節點之最高燃料棒熱通量與同一節點之平均燃料棒熱通量的比值，稱之為_____尖峰因子。
A. 局部
B. 徑向
C. 軸向
D. 總
答案： A.

科目： 293009
知能類： K1.04 [2.2/2.6]
序號： B3294 (N/A)

A BWR core consists of 30,000 fuel rods; each fuel rod has an active length of 12 feet. The core is producing 1,800 MW of thermal power. If the total peaking factor for a node is 2.0, what is the maximum local linear power density being produced in the node?
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft
ANSWER: D

一BWR爐心含有30,000根燃料棒；每根燃料棒有效長度12英呎。爐心產生1,800MW之熱功率。若一節點之總尖峰因子為2.0，則此節點所產生的最大局部單位長度功率密度為何？
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft
答案： D.

科目： 293009
知能類： K1.04 [2.2/2.6]
序號： B3793

A BWR core consists of 30,000 fuel rods; each fuel rod has an active length of 12 feet. The core is producing 1,800 MW of thermal power. If the total peaking factor for a node is 1.6, what is the maximum local linear power density being produced in the node?
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft
ANSWER: C

一BWR爐心含有30,000根燃料棒；每根燃料棒有效長度12英呎。爐心產生1,800MW之熱功率。若一節點之總尖峰因子為1.6，則此節點所產生的最大局部單位長度功率密度為何？
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft
答案： C.

科目： 293009
知能類： K1.05 [3.3/3.5]
序號： B1893 (P1395)

Thermal limits are established to protect the reactor core, and thereby protect the public during plant operations which include...
A. normal operations only.
B. normal and abnormal operations only.
C. normal, abnormal, and postulated accident operations only.
D. normal, abnormal, postulated and unpostulated accident operations.
ANSWER: C

熱限值乃用以保護反應爐爐心，在何種電廠運轉情況下可保護民眾：
A. 只有在正常運轉
B. 只有在正常與異常運轉
C. 只有正常、異常與假想事故運轉
D. 正常、異常、假想與非假想事故運轉(unpostulated accident operations)
答案： C.

科目： 293009
知能類： K1.05 [3.3/3.5]
序號： B2693 (P2696)

A reactor has experienced a loss of coolant accident. Inadequate core cooling has resulted in the following core temperatures one hour into the accident:
90% of the fuel clad has remained below 1800^{o}F
10% of the fuel clad has exceeded 1800^{o}F
5% of the fuel clad has exceeded 2000^{o}F
0.5% of the fuel clad has reached 2200^{o}F
0.0% of the fuel clad has exceeded 2200^{o}F
Peak centerline fuel temperature is 4650^{o}F
Which one of the following is an adverse consequence that will occur if the above fuel and clad temperature conditions remain constant for 24 additional hours followed by the injection of emergency cooling water directly to the top of the core?
A. Explosive hydrogen concentration inside the reactor vessel
B. Explosive hydrogen concentration inside the reactor containment building
C. Release of radioactive fission products due to melting of the fuel pellets and fuel clad
D. Release of radioactive fission products due to rupture of the fuel clad
ANSWER: D

一反應爐歷經冷卻水流失事故。爐心冷卻不足而導致事故後一小時出現下列爐心溫度：
90％燃料護套維持在1800^{o}F以下
10％燃料護套超過1800^{o}F
5％燃料護套超過2000^{o}F
0.5％燃料護套到達2200^{o}F
0.0％燃料護套超過2200^{o}F
燃料中央尖峰溫度為4650^{o}F
若藉由直接從爐頂注入緊急冷卻水，使上述燃料與護套溫度狀況於接下來的24小時維持不變，則將發生下列何者不利之結果？
A. 反應槽內的爆炸性氫氣濃度
B. 反應爐圍阻體廠房內的爆炸性氫氣濃度
C. 由於燃料丸與燃料護套融化而釋放出放射性分裂物質
D. 由於燃料護套破裂而釋放出放射性分裂物質
答案： D.

科目： 293009
知能類： K1.06 [3.4/3.8]
序號： B94

Linear heat generation rate is the...
A. ratio of the average power per fuel rod divided by the associated fuel bundle power.
B. ratio of the power produced in a given fuel bundle divided by total core thermal power.
C. sum of the power produced by all fuel rods in a given fuel bundle at a specific planar cross section.
D. sum of the power per unit area for each unit area of the fuel cladding for a unit length of a fuel rod.
ANSWER: D

單位長度發熱率為
A. 每根燃料棒之平均功率除以相對應之燃料束功率
B. 某燃料束所產生之功率除以總爐心熱功率
C. 在一特定之平面截面上某燃料束中所有燃料棒產生之功率總和
D. 一燃料棒上單位長度燃料護套之功率總和
答案： D.

科目： 293009
知能類： K1.06 [3.4/3.8]
序號： B296

The linear heat generation rate (LHGR) for a reactor core is acceptable if _____ is being maintained at _____.
A. LHGR-limit/LHGR-actual; 0.95
B. LHGR-actual/LHGR-limit; 1.05
C. LHGR-limit/LHGR-actual; 1.10
D. LHGR-actual/LHGR-limit; 1.15
ANSWER: C

若____維持在____，則反應爐爐心之單位長度發熱率（LHGR）為可接受。
A. LHGR-limit/LHGR-actual; 0.95
B. LHGR-actual/LHGR-limit; 1.05
C. LHGR-limit/LHGR-actual; 1.10
D. LHGR-actual/LHGR-limit; 1.15
答案： C.

科目： 293009
知能類： K1.07 [2.8/3.6]
序號： B295

Operating a reactor below the linear heat generation rate thermal limit prevents...
A. cracking of the fuel cladding due to high stress from fuel pellet expansion.
B. melting of the fuel cladding due to cladding temperature exceeding 2200^{o}F during an anticipated transient without a scram.
C. cracking of the fuel cladding due to a lack of cooling caused by departure from nucleate boiling.
D. melting of the fuel cladding due to a lack of cooling following a loss of coolant accident.
ANSWER: A

反應爐要在低於單位長度發熱率（LHGR）熱限值運轉，乃為防止
A. 由於燃料丸膨脹造成高應力所導致之燃料護套破裂
B. 在預期暫態未急停(ATWS)時，由於護套溫度超過2200^{o}F所導致的燃料護套融化
C. 由於因偏離核沸騰造成缺乏冷卻所導致之燃料護套破裂
D. 由於在冷卻水流失事故後缺乏冷卻所導致的燃料護套融化
答案： A.

科目： 293009
知能類： K1.07 [2.8/3.6]
序號： B392

Which one of the following limits takes into consideration fuel-pellet swell effects?
A. Average gain adjustment factor
B. Maximum linear heat generation rate
C. Rated thermal power
D. Minimum critical power ratio
ANSWER: B

下列何種限制是考慮到燃料丸膨脹效應？
A. 平均增益調整因子
B. 最大單位長度發熱率（LHGR）
C. 額定熱功率
D. 最小臨界功率比
答案： B.

科目： 293009
知能類： K1.07 [2.8/3.6]
序號： B894

Which one of the following must be maintained within the technical specification limit to ensure that fuel cladding plastic strain (deformation) is limited to 1%?
A. Average planar linear heat generation rate
B. Linear heat generation rate
C. Minimum critical power ratio safety limit
D. Minimum critical power ratio operating limit
ANSWER: B

為了要使燃料護套塑性應變（變形）限制在1%之內，下列何者必須要維持在運轉規範之限制內？
A. 平面單位長度平均發熱率
B. 單位長度發熱率（LHGR）
C. 最小臨界功率比安全限值
D. 最小臨界功率比運轉限值
答案： B.

科目： 293009
知能類： K1.07 [2.8/3.6]
序號： B1093

Which one of the following is responsible for the clad failure caused by operating the reactor above the limit for linear heat generation rate?
A. Fission product gas expansion causes clad internal design pressure to be exceeded.
B. Corrosion buildup on the fuel clad surface reduces heat transfer and promotes transition boiling.
C. The zircaloy-steam reaction causes accelerated oxidation of the clad at high temperatures.
D. The difference between thermal expansion rates of the fuel pellets and the clad causes severe clad stress.
ANSWER: D

反應爐在超過單位長度發熱率（LHGR）下運轉，下列何者為護套損壞之主因？
A. 分裂產物氣體膨脹導致護套內壓力超過設計壓力
B. 在燃料護套表面累積腐蝕產物，減小了熱傳並增加變態沸騰
C. 鋯合金與蒸汽反應導致了護套在高溫下加速氧化
D. 燃料丸與護套之間的熱膨脹差異，導致了嚴重的護套應力
答案： D.

科目： 293009
知能類： K1.07 [2.8/3.6]
序號： B1692

Maintaining the linear heat generation rate below the thermal limit ensures that...
A. peak cladding temperature after the design basis loss of coolant accident will not exceed 2200^{o}F.
B. during transients, more than 99.97% of the fuel rods will avoid transition boiling.
C. plastic strain (deformation) of the cladding will not exceed 1%.
D. peaking factors will not exceed those assumed in the safety analysis.
ANSWER: C

維持單位長度發熱率（LHGR）在熱限值之下的目的是要確保
A. 尖峰護套溫度在設計基準冷卻水流失事故後，不會超過2200^{o}F
B. 在暫態時，99.97%以上的燃料棒不會發生變態沸騰
C. 護套之塑性應變（變形）不會超過1%
D. 尖峰因子不會超越安全分析中所假定之值
答案： C.

科目： 293009
知能類： K1.08 [3.0/3.4]
序號： B592

If the linear heat generation rate (LHGR) limiting condition for operation is exceeded, the most probable type of fuel failure is cladding...
A. cracking due to high stress.
B. gross failure due to a lack of cooling.
C. embrittlement due to excessive oxidation.
D. distortion due to inadequate cooling of the clad.
ANSWER: A

若超過了單位長度發熱率（LHGR）的運轉限制條件(LCO)，則最可能發生的燃料損壞類型是護套
A. 因為高應力而破裂
B. 因為缺乏冷卻而大量損壞
C. 因為氧化過量而產生脆化
D. 因為護套冷卻不足而產生扭曲
答案： A.

科目： 293009
知能類： K1.09 [3.1/3.7]
序號： B95

The fraction of the limiting power density (FLPD) is equal to...
Where: LHGR = Linear heat generation rate
TPF = Total peaking factor
A. LHGR (actual)
LHGR (limit)
B. LHGR (limit)
LHGR (actual)
C. LHGR (limit) x TPF
LHGR (actual)
D. LHGR (actual)
LHGR (limit) x TPF
ANSWER: A

極限功率密度分率（FLPD）等於
(其中LHGR＝單位長度發熱率；TPF＝總尖峰因子)
A. LHGR (actual)/LHGR (limit)
B. LHGR (limit)/LHGR (actual)
C. LHGR (limit) x TPF/LHGR (actual)
D. LHGR (actual)/LHGR (limit) x TPF
答案： A.

