TOPIC: 192005
KNOWLEDGE: K1.03
QID: P254 (B2254)

A nuclear reactor is exactly critical below the point of adding heat (POAH) during a reactor startup at the end of core life. Control rods are withdrawn for 20 seconds to establish a 0.5 dpm startup rate.

Reactor power will increase...

A. continuously until control rods are reinserted.

B. and stabilize at a value slightly below the POAH.

C. temporarily, then stabilize at the original value.

D. and stabilize at a value slightly above the POAH.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P354 (B356)

A nuclear reactor is critical below the point of adding heat. If control rods are manually inserted for 5 seconds, reactor power will decrease...

A. to a shutdown power level low in the source (startup) range.

B. temporarily, then return to the original value due to the resulting decrease in moderator temperature.

C. until inherent positive reactivity feedback causes the reactor to become critical at a lower neutron level.

D. temporarily, then return to the original value due to subcritical multiplication.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P754 (B755)

A nuclear reactor is exactly critical below the point of adding heat (POAH) during a normal reactor startup. If a control rod is manually withdrawn for 5 seconds, reactor power will increase...

A. to a stable critical power level below the POAH.

B. temporarily, then decrease and stabilize at the original value.

C. to a stable critical power level at the POAH.

D. temporarily, then decrease and stabilize below the original value.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P1054

A nuclear reactor is operating near the end of a fuel cycle at steady state 50% power level when the operator withdraws a group of control rods for 5 seconds. (Assume that main turbine load remains constant and the reactor does <u>not</u> scram/trip.)

Actual reactor power will stabilize ______________ the initial power level and reactor coolant temperature will stabilize ______________ the initial temperature.

A. at; at

B. at; above

C. above; at

D. above; above

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P1254

A nuclear reactor is critical at 50% power. Control rods are inserted a short distance. Assuming that the main turbine-generator load remains constant, actual reactor power will decrease and then...

A. stabilize in the source range.

B. stabilize at a lower value in the power range.

C. increase and stabilize above the original value.

D. increase and stabilize at the original value.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P1654

A nuclear reactor is operating at steady state 50% power near the end of core life when the operator inserts a group of control rods for 5 seconds. Assume turbine load remains constant and the reactor does <u>not</u> scram/trip.

Actual reactor power will stabilize _______________ the initial power level and coolant temperature will stabilize _______________ the initial temperature.

A. at; at

B. at; below

C. below; at

D. below; below

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P1854 (B2155)

A nuclear reactor has been shut down for three weeks with all control rods fully inserted. If a center control rod is fully withdrawn from the core, neutron population will: (Assume the reactor remains subcritical.)

A. increase and stabilize at a new higher level.

B. increase, then decrease and stabilize at the original value.

C. increase, then decrease and stabilize above the original value.

D. remain the same.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P1955 (B954)

A nuclear reactor has been shut down for three weeks with all control rods fully inserted. If a center control rod is fully withdrawn from the core, neutron population will: (Assume the reactor remains subcritical.)

A. increase and stabilize at a new higher level.

B. increase temporarily then return to the original value.

C. increase exponentially until the operator inserts the control rod.

D. remain the same.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.03 [3.5/3.6]
QID: P3854

Criticality has been achieved during a xenon-free nuclear reactor startup. The core neutron flux level is low in the intermediate range and a stable 0.5 dpm startup rate (SUR) has been established. The operator begins inserting control rods in an effort to stabilize the core neutron flux level near its current value. The operator stops inserting control rods exactly when the SUR indicates 0.0 dpm.

Immediately after the operator stops inserting the control rods, the SUR will become ____________ ; then the core neutron flux level will _______________.

A. positive; increase exponentially

B. positive; increase linearly

C. negative; decrease exponentially

D. negative; decrease linearly

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P555 (B856)

The total amount of reactivity added by a control rod position change from a reference height to any other rod height is called...

A. differential rod worth.

B. shutdown reactivity.

C. integral rod worth.

D. reference reactivity.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P654

Integral control rod worth is the change in ____________ per ____________ change in rod position.

A. reactor power; total

B. reactivity; unit

C. reactor power; unit

D. reactivity; total

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P755 (B756)

A control rod is positioned in a nuclear reactor with the following neutron flux parameters:

Core average thermal neutron flux = 10^{12} neutrons/cm^2-sec
Control rod tip neutron flux = 5 x 10^{12} neutrons/cm^2-sec

If the control rod is slightly withdrawn such that the tip of the control rod is located in a neutron flux of 10^{13} neutrons/cm^2-sec, then the differential control rod worth will increase by a factor of _______. (Assume the average flux is constant.)

A. 0.5

B. 1.4

C. 2.0

D. 4.0

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P1354

Integral rod worth is the...