科目： 293009
知能類： K1.10 [3.3/3.7]
序號： B297

The amount of heat stored in the fuel, resulting from the operating kW/foot existing in the fuel prior to a scram, is measured by the...
A. average planar linear heat generation rate (APLHGR).
B. linear heat generation rate (LHGR) multiplied by the total peaking factor.
C. core fraction of limiting power density.
D. APLHGR-to-MAPLHGR ratio.
ANSWER: A

急停之前運轉所產生而儲存於燃料內的熱量是由下列何者來測量？
A. 平面單位長度平均發熱率（APLHGR）
B. 單位長度發熱率（LHGR）乘以總尖峰因子
C. 爐心極限功率密度分率(core fraction of limiting power density)
D. APLHGR對MAPLHGR之比值
答案： A.

科目： 293009
知能類： K1.11 [2.8/3.6]
序號： B195

Which one of the following must be maintained within limits to ensure that peak cladding temperature will not exceed 2200^{o}F after a design basis loss of coolant accident?
A. Linear heat generation rate
B. Average planar linear heat generation rate
C. Minimum critical power ratio
D. Maximum fraction of limiting critical power ratio
ANSWER: B

下列何者必須要維持在限值之內，以確保在設計基準冷卻水流失事故後，尖峰護套溫度不會超過2200^{o}F？
A. 單位長度發熱率(LHGR)
B. 平面單位長度平均發熱率（APLHGR）
C. 最小臨界功率比率
D. 最大極限臨界功率比分率
答案： B.

科目： 293009
知能類： K1.11 [2.8/3.6]
序號： B1393

Maintaining the average planar linear heat generation rate (APLHGR) below the technical specification limiting condition for operation (LCO) ensures that...

A. peak clad temperature after the design basis loss of coolant accident will not exceed 2200^{o}F.
B. during transients, more than 99.9% of the fuel rods are expected to avoid transition boiling.
C. plastic strain (deformation) of the cladding will not exceed 1%.
D. axial peaking factors will not exceed those assumed in the safety analyses.

ANSWER: A

維持平面單位長度平均發熱率（APLHGR）在運轉規範之運轉限制條件（LCO）內，乃為確保

A. 在設計基準冷卻水流失事故後，尖峰護套溫度不會超過2200^{o}F
B. 在暫態時，99.9%以上的燃料棒不會發生變態沸騰
C. 護套之塑性應變（變形）不會超過1%
D. 軸向尖峰因子不會超越安全分析中所假定之值

答案： A.

科目： 293009
知能類： K1.11 [2.8/3.6]
序號： B1793 (P396)

The 2200°F maximum peak fuel cladding temperature limit is imposed because...
A. 2200°F is approximately 500°F below the fuel cladding melting temperature.
C. the rate of the zircaloy-steam reaction increases significantly at temperatures above 2200°F.
D. any cladding temperature higher than 2200°F correlates to a fuel centerline temperature above the fuel melting point.
E. the thermal conductivity of zircaloy decreases rapidly at temperatures above 2200°F causing an unacceptably sharp rise in the fuel centerline temperature.
ANSWER: A

2200°F的最高尖峰燃料護套溫度限制，乃因為
A. 2200°F大約比燃料護套融化溫度低500°F
B. 溫度大於2200°F以上會使鋯合金-蒸汽反應率明顯增加
C. 任何高於2200°F的護套溫度會與燃料中央溫度大於燃料熔點有關聯
D. 鋯合金的熱傳導係數在2200°F以上會快速降低，導致燃料中央溫度不可接受之急速上升
答案： B.

科目： 293009
知能類： K1.11 [2.8/3.6]
序號： B2194 (P2194)

Which one of the following describes the basis for the 2200°F maximum fuel clad temperature limit?

A. The material strength of zircaloy decreases rapidly at temperatures above 2200°F
B. At the normal operating pressure of the reactor vessel a clad temperature of 2200°F indicates that the critical power has been exceeded.
C. The rate of the zircaloy-steam reaction becomes significant at temperatures above 2200°F.
D. 2200°F is approximately 500°F below the fuel clad melting temperature.

ANSWER: C

下列何者為2200°F之最大燃料護套溫度限制的基準？

A. 鋯合金之材料強度在溫度2200°F以上會快速降低
B. 反應爐槽在正常運轉壓力時，護套溫度2200°F代表了已超過臨界功率
C. 溫度大於2200°F會使鋯合金-蒸汽反應率變得顯著
D. 2200°F大約比燃料護套融化溫度低500°F

答案： C.

科目： 293009
知能類： K1.11 [2.8/3.6]
序號： B2292 (P2995)

Which one of the following describes the basis for the 2,200^{o}F maximum fuel clad temperature limit?

A. 2,200^{o}F is approximately 500^{o}F below the fuel clad melting temperature.
B. The rate of the zircaloy-steam reaction increases significantly above 2,200^{o}F.
C. If fuel clad temperature reaches 2,200^{o}F, the onset of transition boiling is imminent.
D. The differential expansion between the fuel pellets and the fuel clad becomes excessive above 2,200^{o}F.

ANSWER: B

下列何者為2200^{o}F之最大燃料護套溫度限制的基準？

A. 2200^{o}F大約比燃料護套融化溫度低500^{o}F
B. 溫度大於2200^{o}F會使鋯合金-蒸汽反應率顯著增加
C. 若燃料護套溫度達到2200^{o}F,則變態沸騰即將開始
D. 溫度大於2200^{o}F時，燃料丸與燃料護套會發生過度的膨脹差

答案： B.

科目： 293009
知能類： K1.12 [2.9/3.5]
序號： B494
If the average planar linear heat generation rate limit is exceeded, what is the most probable type of fuel clad failure during a design basis loss of cooling accident?
A. Cracking due to high stress
B. Embrittlement due to excessive oxidation
C. Cracking due to uneven heating and cooling of the clad
D. Gross failure due to exceeding 2200^{o}F peak clad temperature
ANSWER: D

若超過平面單位長度平均發熱率（APLHGR）限值，則在設計基準冷卻水流失事故後，最可能發生何種類型的護套損壞？
A. 因為高應力產生的破裂
B. 因為過度氧化所產生的脆化
C. 因為護套冷熱不均勻所產生的破裂
D. 因為尖峰護套溫度超過2200^{o}F所產生的大量損壞
答案： D.

科目： 293009
知能類： K1.13 [3.1/3.6]
序號： B97

Operating a reactor within limits defined by the maximum average planar linear heat generation rate (MAPLHGR) prevents...
A. exceeding 1% plastic strain in the cladding.
B. exceeding peak fuel temperature of 2200^{o}F.
C. the onset of transition boiling in the upper core.
D. exceeding a peak clad temperature of 2200^{o}F.
ANSWER: D

反應爐運轉在最大平均平面單位長度發熱率（MAPLHGR）之下，乃為預防
A. 護套塑性應力超過1%
B. 尖峰燃料溫度超過2200^{o}F
C. 爐心上部發生變態沸騰
D. 尖峰護套溫度超過2200^{o}F
答案： D.

科目： 293009
知能類： K1.13 [3.1/3.6]
序號： B896

Which of the following is indicated when the average planar linear heat generation rate (APLHGR)-to-maximum APLHGR ratio is less than 1?
A. Linear heat generation rate (LHGR) limit has not been exceeded.
B. LHGR limit has been exceeded.
C. APLGHR limit has not been exceeded.
D. APLGHR limit has been exceeded.
ANSWER: C

當平均平面單位長度發熱率（APLHGR）與最大平均平面單位長度發熱率的比例小於1，代表目前狀況為何？
A. 尚未超過單位長度發熱率(LHGR)限值
B. 已經超過LHGR限值
C. 尚未超過APLHGR限值
D. 已經超過APLHGR限值
答案： C.

科目： 293009
知能類： K1.13 [3.1/3.6]
序號： B1595

Which one of the following is indicated when the maximum average power ratio (MAPRAT) is greater than 1.0?
A. The linear heat generation rate (LHGR) limit has not been exceeded.
B. The average planar linear heat generation rate (APLHGR) limit has not been exceeded.
C. The LHGR limit has been exceeded.
D. The APLHGR limit has been exceeded.
ANSWER: D

當最大平均功率比(MAPRAT)大於1，代表目前狀況為何？
A. 尚未超過單位長度發熱率(LHGR)限值
B. 尚未超過平均平面單位長度發熱率（APLHGR）
C. 已經超過LHGR限值
D. 已經超過APLHGR限值
答案： D.

科目： 293009
知能類： K1.13 [3.1/3.6]
序號： B1795

Which one of the following is indicated when the maximum average power ratio (MAPRAT) is less than 1.0?
A. The linear heat generation rate (LHGR) limit has been exceeded.
B. The average planar linear heat generation rate (APLHGR) limit has been exceeded.
C. The APLHGR limit has not been exceeded.
D. The LHGR limit has not been exceeded.
ANSWER: C

當最大平均功率比(MAPRAT)小於1，代表目前狀況為何？
A. 已經超過單位長度發熱率(LHGR)限值
B. 已經超過平均平面單位長度發熱率（APLHGR）
C. 尚未超過APLHGR限值
D. 尚未超過LHGR限值
答案： C.

科目： 293009
知能類： K1.13 [3.1/3.6]
序號： B2595

If a reactor is operating above its Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) prior to a loss of coolant accident, fuel pellet centerline temperature may reach 4200°F and fuel cladding temperature may reach 2300°F during the accident.
Which one of the following describes the likely clad rupture mechanism?
A. Excessive fuel pellet expansion
B. Excessive plastic strain in the clad
C. Excessive embrittlement of the clad
D. Excessive cadmium and iodine attack on the clad
ANSWER: C

若一反應爐在冷卻水流失事故前運轉在高於最大平均平面單位長度發熱率(MAPLHGR)，當事故時，燃料丸中央溫度可能達到4200°F，且燃料護套溫度可能達到2300°F。下列何者描述了可能發生的護套破裂機制？
A. 燃料丸膨脹過大
B. 護套塑性應變過大
C. 護套脆化過度
D. 鎘與碘侵襲護套過度
答案： C.

科目： 293009
知能類： K1.14 [2.2/2.7]
序號： B393
At high core exposures, the maximum average planar linear heat generation rate (MAPLHGR) limit decreases with increasing core exposure. What is the reason for this decrease?
A. Buildup of krypton and xenon gas reduces stress on cladding, thereby reducing MAPLHGR limit.
B. Zirconium-steam chemical reaction in cladding becomes less reactive with increased core age.
C. Fission product gases leak out of control rods, thereby reducing heat transfer coefficient.
D. Fission product gases have a lower heat transfer coefficient than the helium fill gas.
ANSWER: D

在高爐心曝露(exposure)下，最大平均平面單位長度發熱率(MAPLHGR)限值會隨著爐心曝露的增加而下降。此下降之原因為何？
A. 氪與氙氣的累積而降低護套的應力，因而降低了MAPLHGR限值
B. 隨著爐心壽命增加，護套內的鋯-蒸汽化學反應活性下降
C. 分裂產物氣體自控制棒洩漏，因而降低了熱傳係數
D. 分裂產物氣體的熱傳係數比填充氦氣的熱傳係數低
答案： D.