A. change in reactivity per unit change in rod position.

B. reactivity inserted by moving a control rod from a reference point to another point.

C. change in worth of a control rod per unit change in reactor power.

D. rod worth associated with the most reactive control rod.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P1471

Reactor power was ramped from 80% power to 100% power over 4 hours. The 80% conditions were as follows:

Reactor coolant system (RCS) boron concentration:	600 ppm
Control rod position:	110 inches
RCS average temperature:	575 °F

The 100% conditions are as follows:

RCS boron concentration:	580 ppm
Control rod position:	130 inches
RCS average temperature:	580 °F

Given the following reactivity coefficient/worth values, and neglecting changes in fission product poison reactivity, what is the differential control rod worth?

Power coefficient:	-0.03% ΔK/K/%
Moderator temperature coefficient:	-0.02% ΔK/K/°F
Differential boron worth:	-0.01% ΔK/K/ppm

A. -0.02% ΔK/K/inch

B. -0.025% ΔK/K/inch

C. -0.04% ΔK/K/inch

D. -0.05% ΔK/K/inch

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P1554 (B1057)

A control rod is positioned in a nuclear reactor with the following neutron flux parameters:

Core average thermal neutron flux = 1 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 5 x 10^{12} n/cm^2-sec

If the control rod is slightly withdrawn such that the control rod tip is located in a thermal neutron flux of 1 x 10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _______. (Assume the core average thermal neutron flux is constant.)

A. 2

B. 4

C. 10

D. 100

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P1755 (B1855)

A control rod is positioned in a nuclear reactor with the following neutron flux parameters:

Core average thermal neutron flux = 1.0 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 4.0 x 10^{12} n/cm^2-sec

If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1.2 x 10^{13} n/cm^2-sec, then the differential control rod worth will be increased by a factor of _______. (Assume the core average thermal neutron flux is constant.)

A. 1/3

B. 3

C. 9

D. 27

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P2255

A nuclear reactor is operating at steady state 70% power with the following conditions:

RCS boron concentration:	600 ppm
Control rod position:	110 inches
RCS average temperature:	575 °F

Reactor power is increased to 100% over the next four hours. The 100% reactor power conditions are as follows:

RCS boron concentration:	590 ppm
Control rod position:	130 inches
RCS average temperature:	580 °F

Given the following reactivity coefficient/worth values, and neglecting fission product poison reactivity changes, what is the differential control rod worth?

Power coefficient:	-0.3% ΔK/K/%
Moderator temperature coefficient:	-0.2% ΔK/K/°F
Differential boron worth:	-0.1% ΔK/K/ppm

A. 0.2% ΔK/K/inch

B. 0.25% ΔK/K/inch

C. 0.4% ΔK/K/inch

D. 0.5% ΔK/K/inch

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.05 [2.8/3.1]
QID: P2554 (B2655)

A control rod is positioned in a nuclear reactor with the following neutron flux parameters:

Core average thermal neutron flux = 1.0 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 4.0 x 10^{12} n/cm^2-sec

If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1.6 x 10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _______. (Assume the core average thermal neutron flux is constant.)

A. 2

B. 4

C. 8

D. 16

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.06 [2.6/2.9]
QID: P134 (B1755)

Which one of the following expresses the relationship between differential rod worth (DRW) and integral rod worth (IRW)?

A. DRW is the IRW at a specific rod position.

B. DRW is the square root of the IRW at a specific rod position.

C. DRW is the slope of the IRW curve at a specific rod position.

D. DRW is the area under the IRW curve at a specific rod position.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.06 [2.6/2.9]
QID: P655 (B2255)

Which one of the following parameters typically has the greatest effect on the shape of a differential rod worth curve?

A. Core radial neutron flux distribution

B. Core axial neutron flux distribution

C. Core xenon distribution

D. Burnable poison distribution

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.06 [2.6/2.9]
QID: P856

During normal full power operation, the differential control rod worth is less negative at the top and bottom of the core compared to the center regions due to the effects of...

A. reactor coolant boron concentration.

B. neutron flux distribution.

C. xenon concentration.

D. fuel temperature distribution.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.06 [2.6/2.9]
QID: P1555 (B1657)

Which one of the following expresses the relationship between differential rod worth (DRW) and integral rod worth (IRW)?

A. IRW is the slope of the DRW curve.

B. IRW is the inverse of the DRW curve.

C. IRW is the sum of the DRWs between the initial and final control rod positions.

D. IRW is the sum of the DRWs of all control rods at any specific control rod position.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P54

As moderator temperature increases, the differential rod worth becomes more negative because...

A. decreased moderator density causes more neutron leakage out of the core.

B. moderator temperature coefficient decreases, causing decrease competition.

C. fuel temperature increases, decreasing neutron absorption in fuel.

D. decreased moderator density increases neutron migration length.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P454

Differential rod worth will become most negative if reactor coolant system (RCS) temperature is __________ and RCS boron concentration is __________.