科目： 293009
知能類： K1.15 [2.6/3.1]
序號： B792

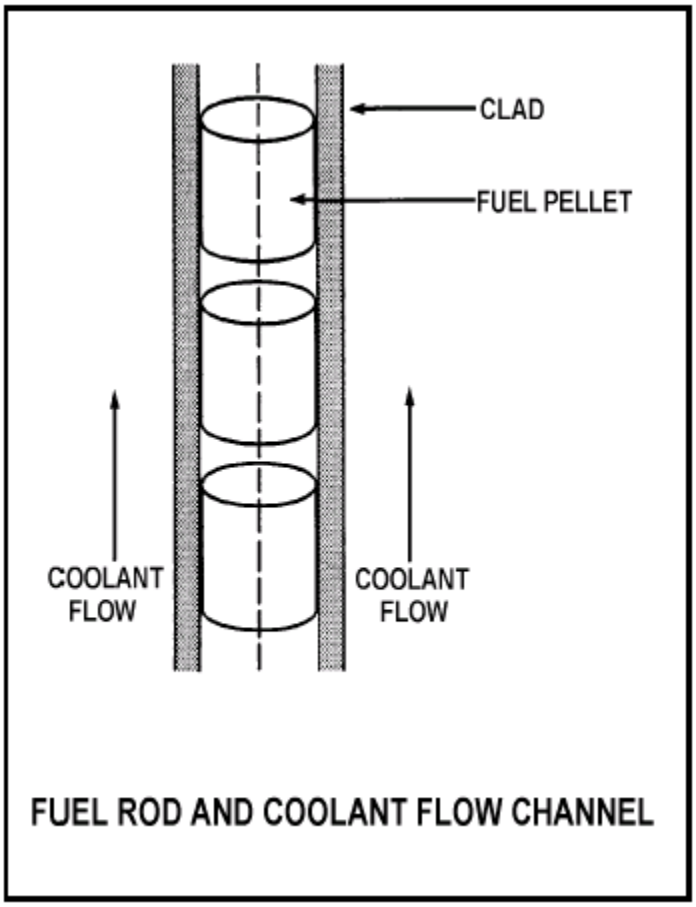
During a loss-of-coolant accident, which one of the following heat transfer mechanisms provides the most core cooling when fuel elements are not in contact with the coolant?
A. Radiation
B. Emission
C. Convection
D. Conduction
ANSWER: A

在冷卻水流失事故中，當燃料元件無法與冷卻水接觸時，下列何種熱傳機制提供最多的爐心冷卻？
A. 輻射
B. 發射
C. 對流
D. 傳導
答案： A.

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B394 (P895)

Refer to the drawing of a fuel rod and coolant flow channel at the beginning of core life (see figure below).
Given the following initial core parameters:
Reactor power = 100%
$T_{coolant} = 500^oF$
$T_{fuel\ centerline} = 3000^oF$
Which one of the following would be the fuel centerline temperature if, over core life, the total fuel-to-coolant thermal conductivity were doubled? (Assume reactor power is constant.)
A. 1000^oF
B. 1250^oF
C. 1500^oF
D. 1750^oF
ANSWER: A

參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝100%
$T_{coolant} = 500^oF$
$T_{fuel\ centerline} = 3000^oF$
在整個爐心壽命中，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. 1000^oF
B. 1250^oF
C. 1500^oF
D. 1750^oF
答案： D.

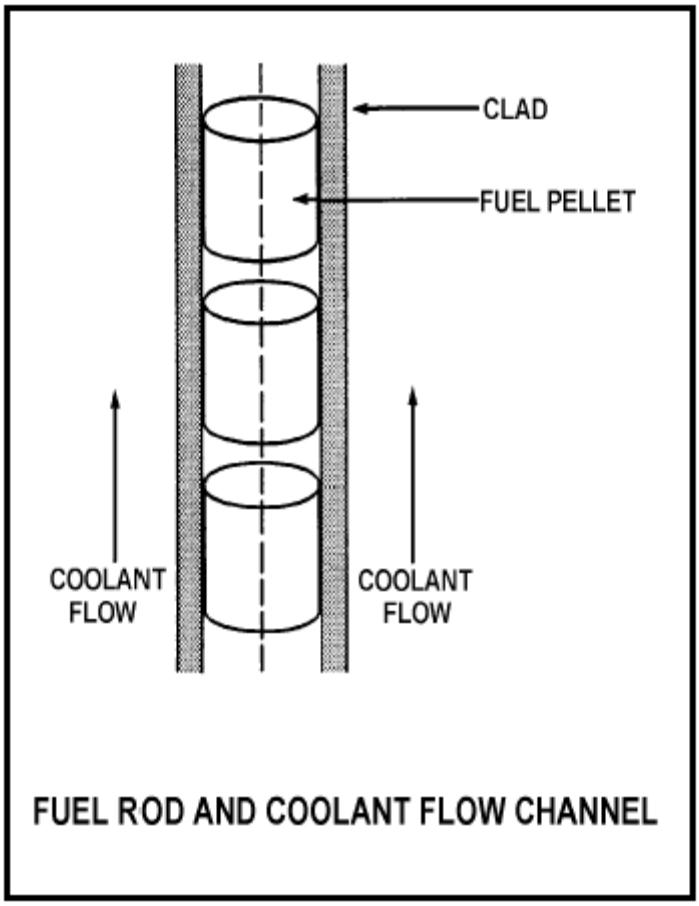


FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B495 (P495)

Refer to the drawing of a fuel rod and coolant flow channel at the beginning of core life (see figure below).
Given the following initial core parameters:
Reactor power = 100%
$T_{coolant} = 500^{o}F$
$T_{fuel\ centerline} = 2500^{o}F$
What would the fuel centerline temperature be if, over core life, the total fuel-to-coolant thermal conductivity were doubled? (Assume reactor power is constant.)
A. $1250^{o}F$
B. $1300^{o}F$
C. $1400^{o}F$
D. $1500^{o}F$
ANSWER: D

參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝100%
$T_{coolant} = 500^{o}F$
$T_{fuel\ centerline} = 2500^{o}F$
在整個爐心壽命中，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. $1250^{o}F$
B. $1300^{o}F$
C. $1400^{o}F$
D. $1500^{o}F$
答案： D.



FUEL ROD AND COOLANT FLOW CHANNEL

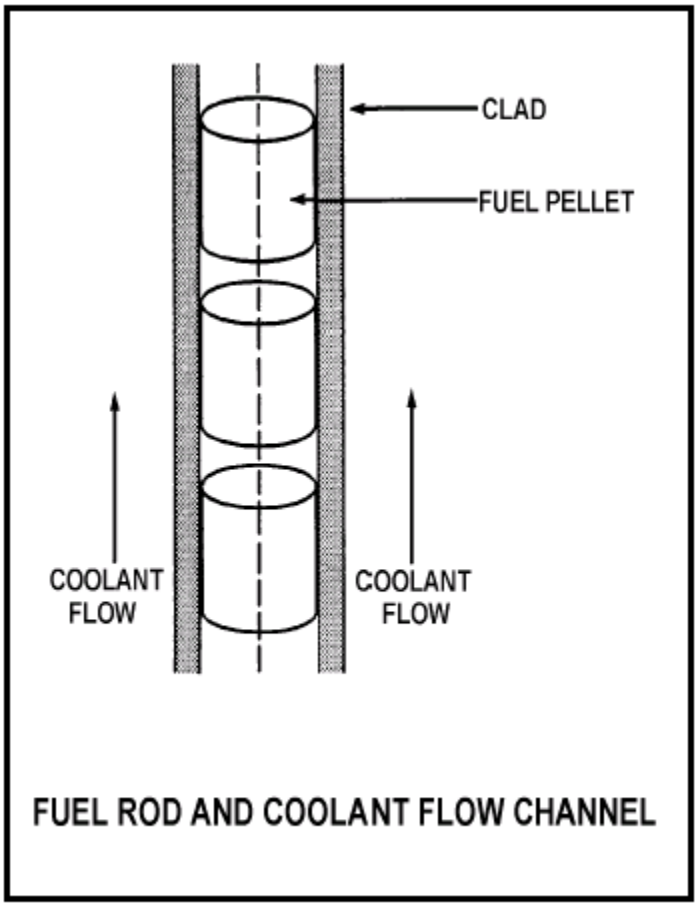
科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B1395 (P1894)
Which one of the following describes the fuel-to-coolant thermal conductivity at the end of core life (EOL) as compared to the beginning of core life (BOL)?
A. Smaller at EOL due to fuel pellet densification
B. Smaller at EOL due to contamination of fill gas with fission product gases
C. Larger at EOL due to reduction in gap between fuel pellets and clad
D. Larger at EOL due to greater temperature difference between fuel pellets and coolant
ANSWER: C

相較於爐心壽命初期（BOL），在爐心壽命末期（EOL）燃料對冷卻水之熱傳導係數如何？
A. 在EOL時較小，因為燃料丸密化
B. 在EOL時較小，因為填充氣體被分裂產物氣體污染
C. 在EOL時較大，因為燃料丸與護套間的間隙縮小
D. 在EOL時較大，因為燃料丸與冷卻水間的溫差較大
答案： C.

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B1594 (P1594)

Refer to the drawing of a fuel rod and coolant flow channel at the beginning of core life (see figure below).
Given the following initial core parameters:
Reactor power = 100%
$T_{coolant} = 500^{o}F$
$T_{fuel\ centerline} = 2700^{o}F$
What would be the fuel centerline temperature at the end of core life if the total fuel-to-coolant thermal conductivity doubled? (Assume reactor power is constant.)
A. $1100^{o}F$
B. $1350^{o}F$
C. $1600^{o}F$
D. $1850^{o}F$
ANSWER: C

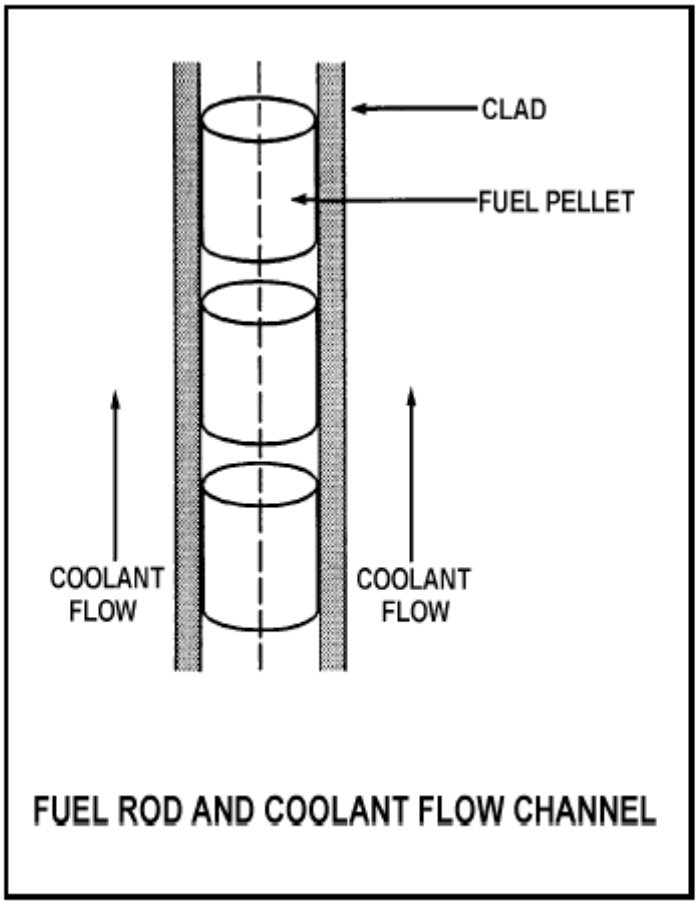
參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝100％
$T_{coolant} = 500^{o}F$
$T_{fuel\ centerline} = 2700^{o}F$
在爐心壽命末期中，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. $1100^{o}F$
B. $1350^{o}F$
C. $1600^{o}F$
D. $1850^{o}F$
答案： C.



FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B1697 (P3395)
Refer to the drawing of a fuel rod and coolant flow channel at the beginning of core life (see figure below).
Given the following initial core parameters:
Reactor power = 50%
$T_{coolant}$ = 550°F
$T_{fuel\ centerline}$ = 2750°F
What will the fuel centerline temperature be if, over core life, the total fuel-to-coolant thermal conductivity doubles? (Assume reactor power is constant.)
A. 1100°F
B. 1375°F
C. 1525°F
D. 1650°F
ANSWER: D

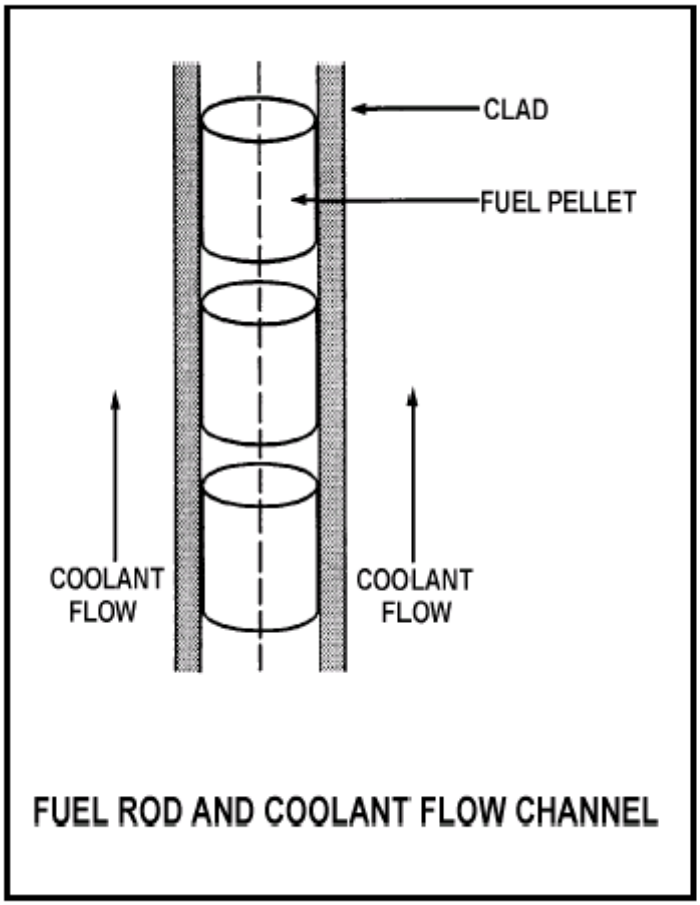
參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝50％
$T_{coolant}$ = 550°F
$T_{fuel\ centerline}$ = 2750°F
在整個爐心壽命中，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. 1100°F
B. 1375°F
C. 1525°F
D. 1650°F
答案： D.



FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B1995 (P1994)
Refer to the drawing of a fuel rod and coolant flow channel (see figure below) at beginning of core life.
Given the following initial core parameters:
Reactor power = 80%
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 2540°F
What would the fuel centerline temperature be if, over core life, the total fuel-to-coolant thermal conductivity were doubled? (Assume reactor power is constant.)
A. 1270°F
B. 1370°F
C. 1440°F
D. 1540°F
ANSWER: D

參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝80％
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 2540°F
在整個爐心壽命中，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. 1270°F
B. 1370°F
C. 1440°F
D. 1540°F
答案： D.



FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B2192 (P2195)

Which one of the following describes the fuel-to-coolant thermal conductivity for a fuel assembly at the beginning of core life (BOL) as compared to the end of core life (EOL)?

A. Larger at BOL due to a higher fuel pellet density
B. Larger at BOL due to lower contamination of fuel rod fill gas with fission product gases
C. Smaller at BOL due to a larger gap between the fuel pellets and clad
D. Smaller at BOL due to a smaller corrosion film on the surface of the fuel rods

ANSWER: C

相較於爐心壽命末期（EOL），對一燃料元件在爐心壽命初期（BOL）燃料對冷卻水之熱傳導係數如何？

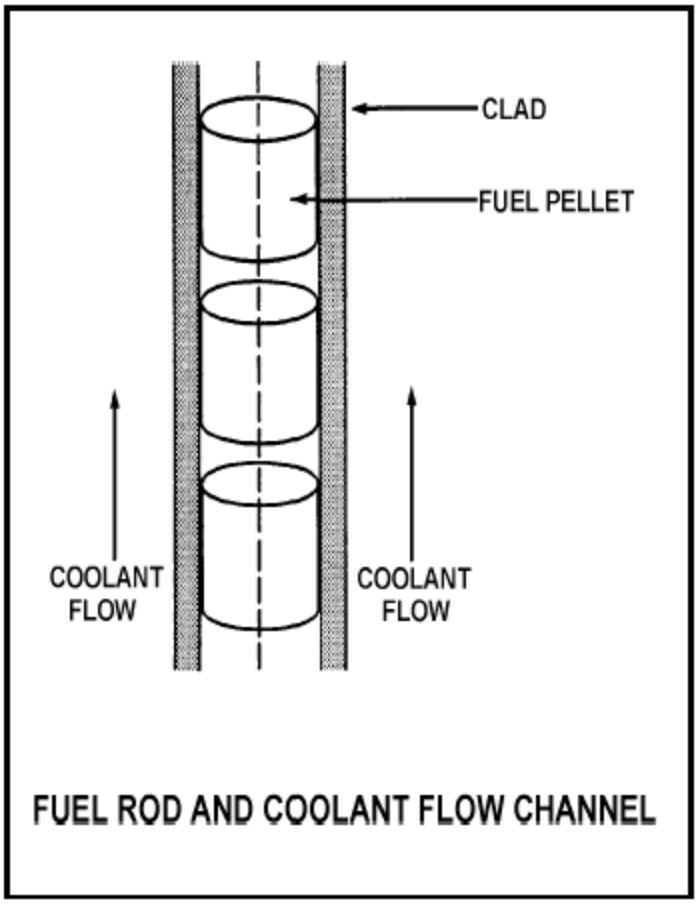
A. 在BOL時較大，因為燃料丸密度較大
B. 在BOL時較大，因為填充氣體被分裂產物氣體污染程度較低
C. 在BOL時較小，因為燃料丸與護套間的間隙較大
D. 在BOL時較小，因為燃料棒表面的腐蝕膜較小

答案： C.

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B2394 (P2395)

Refer to the drawing of a fuel rod and coolant flow channel (see figure below) at beginning of core life.
The reactor is shut down with the following parameter values:
$T_{coolant} = 320^oF$
$T_{fuel\ centerline} = 780^oF$
What would the fuel centerline temperature be under these same conditions at the end of core life if the total fuel-to-coolant thermal conductivity were doubled?
A. 550^oF
B. 500^oF
C. 450^oF
D. 400^oF
ANSWER: A

參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
此反應爐停爐時具有下列參數值：
$T_{coolant} = 320^oF$
$T_{fuel\ centerline} = 780^oF$
爐心壽命末期，若燃料對冷卻水之總熱傳導係數增加一倍，則相同條件下的燃料中央溫度為何？
A. 550^oF
B. 500^oF
C. 450^oF
D. 400^oF
答案： A.

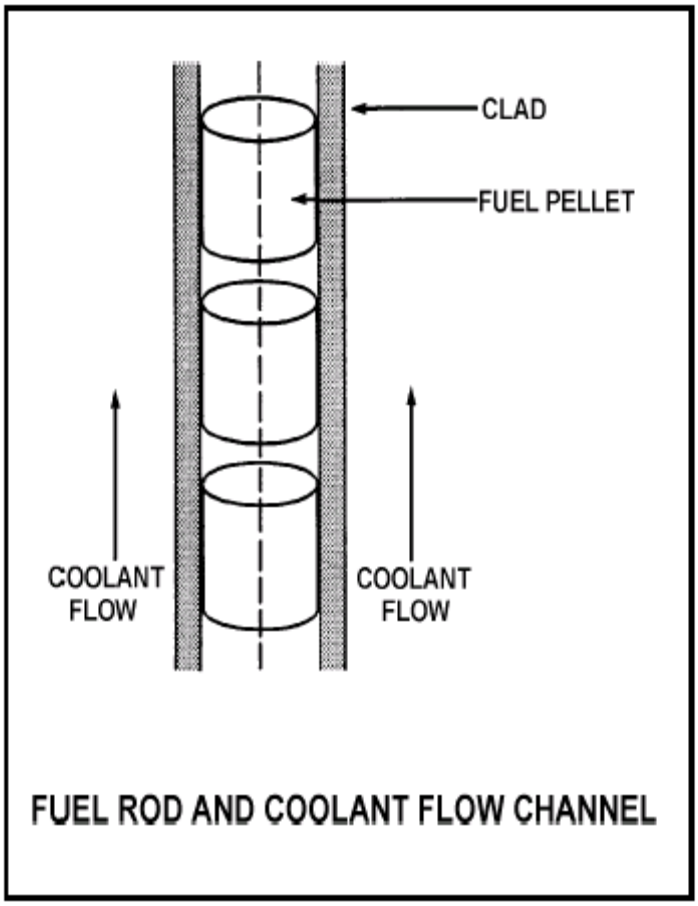


FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B2696 (P2296)

Refer to the drawing of a fuel rod and coolant flow channel at the beginning of a fuel cycle (see figure below).
Given the following initial core parameters:
Reactor power = 60%
$T_{coolant} = 560^{o}F$
$T_{fuel\ centerline} = 2500^{o}F$
Which one of the following will be the fuel centerline temperature at the end of the fuel cycle if the total fuel-to-coolant thermal conductivity doubles? (Assume reactor power is constant.)
A. $1080^{o}F$
B. $1250^{o}F$
C. $1530^{o}F$
D. $1810^{o}F$
ANSWER: C

參考於爐心壽命初期之燃料棒與冷卻水流通道之圖示（見下圖）。
根據下列初始爐心參數：
反應爐功率＝60％
$T_{coolant} = 560^{o}F$
$T_{fuel\ centerline} = 2500^{o}F$
在燃料週期末期，若燃料對冷卻水之總熱傳導係數增加一倍，則燃料中央溫度將是下列何者？（假設反應爐功率維持不變。）
A. $1080^{o}F$
B. $1250^{o}F$
C. $1530^{o}F$
D. $1810^{o}F$
答案： C.



FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B2794 (N/A)

Given the following initial core parameters for a segment of a fuel rod:
Power density = 2 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 1200°F
Reactor power is increased such that the following core parameters now exist for the fuel rod segment:
Power density = 3 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = ?
Assuming void fraction surrounding the fuel rod segment does not change, what will be the new stable $T_{fuel\ centerline}$?
A. 1380°F
B. 1530°F
C. 1670°F
D. 1820°F
ANSWER: B

根據某燃料棒某區段之下列初始爐心參數：
功率密度 = 2 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 1200°F
反應爐功率增加因而導致下列燃料棒爐心參數：
功率密度 = 3 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = ?
假設在燃料棒區段周圍之空泡分率不變，則新的穩定$T_{fuel\ centerline}$為何?
A. 1380°F
B. 1530°F
C. 1670°F
D. 1820°F
答案： B.

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B2896 (N/A)

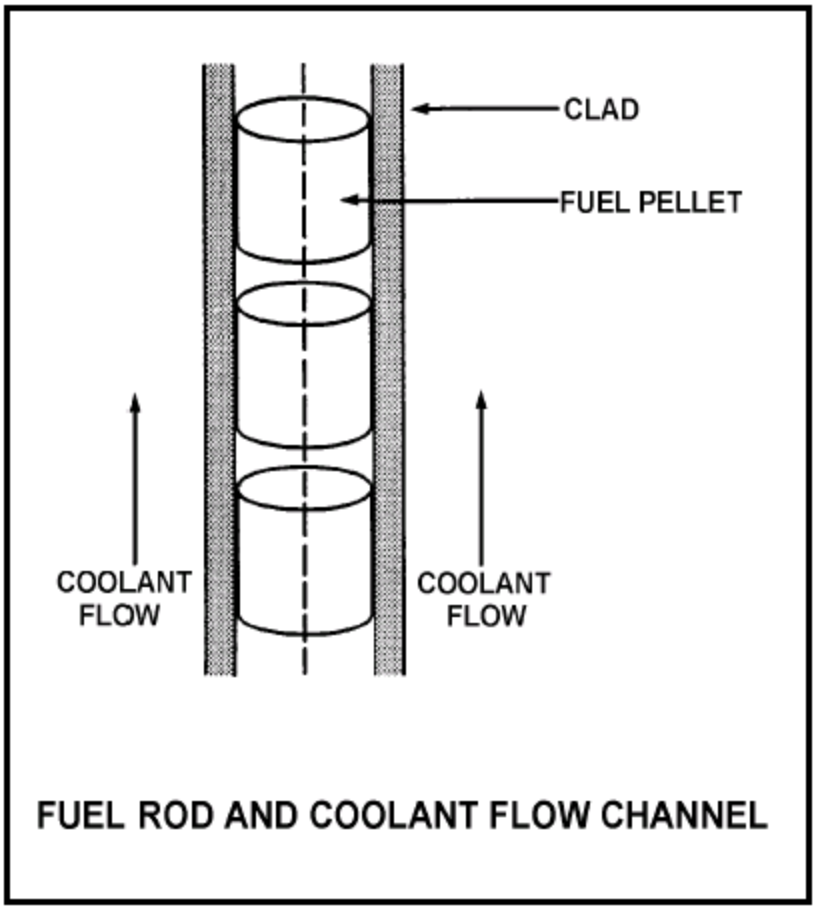
Given the following initial core parameters for a segment of a fuel rod:
Power density = 2 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 1800°F
Reactor power is increased such that the following core parameters now exist for the fuel rod segment:
Power density = 4 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = ?
Assuming void fraction surrounding the fuel rod segment does not change, what will be the new stable $T_{fuel\ centerline}$?
A. 2520°F
B. 2780°F
C. 3060°F
D. 3600°F
ANSWER: C

根據某燃料棒某區段之下列初始爐心參數：
功率密度 = 2 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = 1800°F
反應爐功率增加因而導致下列燃料棒爐心參數：
功率密度 = 4 kW/ft
$T_{coolant}$ = 540°F
$T_{fuel\ centerline}$ = ?
假設在燃料棒區段周圍之空泡分率不變，則新的穩定$T_{fuel\ centerline}$為何?
A. 2520°F
B. 2780°F
C. 3060°F
D. 3600°F
答案： C.

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B3193 (P3195)

Refer to the drawing of a fuel rod and coolant flow channel (see figure below).
The reactor is shut down at the beginning of a fuel cycle with the following average parameter values:
$T_{coolant} = 440^oF$
$T_{fuel\ centerline} = 780^oF$
If the total fuel-to-coolant thermal conductivity doubles over core life, what will the fuel centerline temperature be with the same coolant temperature and reactor decay heat conditions at the end of the fuel cycle?
A. 610^oF
B. 580^oF
C. 550^oF
D. 520^oF
ANSWER: A

參考燃料棒與冷卻水流通道之圖示（見下圖）。
此反應爐於燃料週期初期停爐，並具有下列參數值：
$T_{coolant} = 440^oF$
$T_{fuel\ centerline} = 780^oF$
爐心壽命末期在相同之冷卻水溫度與反應爐衰變熱的情況下，若燃料對冷卻水之總熱傳導係數增加一倍時，則燃料中央溫度為何？
A. 610^oF
B. 580^oF
C. 550^oF
D. 520^oF
答案： A.

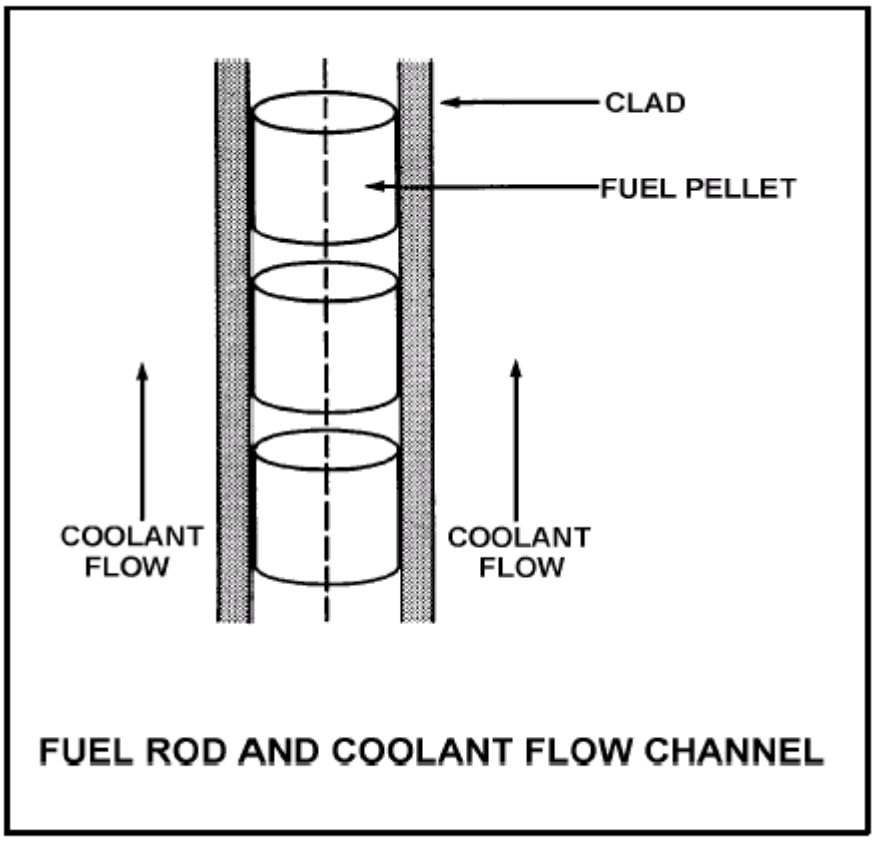


FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.16 [2.4/2.8]
序號： B3893

Refer to the drawing of a fuel rod and coolant flow channel (see figure below).
Given the following initial stable core parameters:
Reactor power = 50%
$T_{coolant}$ = 550°F
$T_{fuel\ centerline}$ = 1,250°F
Assume that the total heat transfer coefficient and the reactor coolant temperature do not change. What will the approximate stable fuel centerline temperature be if reactor power is increased to 75%?
A. 1,425°F
B. 1,600°F
C. 1,750°F
D. 1,875°F
ANSWER: B

參考燃料棒與冷卻水流動通道之圖示（見下圖）。
根據下列初始穩定爐心參數：
反應爐功率＝50%
$T_{coolant}$ = 550°F
$T_{fuel\ centerline}$ = 1,250°F
假設總熱傳係數與反應爐冷卻水溫度不變。若反應爐功率增加至75%，則穩定燃料中央溫度約為何？
A. 1,425°F
B. 1,600°F
C. 1,750°F
D. 1,875°F
答案： B.



FUEL ROD AND COOLANT FLOW CHANNEL

科目： 293009
知能類： K1.17 [3.3/3.7]
序號： B145

The fuel bundle power that will cause the onset of transition boiling at some point in the fuel bundle is the...
A. technical specification limit.
B. critical power.
C. maximum fraction of limiting power density.
D. maximum power density.
ANSWER: B

在燃料束的某些點上會導致變態沸騰的燃料束功率稱為
A. 運轉規範限值
B. 臨界功率
C. 極限功率密度之最大分率
D. 最大功率密度
答案： B.

科目： 293009
知能類： K1.17 [3.3/3.7]
序號： B1997 (P3587)

Which one of the following is most likely to result in fuel clad damage?
A. Operating at 110% of reactor vessel design pressure.
B. An inadvertent reactor scram from 100% power.
C. Operating with fuel bundle power greater than critical power.
D. Operating with saturated nucleate boiling occurring in a fuel bundle.
ANSWER: C

下列何者最可能導致燃料護套受損？
A. 在110％反應爐槽設計壓力下運轉
B. 100％功率下反應爐意外急停
C. 在燃料束功率超過臨界功率下運轉
D. 在燃料束中發生飽和核沸騰下運轉
答案： C.

科目： 293009
知能類： K1.18 [3.2/3.7]
序號： B298

Which one of the following expressions describes the critical power ratio?
A. Critical power/actual bundle power
B. Actual bundle power/critical power
C. Average bundle power/critical power
D. Critical power/average bundle power
ANSWER: A

下列何者表示臨界功率比？
A. 臨界功率/實際燃料束功率
B. 實際燃料束功率/臨界功率
C. 平均燃料束功率/臨界功率
D. 臨界功率/平均燃料束功率
答案： A.

科目： 293009
知能類： K1.19 [2.8/3.6]
序號： B187

Which one of the following limits or conditions is avoided by maintaining the minimum critical power ratio within specific limits?
A. 1% plastic strain on cladding
B. 99.9% of the fuel pins in the core not experiencing transition boiling during a transient
C. Gross cladding failure due to lack of cooling
D. Fuel cladding cracking due to high stress
ANSWER: B

將最小臨界功率比維持在特定限值內，可以防止下列何種限制或狀況發生？
A. 1%護套塑性應變
B. 暫態時99.9%爐心燃料不會發生變態沸騰
C. 因為缺乏冷卻所導致的護套大量損壞
D. 因為高應力導致的護套破裂
答案： B.

科目： 293009
知能類： K1.19 [2.8/3.6]
序號： B597

Which one of the following adverse conditions is avoided primarily by maintaining the minimum critical power ratio within specified values (limits)?
A. Excessive plastic strain on cladding
B. Excessive cladding creep
C. Excessive decay heat in the fuel
D. Excessive cladding temperatures
ANSWER: D

下列何種不利狀況主要靠維持最低臨界功率比例在特定限值內而加以避免？
A. 護套的塑性應變過大
B. 護套潛變(creep)過大
C. 燃料衰變熱過大
D. 護套溫度過高
答案： D.