A. increased; decreased

B. decreased; decreased

C. increased; increased

D. decreased; increased

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P955

With a nuclear power plant operating normally at full power, a 5°F decrease in moderator temperature will cause the differential control rod worth to become...

A. more negative due to better moderation of neutrons.

B. less negative due to shorter neutron migration length.

C. more negative due to increased neutron absorption in moderator.

D. less negative due to increased resonance absorption of neutrons.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P1556 (B2656)

As moderator temperature increases, the differential rod worth will become...

A. more negative due to longer neutron migration length.

B. less negative due to reduced moderation of neutrons.

C. more negative due to decreased resonance absorption of neutrons.

D. less negative due to decreased moderator absorption of neutrons.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P2156

A nuclear reactor is operating at 80% power near the end of a fuel cycle with the controlling group of control rods inserted 5% into the core. Which one of the following will cause group differential rod worth to become <u>less</u> negative? (Consider only the direct effect of the indicated change.)

A. Burnable poison rods become increasingly depleted.

B. Core Xe-135 concentration decreases toward an equilibrium value.

C. Reactor coolant temperature is allowed to decrease from 575°F to 570°F.

D. Reactor power is decreased to 70% using control rods for control of RCS temperature.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P2356

A nuclear reactor startup is in progress from a cold shutdown condition. During the RCS heatup phase of the startup, control rod differential reactivity worth (ΔK/K per inch insertion) becomes _______ negative; and during the complete withdrawal of the initial bank of control rods, control rod differential reactivity worth becomes _______.

A. more; more negative and then less negative

B. more; less negative and then more negative

C. less; more negative during the entire withdrawal

D. less; less negative during the entire withdrawal

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.07 [2.5/2.8]
QID: P2655

Which one of the following will cause group differential control rod worth to become less negative? (Assume the affected group of control rods remains 10% inserted for each case.)

A. During long-term full power operation, fuel temperature decreases as the fuel pellets come into contact with the fuel clad.

B. The reactor coolant system is cooled from 170°F to 120°F in preparation for a core refueling.

C. Core Xe-135 builds up in the lower half of the core.

D. Early in core life, the concentration of burnable poison decreases.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.08 [2.7/2.9]
QID: P857 (B3356)

The main reason for designing and operating a nuclear reactor with a flattened neutron flux distribution is to...

A. provide even burnup of control rods.

B. reduce neutron leakage from the core.

C. allow a higher average power density.

D. provide more accurate nuclear power indication.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.08 [2.7/2.9]
QID: P2456 (B2457)

Which one of the following is a reason for neutron flux shaping in a nuclear reactor core?

A. To minimize local power peaking by more evenly distributing the core thermal neutron flux

B. To reduce thermal neutron leakage by decreasing the neutron flux at the edge of the reactor core

C. To reduce the size and number of control rods needed to ensure the reactor remains subcritical following a reactor trip

D. To increase control rod worth by peaking the thermal neutron flux at the top of the reactor core

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.09 [2.8/3.0]
QID: P55

What is a purpose of control rod bank overlap?

A. Provides a more uniform differential rod worth and axial flux distribution.

B. Provides a more uniform differential rod worth and allows dampening of xenon-induced flux oscillations.

C. Ensures that all rods remain within the allowable tolerance between their individual position indicators and their group counters, and ensures rod insertion limits are not exceeded.

D. Ensures that all rods remain within their allowable tolerance between individual position indicators and their group counters, and provides a more uniform axial flux distribution.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.09 [2.8/3.0]
QID: P656

The purposes of using control rod bank overlap are to...

A. provide a more uniform axial power distribution and to provide a more uniform differential rod worth.

B. provide a more uniform differential rod worth and to provide a more uniform radial power distribution.

C. provide a more uniform radial power distribution and to maintain individual and group rod position indicators within allowable tolerances.

D. maintain individual and group rod position indicators within allowable tolerances and to provide a more uniform axial power distribution.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.09 [2.8/3.0]
QID: P1156

One purpose of using control rod bank/group overlap is to...

A. ensure adequate shutdown margin.

B. provide a more uniform differential rod worth.

C. allow dampening of xenon-induced flux oscillation.

D. ensure control rod insertion limits are <u>not</u> exceeded.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.10 [3.0/3.3]
QID: P455

Which one of the following describes why most of the power is produced in the lower half of a nuclear reactor core that has been operating at 100% power for several weeks with all control rods withdrawn at the beginning of core life?

A. Xenon concentration is lower in the lower half of the core.

B. The moderator to fuel ratio is lower in the lower half of the core.

C. The fuel loading in the lower half of the core contains a higher U-235 enrichment.

D. The moderator temperature coefficient of reactivity is adding less negative reactivity in the lower half of the core.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.10 [3.0/3.3]
QID: P1357

A nuclear reactor is operating at 75% power in the middle of a fuel cycle. Which one of the following actions will cause the greatest shift in reactor power distribution toward the top of the core? (Assume control rods remain fully withdrawn.)