科目： 293009
知能類： K1.19 [2.8/3.6]
序號： B694

The purpose of maintaining the critical power ratio greater than 1.0 is to...
A. prevent fuel clad cracking during analyzed accident conditions.
B. avoid the onset of transition boiling during expected operating transients.
C. limit peak cladding temperatures to less than 2200^{o}F during analyzed accident conditions.
D. prevent melting at the fuel pellet centerline during expected operating transients.
ANSWER: B

維持臨界功率比大於1.0的目的為
A. 預防在分析的事故狀況中燃料護套破裂
B. 避免在預期的運轉暫態時發生變態沸騰
C. 在事故分析時限制尖峰護套溫度小於2200^{o}F
D. 預防在預期的運轉暫態時燃料丸中央融化
答案： B.

科目： 293009
知能類： K1.19 [2.8/3.6]
序號： B798

Which thermal limit is maintained to ensure the core does not experience transition boiling?
A. Minimum critical power ratio
B. Maximum average planar linear heat generation ratio (APLHGR)
C. Maximum fraction of limiting power density
D. APLHGR-to-maximum APLHGR ratio
ANSWER: A

維持下列何項熱限值是為了確保爐心不致發生變態沸騰？
A. 最小臨界功率比
B. 最大平均平面單位長度發熱率(ALPHGR)
C. 極限功率密度之最大分率
D. ALPHGR與最大ALPHGR之比值
答案： A.

科目： 293009
知能類： K1.19 [2.8/3.6]
序號： B2796

If a reactor is operating with the minimum critical power ratio (MCPR) at its transient limit (safety limit), which one of the following is indicated?
A. None of the fuel rods are experiencing critical heat flux.
B. A small fraction of the fuel rods may be experiencing critical heat flux.
C. All radioactive fission products are being contained within the reactor fuel.
D. All radioactive fission products are being contained within either the reactor fuel or the reactor vessel.
ANSWER: B

若一反應爐運轉在最小臨界功率比(MCPR)的安全限值(safety limit），則下列何者為真？
A. 無燃料棒處於臨界熱通量
B. 有小比例的燃料棒正處於臨界熱通量
C. 所有的放射性分裂產物全部包封在反應爐燃料內
D. 所有的放射性分裂產物全部包封在反應爐燃料內或反應爐槽內
答案： B.

科目： 293009
知能類： K1.20 [3.1/3.6]
序號： B1196

Bundle critical power ratio must be maintained _____ 1.0 to prevent fuel damage caused by a rapid increase in the temperature of the _____.
A. greater than; fuel pellets
B. less than; fuel pellets
C. greater than; fuel clad
D. less than; fuel clad
ANSWER: C

燃料束臨界功率比必須要維持在_____1.0的情況下，以預防因_____的溫度快速增加所導致的燃料破損。
A. 大於；燃料丸
B. 小於；燃料丸
C. 大於；燃料護套
D. 小於；燃料護套
答案： C.

科目： 293009
知能類： K1.23 [2.8/3.2]
序號： B96

Which one of the following parameter changes will cause an increase in the critical power of a fuel bundle?
A. The subcooling of the coolant entering the bundle decreases.
B. The local peaking factor increases.
C. The coolant flow through the bundle increases.
D. The axial power peak shifts from the bottom to the top of the bundle.
ANSWER: C

下列何參數變化會導致燃料束之臨界功率增加？
A. 進入燃料束之冷卻水次冷度降低
B. 局部尖峰因子增加
C. 流經燃料束之冷卻水增加
D. 軸向功率尖峰從燃料束底部轉移至頂部
答案： C.

科目： 293009
知能類： K1.23 [2.8/3.2]
序號： B2498

A plant is operating at 90% power at the end of core life when reactor recirculation flow rate suddenly decreases by 10%. Assuming the reactor does not scram immediately, critical power will initially _____ and reactor power will initially _____.
A. increase; increase
B. increase; decrease
C. decrease; increase
D. decrease; decrease
ANSWER: D

一電廠於爐心壽命末期時正以90%功率運轉，此時反應爐再循環流量突然降低10%。假設反應爐並未立即急停，則臨界功率最初將會_____同時反應爐功率最初將會_____。
A. 增加；增加
B. 增加；降低
C. 降低；增加
D. 降低；降低
答案： D.

科目： 293009
知能類： K1.24 [2.7/3.2]
序號： B995

During normal power operation a reactor pressure increase causes critical power to _____ because the latent heat of vaporization _____.
A. increase; decreases
B. decrease; decreases
C. increase; increases
D. decrease; increases
ANSWER: B

在正常功率運轉時，反應爐壓力增加，將導致臨界功率_____，因為汽化潛熱_____。
A. 增加；減小
B. 減小；減小
C. 增加；增加
D. 減小；增加
答案： B.

科目： 293009
知能類： K1.24 [2.7/3.2]
序號： B1297

A plant is operating at 100% load when a turbine trip occurs with no bypass valve actuation. Assuming the reactor does not scram immediately, critical power ratio will initially...
A. increase due to an increased latent heat of vaporization.
B. decrease due to a decreased latent heat of vaporization.
C. increase due to an increased reactor power.
D. decrease due to a decreased reactor power.
ANSWER: B

當發生汽機跳脫而無旁通閥啟動時，電廠正運轉在100％負載。假設反應爐並未立即急停，則臨界功率比起初將會
A. 增加，因為汽化潛熱增加
B. 減小，因為汽化潛熱減小
C. 增加，因為反應爐功率增加
D. 減小，因為反應爐功率減小
答案： B.

科目： 293009
知能類： K1.24 [2.7/3.2]
序號： B2398

A plant is operating at 90% power at the end of core life when the turbine control system opens the turbine control valves an additional 5 percent. Assuming the reactor does not scram immediately, critical power ratio will initially _____ due to a(n) _____ latent heat of vaporization.
A. increase; increased
B. increase; decreased
C. decrease; increased
D. decrease; decreased
ANSWER: A

一爐心壽命末期的電廠正運轉於90%功率時，其汽機控制系統將汽機控制閥多開啟5%。假設反應爐並未立即急停，則臨界功率比最初將會_____，因為汽化潛熱_____。
A. 增加；增加
B. 增加；減小
C. 減小；增加
D. 減小；減小
答案： A.

科目： 293009
知能類： K1.24 [2.7/3.2]
序號： B2998 (N/A)

A plant is operating at 90% power at the end of core life when a signal error causes the turbine control system to throttle the turbine control valves 5 percent in the closed direction. Assuming the turbine control valves stabilize in their new position and the reactor does not scram, the critical power ratio will initially...
A. increase because reactor power initially increases.
B. decrease because reactor power initially decreases.
C. increase because the reactor coolant latent heat of vaporization initially increases.
D. decrease because the reactor coolant latent heat of vaporization initially decreases.
ANSWER: D

一爐心壽命末期的電廠正運轉於90%功率時，此時一信號錯誤導致汽機控制系統將汽機控制閥朝關閉方向節流5%。假設汽機控制閥穩定在新的位置，且反應爐並未急停，則臨界功率比最初將會
A. 增加，因為反應爐功率最初增加
B. 減小，因為反應爐功率最初減小
C. 增加，因為反應爐冷卻水汽化潛熱最初增加
D. 減小，因為反應爐冷卻水汽化潛熱最初減小
答案： D.

科目： 293009
知能類： K1.26 [2.6/3.1]
序號： B897

For a reactor operating at 100% power, which one of the following combinations of axial power distribution and recirculation system flow rate will result in the smallest critical power ratio in the limiting fuel bundle?

AXIAL POWER DISTRIBUTION	RECIRCULATION SYSTEM FLOW RATE
A. Top-peaked	Low
B. Top-peaked	High
C. Bottom-peaked	Low
D. Bottom-peaked	High

ANSWER: A

對於一運轉在100%功率之反應爐，下列何種軸向功率分佈與再循環系統流量的組合，將會導致最具限制性的燃料束最小臨界功率比？

軸向功率分佈	再循環系統流量
A. 頂部尖峰	低
B. 頂部尖峰	高
C. 底部尖峰	低
D. 底部尖峰	高

答案： A.

科目： 293009
知能類： K1.26 [2.6/3.1]
序號： B1396

How is critical power affected when the axial power distribution in a fuel bundle shifts from bottom-peaked to top-peaked?
A. Critical power increases to a new, higher value.
B. Critical power increases temporarily, then returns to its initial value.
C. Critical power decreases to a new, lower value.
D. Critical power decreases temporarily, then returns to its initial value.
ANSWER: C

當燃料束的軸向功率分佈從底部尖峰轉移至頂部尖峰時，臨界功率會受到何種影響？
A. 臨界功率增加至一新的較高值
B. 臨界功率暫時增加，其後回復其原來的值
C. 臨界功率降低至一新的較低值
D. 臨界功率暫時降低，其後回復其原來的值
答案： C.

科目： 293009
知能類： K1.27 [2.7/3.3]
序號： B795

For what operational condition does the flow biasing correction factor (K_f) adjust the minimum critical power ratio?
A. Operation at less than rated steam flow
B. Operation at greater than rated steam flow
C. Operation at less than rated core flow
D. Operation at greater than rated core flow
ANSWER: C

流量偏差修正因素在何種運轉條件下，會調整最小臨界功率比？
A. 運轉在小於額定蒸汽流量時
B. 運轉在大於額定蒸汽流量時
C. 運轉在小於額定爐心流量時
D. 運轉在大於額定爐心流量時
答案： C.

科目： 293009
知能類： K1.29 [2.4/2.7]
序號： B996

The fuel thermal time constant describes the amount of time required for...
A. the fuel to change its rate of heat generation by 63%.
B. the fuel centerline temperature to undergo 63% of its total change resulting from a given power change.
C. the fuel cladding temperature to undergo 63% of its total change resulting from a given change in fuel temperature.
D. reactor power to undergo 63% of its total change resulting from a given reactivity insertion.
ANSWER: C

燃料熱時間常數(thermal time constant)描述何種作用所需之時間？
A. 燃料改變其發熱率63%
B. 燃料中央溫度因功率變化而生變化時，達到其總變化之63%
C. 燃料護套溫度因燃料溫度變化而生變化時，達到其總變化之63%
D. 反應爐功率因反應度加入而生變化時，達到其總變化之63%
答案： C.

科目： 293009
知能類： K1.29 [2.4/2.7]
序號： B2496

The fuel thermal time constant specifies the amount of time required for...
A. a fuel bundle to achieve equilibrium temperature following a power change.
B. a fuel pellet to achieve equilibrium temperature following a power change.
C. the fuel centerline temperature to undergo most of its total change following a power change.
D. the fuel cladding temperature to undergo most of its total change following a power change.
ANSWER: D

燃料熱時間常數(thermal time constant)描述何種作用所需之時間？
A. 燃料束在功率變化後達到平衡溫度
B. 燃料丸在功率變化後達到平衡溫度
C. 燃料中央溫度在功率變化後經歷大部分的總變化
D. 燃料護套溫度在功率變化後經歷大部分的總變化
答案： D.

科目： 293009
知能類： K1.30 [2.3/2.7]
序號： B1596

A step increase in reactor power results in a fuel cladding surface temperature increase from 550^{o}F to 580^{o}F at steady-state conditions. The fuel thermal time constant is 6 seconds.Which one of the following is the approximate fuel cladding surface temperature 6 seconds after the power change?
A. 571^{o}F
B. 569^{o}F
C. 565^{o}F
D. 561^{o}F
ANSWER: B

反應爐功率步階(step)增加導致燃料護套表面溫度從550^{o}F增加至580^{o}F(最後的穩態溫度)。燃料熱時間常數(thermal time constant)為6秒。下列何者為在功率變化6秒後燃料護套的大約溫度？
A. 571^{o}F
B. 569^{o}F
C. 565^{o}F
D. 561^{o}F
答案： B.

科目： 293009
知能類： K1.30 [2.3/2.7]
序號： B2095

A step increase in reactor power results in a fuel cladding surface temperature increase from 560°F to 590°F. The fuel thermal time constant is 6 seconds.
Which one of the following is the approximate fuel cladding surface temperature 6 seconds after the power change?
A. 579°F
B. 575°F
C. 570°F
D. 567°F
ANSWER: A

反應爐功率步階(step)增加導致燃料護套表面溫度從560°F增加至590°F(最後的穩態溫度)。燃料熱時間常數(thermal time constant)為6秒。下列何者為在功率變化6秒後，燃料護套的大約溫度？
A. 579°F
B. 575°F
C. 570°F
D. 567°F
答案： A.

科目： 293009
知能類： K1.30 [2.3/2.7]
序號： B2193

A step increase in reactor power results in a fuel rod surface temperature increase from 555°F to 585°F at steady state conditions. The fuel thermal time constant is 6 seconds. Which one of the following is the approximate fuel rod surface temperature 6 seconds after the power change?
A. 574°F
B. 570°F
C. 567°F
D. 563°F
ANSWER: A

反應爐功率步階(step)增加導致燃料棒表面溫度從555°F增加至585°F(最後的穩態溫度)。燃料熱時間常數(thermal time constant)為6秒。下列何者為在功率變化6秒後，燃料棒表面的大約溫度？
A. 574°F
B. 570°F
C. 567°F
D. 563°F
答案： A.

科目： 293009
知能類： K1.30 [2.3/2.7]
序號： B2297

A step increase in reactor power will result in a fuel rod surface temperature increase from 570^{o}F to 590^{o}F at steady state conditions. The fuel thermal time constant is 6 seconds. Which one of the following is the approximate fuel rod surface temperature 6 seconds after the power change?
A. 574^{o}F
B. 577^{o}F
C. 580^{o}F
D. 583^{o}F
ANSWER: D

反應爐功率步階(step)增加導致燃料棒表面溫度從570^{o}F增加至590^{o}F(最後的穩態溫度)。燃料熱時間常數(thermal time constant)為6秒。下列何者為在功率變化6秒後，燃料棒表面的大約溫度？
A. 574^{o}F
B. 577^{o}F
C. 580^{o}F
D. 583^{o}F
答案： D.

科目： 293009
知能類： K1.31 [3.0/3.4]
序號： B396 (P394)

The pellet-to-clad gap in fuel rod construction is designed to...
A. decrease fuel pellet densification and elongation.
B. reduce fission product gas pressure buildup.
C. increase heat transfer.
D. reduce internal clad strain.
ANSWER: D

在燃料棒中，燃料丸與護套的間隙是設計用以
A. 降低燃料丸密化與伸長
B. 降低分裂產物氣體壓力累積
C. 增加熱傳
D. 降低護套內部應變
答案： D.

科目： 293009
知能類： K1.32 [2.9/3.3]
序號： B99

Why does the threshold power for pellet-clad interaction decrease as fuel burnup increases?

A. The fuel pellet thermal conductivity is reduced significantly by irradiation.
B. The buildup of certain fission product gases causes chemical embrittlement of the cladding.
C. Fuel pellet densification causes the center of the pellet to expand against the cladding as the pellet length shrinks.
D. Zirconium hydriding increases significantly as the zirconium oxide layer builds up on the clad.

ANSWER: B

當燃料燃耗增加時，為何燃料丸—護套交互作用低限(threshold)功率會減小？

A. 燃料丸熱傳導係數因輻射而大幅降低
B. 某些分裂產物氣體累積，而導致護套化學脆化
C. 燃料丸密化，當燃料丸長度收縮時，導致燃料丸中心膨脹而碰觸到護套
D. 當鋯氧化層在護套上生成，而導致鋯氫化顯著增加

答案： B.

科目： 293009
知能類： K1.32 [2.9/3.3]
序號： B497

The presence of embrittling isotopes is one of the initiating factors of pellet-clad interaction. Which one of the following describes the primary source of the embrittling isotopes?
A. Created during fission of the reactor fuel
B. Introduced during the fuel manufacturing process
C. Migrate from reactor coolant through cladding
D. Produced as corrosion products inside fuel rod
ANSWER: A

脆化同位素(embrittling isotopes)的存在乃燃料丸—護套交互作用的引發因素之一。下列何者為脆化同位素的主要來源？
A. 在反應爐燃料核分裂過程中產生
B. 在燃料生產過程中被加入
C. 從反應爐冷卻水穿透護套而來
D. 為燃料棒內部的腐蝕產物
答案： A.

科目： 293009
知能類： K1.32 [2.9/3.3]
序號： B2195

Which one of the following is most likely to result in fuel failure due to pellet-clad interaction?
A. Increasing reactor power from 20% to 50% near the beginning of a fuel cycle
B. Increasing reactor power from 20% to 50% near the end of a fuel cycle
C. Increasing reactor power from 70% to 100% near the beginning of a fuel cycle
D. Increasing reactor power from 70% to 100% near the end of a fuel cycle
ANSWER: D

下列何者最可能因燃料丸—護套交互作用而導致燃料損壞？
A. 在接近燃料週期初期，將反應爐功率從20％增加至50％
B. 在接近燃料週期末期，將反應爐功率從20％增加至50％
C. 在接近燃料週期初期，將反應爐功率從70％增加至100％
D. 在接近燃料週期末期，將反應爐功率從70％增加至100％
答案： D.

科目： 293009
知能類： K1.33 [2.4/2.8]
序號： B796

Select the purpose of the gap between the fuel pellet and the clad.
A. Prevent contact between the fuel pellets and the clad
B. Increase heat transfer from the fuel pellet to the clad
C. Accommodate differential expansion between the fuel pellets and the clad
D. Reduce diffusion of fission product gases through the clad and into the reactor coolant system
ANSWER: C

燃料丸與護套的間隙目的為何？
A. 防止燃料丸與護套接觸
B. 增加從燃料丸至護套的熱傳
C. 承受燃料丸與護套間不同的膨脹率
D. 降低分裂產物氣體穿透護套進入反應爐冷卻水系統的擴散作用
答案： C.

科目： 293009
知能類： K1.33 [2.4/2.8]
序號： B1696

What is the primary purpose of the gap between a fuel pellet and the surrounding cladding?
A. To allow insertion of fuel pellets into the fuel rods.
B. To provide a collection volume for fission product gases.
C. To maintain the design fuel thermal conductivity throughout the fuel cycle.
D. To accommodate different expansion rates of the fuel pellets and cladding.
ANSWER: D

燃料丸與周圍護套間的間隙主要目的為何？
A. 允許燃料丸裝入燃料棒內
B. 提供分裂產物氣體的收集空間
C. 在整個燃料週期中維持設計的燃料熱傳導係數
D. 為了承受燃料丸與護套間不同的膨脹率
答案： D.

科目： 293009
知能類： K1.34 [2.3/2.6]
序號： B797

Select the cause for the reduction in the size of the gap between the fuel pellet and the clad over core life.
A. Contraction of the clad due to zirconium hydriding
B. Expansion of the fuel pellets due to fission product buildup
C. Contraction of the clad due to fuel rod internal vacuum
D. Expansion of the fuel pellets due to densification
ANSWER: B

在爐心壽命過程當中，燃料丸與護套間的間隙減小的原因為何？
A. 因為鋯的氫化所導致的護套收縮
B. 因為分裂產物累積所導致的燃料丸膨脹
C. 因為燃料棒內部真空所導致的護套收縮
D. 因為密化所導致的燃料丸膨脹
答案： B.

科目： 293009
知能類： K1.35 [2.2/2.6]
序號： B397

Studies of nuclear fuel rod damage revealed that two essential criteria for pellet-clad interaction fuel damage are cladding stress and a chemical embrittling fission product interaction between two chemical agents and the zircalloy cladding.
What are the two (2) chemical agents?
A. Iodine and cadmium
B. Cadmium and bromine
C. Bromine and ruthenium
D. Ruthenium and iodine
ANSWER: A

核燃料棒破損研究顯示燃料丸—護套交互作用導致燃料破損有兩必要準則，一為護套應力，二為兩化學物質與鋯合金護套間化學脆化分裂產物的交互作用。此兩化學物質為何？
A. 碘與鎘
B. 鎘與溴
C. 溴與釕
D. 釕與碘
答案： A.

科目： 293009
知能類： K1.40 [2.8/3.3]
序號： B696

Gross cladding failure is precluded during a design basis loss of coolant accident by operation below the limit for...
A. total peaking factor.
B. linear heat generation rate.
C. operating critical power ratio.
D. average planar linear heat generation rate.
ANSWER: D

在設計基準冷卻水流失事故中，可藉由運轉在低於何種限制值而避免護套的大量損壞？
A. 總尖峰因子
B. 單位長度發熱率(LHGR)
C. 運轉臨界功率比
D. 平面單位長度平均發熱率（APLHGR）
答案： D.

科目： 293009
知能類： K1.40 [2.8/3.3]
序號： B1497

Gross fuel cladding failure during a design basis loss of coolant accident is prevented by adhering to the...
A. linear heat generation rate limit.
B. maximum average planar linear heat generation rate limit.
C. minimum critical power ratio limit.
D. preconditioning interim operating management recommendations.
ANSWER: B

在設計基準冷卻水流失事故中，可藉由遵守何者而預防燃料護套的大量損壞？
A. 單位長度發熱率(LHGR)限制值
B. 平面單位長度平均發熱率（APLHGR）限制值
C. 最小臨界功率比限制值
D. 燃料預調節
答案： B.

科目： 293009
知能類： K1.41 [2.8/3.3]
序號： B697

During a rapid increase in core flow, the most limiting thermal limit is...
A. total peaking factor.
B. critical power ratio.
C. average planar linear heat generation rate.
D. linear heat generation rate.
ANSWER: B

在爐心流量快速增加時，最具限制性的熱限值為
A. 總尖峰因子
B. 臨界功率比
C. 平面單位長度平均發熱率（APLHGR）
D. 單位長度發熱率(LHGR)
答案： B.

科目： 293009
知能類： K1.41 [2.8/3.3]
序號： B1098

A plant is operating at 60% reactor power. Which one of the following will result in the highest critical power ratio? (Assume neutron flux distribution does not change.)
A. 25% power increase using only recirculation flow
B. 25% power increase using only control rods
C. 25% power decrease using only recirculation flow
D. 25% power decrease using only control rods
ANSWER: D

一電廠運轉在60％功率。下列何者將導致最高的臨界功率比？（假設中子通量分佈沒有變化。）
A. 只使用再循環流量增加25％功率
B. 只使用控制棒增加25％功率
C. 只使用再循環流量減少25％功率
D. 只使用控制棒減少25％功率
答案： D.

科目： 293009
知能類： K1.41 [2.8/3.3]
序號： B1598

A plant is operating at 60% reactor power. Which one of the following will result in the lowest critical power ratio? (Assume core neutron flux distribution does not change.)
A. 25% power increase using only control rods
B. 25% power decrease using only control rods
C. 25% power increase using only recirculation flow
D. 25% power decrease using only recirculation flow
ANSWER: A

一電廠運轉在60%功率。下列何者將導致最低的臨界功率比？（假設爐心中子通量分佈沒有變化。）
A. 只使用控制棒增加25%功率
B. 只使用控制棒減少25%功率
C. 只使用再循環流量增加25%功率
D. 只使用再循環流量減少25%功率
答案： A.

科目： 293009
知能類： K1.42 [2.8/3.3]
序號： B498

With a reactor at 100% power, reactor pressure suddenly increases, causing a decrease in the latent heat of vaporization. Which one of the following is the limiting thermal limit for these conditions?
A. Linear heat generation rate
B. Average planar linear heat generation rate
C. Critical power ratio
D Preconditioning interim operating management recommendations
ANSWER: C

一反應爐在100%功率下運轉，反應爐壓力突然增加，導致汽化潛熱減小。下列何者為此狀況最具限制性的熱限值？
A. 單位長度發熱率(LHGR)
B. 平面單位長度平均發熱率（APLHGR）
C. 臨界功率比
D. 燃料預調節
答案： C.

科目： 293009
知能類： K1.43 [2.9/3.4]
序號： B698

If cold water is suddenly injected into the reactor vessel while operating at 50% power, critical power will _____ and bundle power will _____.
A. increase; increase
B. decrease; increase
C. increase; decrease
D. decrease; decrease
ANSWER: A

若冷水突然注入運轉在50%功率之反應爐槽，臨界功率將會_____，而燃料束功率將會_____。
A. 增加；增加
B. 減小；增加
C. 增加；減小
D. 減小；減小
答案： A.

科目： 293009
知能類： K1.43 [2.9/3.4]
序號： B1298

If reactor feedwater temperature suddenly decreases by 10˚F during operation at 75% power, critical power will _____ and bundle power will _____.
(Assume the reactor does not scram.)
A. increase; increase
B. decrease; increase
C. increase; decrease
D. decrease; decrease
ANSWER: A

當運轉在75%功率時，反應爐飼水溫度突然降低10˚F，臨界功率將會_____，而燃料束功率將會_____。（假設反應爐並未急停。）
A. 增加；增加
B. 減小；增加
C. 增加；減小
D. 減小；減小
答案： A.

科目： 293009
知能類： K1.43 [2.9/3.4]
序號： B1498

The most limiting thermal limit for a loss of feedwater heating transient is...
A. average planar linear heat generation rate.
B. linear heat generation rate.
C. critical power ratio.
D. core thermal power.
ANSWER:C

對於喪失飼水加熱的暫態，最具限制性的熱限值為
A. 平面單位長度平均發熱率（APLHGR）
B. 單位長度發熱率(LHGR)
C. 臨界功率比
D. 爐心熱功率
答案： C.

科目： 293009
知能類： K1.43 [2.9/3.4]
序號： B2298

If reactor feedwater temperature suddenly increases by 10°F during operation at 75% power, critical power will _____ and bundle power will _____.
(Assume the reactor does not scram.)
A. increase; increase
B. increase; decrease
C. decrease; increase
D. decrease; decrease
ANSWER: D

當運轉在75%功率時，反應爐飼水溫度突然增加10°F，臨界功率將會_____，而燃料束功率將會_____。（假設反應爐並未急停。）
A. 增加；增加
B. 增加；減小
C. 減小；增加
D. 減小；減小
答案： D.

科目/題號：293009/1 (2016 新增)
知能類：k1.04〔2.2/2.6〕
序號：B4447

A reactor is operating at its licensed thermal limit of 2,200 MW. The linear heat generation rate (LHGR) limit is 13.0 kW/ft.
Given:

- The reactor core contains 560 fuel bundles.
- Each bundle contains 62 fuel rods, each with an active length of 12.5 feet
- The highest total peaking factors are at the following core locations:
  Location A: 2.9
  Location B: 2.7
  Location C: 2.5
  Location D: 2.3

Which one of the following describes the operating condition of the core relative to the LHGR limit?
A. All locations in the core are operating below the LHGR limit.
B. Only location A has exceeded the LHGR limit while the remainder of the core is operating below the limit.
C. Locations A and B have exceeded the LHGR limit while the remainder of the core is operating below the limit.
D. Locations A, B, and C have exceeded the LHGR limit while the remainder of the core is operating below the limit.
ANSWER: C.

一反應器運轉在其執照熱限值2,200 MWt內。其線性熱產生率(LHGR)限值為13.0kW/ft。已知：

- ●反應器爐心包含560組燃料束
- ●每束燃料包含62支燃料棒，每支燃料棒有效長度12.5 feet
- ●最大總尖峰因素在下列爐心位置：
  位置A: 2.9
  位置B: 2.7
  位置C :2.5
  位置D :2.3

下列何者係描述爐心相對於線性熱產生率限值之運轉條件？
A.爐心所有位置均運轉在線性熱產生率限值之內
B.只有位置A超過線性熱產生率限值，其它爐心位置均運轉在限值之內
C.位置A和B超過線性熱產生率限值，其它爐心位置均運轉在限值之內
D.位置A、B和C超過線性熱產生率限值，其它爐心位置均運轉在限值之內

答案： C

科目/題號：293009/2 (2016 新增)
知能類：k1.04〔2.2/2.6〕
序號：B4948

A BWR core consists of 30,000 fuel rods; each fuel rod has an active length of 12 feet. The core is producing 1,350 MW of thermal power. If the total peaking factor for a node is 1.6, what is the maximum local linear power density being produced in the node?
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft
ANSWER: B.

一沸水式反應器爐心包含30,000支燃料棒；每支燃料棒有效長度12 feet。爐心產生1,350MWt。假如某節之總尖峰因數為1.6，則該節所產生之最大局部線性功率密度將是多少？
A. 4.0 kW/ft
B. 6.0 kW/ft
C. 8.0 kW/ft
D. 10.0 kW/ft

答案： B

科目/題號：293009/3 (2016 新增)
知能類：k1.04〔2.2/2.6〕
序號：B5247

A reactor is operating at 3,400 MW thermal power. The linear heat generation rate (LHGR) limit is 14.7 kW/ft.
Given:

- The reactor core contains 640 fuel bundles.
- Each bundle contains 62 fuel rods, each with an active length of 12.5 feet
- The highest total peaking factors are at the following core locations:
  Location A: 2.4
  Location B: 2.3
  Location C: 2.2
  Location D: 2.1

Which one of the following describes the operating conditions in the core relative to the LHGR limit?
A. All locations in the core are operating below the LHGR limit.
B. Location A has exceeded the LHGR limit while the remainder of the core is operating below the limit.
C. Locations A and B have exceeded the LHGR limit while the remainder of the core is operating below the limit.
D. Locations A, B, and C have exceeded the LHGR limit while the remainder of the core is operating below the limit.
ANSWER: D.

一反應器運轉在3,400MWt，其線性熱產生率限值(LHGR)為14.7kW/ft。已知：

- ●此反應器爐心包含640組燃料束
- ●每束燃料包含62支燃料棒，每支燃料棒有效長度12.5feet
- ●最大總尖峰因數在下列爐心位置：
  位置A：2.4
  位置B：2.3
  位置C：2.2
  位置D：2.1

下列何者係描述爐心相對於線性熱產生率限值之運轉條件？
A.爐心所有位置均運轉在線性熱產生率限值之內
B.只有位置A超過線性熱產生率限值，其它爐心位置均運轉在限值之內
C.位置A和B超過線性熱產生率限值，其它爐心位置均運轉在限值之內
D.位置A、B和C超過線性熱產生率限值，其它爐心位置均運轉在限值之內

答案： D

科目/題號：293009/4 (2016 新增)
知能類：k1.04〔2.2/2.6〕
序號：B6247(P6249)

A reactor is operating at steady-state conditions in the power range with the following average temperatures in a core plane:

Tcoolant = 550°F

Tfuel centerline = 1,680°F

Assume that the fuel rod heat transfer coefficients and reactor coolant temperatures are equal throughout the core plane. If the maximum total peaking factor in the core plane is 2.1, what is the maximum fuel centerline temperature in the core plane?

A. 2,923°F
B. 3,528°F
C. 4,078°F
D. 4,683°F
ANSWER: A.

一反應器穩定運轉在功率階具有下列爐心平面平均溫度；

爐心冷卻水溫度 = 550℉

燃料棒中心線溫度 =1,680℉

假設燃料熱傳係數和反應器冷卻水溫度在整個爐心平面均相同。假若爐心平面之最大總尖峰因數為2.1，則爐心平面最大燃料棒中心線溫度是多少？

A.2,923℉
B.3,528℉
C.4,078℉
D.4,683℉

答案： A

科目/題號：293009/5 (2016 新增)
知能類：k1.24〔2.7/3.2〕
序號：B4749

A nuclear power plant is operating at 90 percent power at the end of core life when a signal error causes the turbine control system to open the turbine control valves an additional 5 percent. Assuming the reactor does not scram, the critical power ratio will initially...
A. increase, because reactor power initially increases.
B. decrease, because reactor power initially decreases.
C. increase, because the reactor coolant latent heat of vaporization initially increases.
D. decrease, because the reactor coolant latent heat of vaporization initially decreases.
ANSWER: C.

核能電廠於爐心壽命末期運轉在90%功率，當一誤信號致使汽機控制閥開度額外增加5%。假如反應器並未急停，則初始之臨界功率比將是…？
A.增加，因為反應器功率初始會增加
B.減少，因為反應器功率初始會減少
C.增加，因為反應器冷卻水蒸發潛熱初始會增加
D.減少，因為反應器冷卻水蒸發潛熱初始會減少

答案： C

科目/題號：293009/6 (2016 新增)
知能類：k1.34〔2.3/2.6〕
序號：B6449(P6449)

Consider a new fuel rod operating at a constant power level for several weeks. During this period, fuel pellet densification in the fuel rod causes the heat transfer rate from the fuel pellets to the cladding to _____; this change causes the average fuel temperature in the fuel rod to _____.
A. decrease; increase
B. decrease; decrease
C. increase; increase
D. increase; decrease
ANSWER: A.

考慮一支新燃料棒運轉在一固定功率已數週。在此期間燃料棒中的燃料丸密化(densification)作用，導致從燃料丸至護套的熱傳率將_____；此改變將引起燃料棒中平均燃料溫度將_____。
A.減少；增加
B.減少；減少
C.增加；增加
D.增加；減少

答案： A

科目/題號：293009/7 (2016 新增)
知能類： k1.34〔2.3/2.6〕
序號： B7630

If fuel pellet densification occurs in a fuel rod producing a constant power output, the average linear heat generation rate in the fuel rod will _____ because pellet densification causes fuel pellets to _____.
A. decrease; swell
B. decrease; shrink
C. increase; swell
D. increase; shrink
ANSWER: D.

假如一固定功率輸出的燃料中發生燃料丸密化(densification)作用，則燃料棒之平均線性熱產生率將會____，因為燃料丸密化作用，引起燃料丸_____。
A.減少；膨脹
B.減少；收縮
C.增加；膨脹
D.增加；收縮

答案： D