A. Decrease reactor power by 25%.

B. Decrease reactor coolant boron concentration by 10 ppm.

C. Decrease average reactor coolant temperature by 5°F.

D. Decrease reactor coolant system operating pressure by 15 psia.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.10 [3.0/3.3]
QID: P2656

A nuclear reactor has been operating at 100% power for 3 weeks shortly after a refueling outage. All control rods are fully withdrawn,. Which one of the following describes why most of the power is being produced in the lower half of the core?

A. The fuel loading in the lower half of the core contains a higher U-235 enrichment.

B. Reactor coolant boron is adding more negative reactivity in the upper half of the core.

C. There is a greater concentration of Xe-135 in the upper half of the core.

D. The moderator temperature coefficient of reactivity is adding more negative reactivity in the upper half of the core.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.11 [2.8/3.2]
QID: P1157

If core quadrant power distribution (sometimes referred as quadrant power tilt or azimuthal tilt) is maintained within design limits, which one of the following conditions is most likely?

A. Axial power distribution is within design limits.

B. Radial power distribution is within design limits.

C. Nuclear instrumentation is indicating within design accuracy.

D. Departure from nucleate boiling ratio is within design limits.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.12 [2.9/3.1]
QID: P255

A comparison of the heat flux in the hottest coolant channel to the average heat flux in the core describes...

A. a core correction calibration factor.

B. a hot channel/peaking factor.

C. a heat flux normalizing factor.

D. an axial/radial flux deviation factor.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.12 [2.9/3.1]
QID: P256

A nuclear reactor has been taken critical following a refueling outage and is currently at the point of adding heat during a normal reactor startup. Which one of the following describes the axial power distribution in the core as power is increased to 10% by control rod withdrawal? (Neglect reactivity effects of reactor coolant temperature change.)

A. Shifts toward the bottom of the core.

B. Shifts toward the top of the core.

C. Shifts away from the center toward the top and bottom of the core.

D. Shifts away from the top and bottom toward the center of the core.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.12 [2.9/3.1]
QID: P355

By maintaining the radial and axial core power distributions within their prescribed limits, the operator is assured that _______________ will remain within acceptable limits.

A. power density (kW/foot) and departure from nucleate boiling ratio (DNBR)

B. DNBR and shutdown margin

C. core delta-T and power density (kW/foot)

D. shutdown margin and core delta-T

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.13 [2.8/3.2]
QID: P3156

Consider a nuclear reactor core with four quadrants: A, B, C, and D. The reactor is operating at steady state 90% power when a fully withdrawn control rod in quadrant C drops to the bottom of the core. Assume that no operator actions are taken and reactor power stabilizes at 88%.

How are the maximum upper and lower core power tilt values (sometimes called quadrant power tilt ratio or azimuthal power tilt) affected by the dropped rod?

A. Upper core value decreases while lower core value increases.

B. Upper core value increases while lower core value decreases.

C. Both upper and lower core values decrease.

D. Both upper and lower core values increase.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.14 [3.2/3.5]
QID: P356 (B358)

A nuclear reactor is operating at equilibrium full power when a single control rod fully inserts (from the fully withdrawn position). Reactor power is returned to full power with the control rod still fully inserted.

Compared to the initial axial neutron flux shape, the current flux shape will have a...

A. minor distortion, because a fully inserted control rod has zero reactivity worth.

B. minor distortion, because the fully inserted control rod is an axially uniform poison.

C. major distortion, because the upper and lower core halves are loosely coupled.

D. major distortion, because power production along the length of the rod drastically decreases.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.14 [3.2/3.5]
QID: P956

After a control rod is fully inserted (from the fully withdrawn position), the effect on the axial flux shape is minimal. This is because...

A. the differential rod worth is constant along the length of the control rod.

B. the fully inserted control rod is an axially uniform poison.

C. a control rod only has reactivity worth if it is moving.

D. a variable poison distribution exists throughout the length of the control rod.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.15 [3.4/3.9]
QID: P57

Why are the control rod insertion limits power dependent?

A. Power defect increases as power increases.

B. Control rod worth decreases as power increases.

C. Doppler (fuel temperature) coefficient decreases as power increases.

D. Equilibrium core xenon-135 negative reactivity increases as power increases.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.15 [3.4/3.9]
QID: P1055

Control rod insertion limits are established for power operation because excessive rod insertion will...

A. adversely affect core power distribution.

B. generate excessive liquid waste due to dilution.

C. cause reduced control rod lifetime.

D. cause unacceptable fast and thermal neutron leakage.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.15 [3.4/3.9]
QID: P1456

Control rod insertion limits ensure that control rods will be more withdrawn as reactor power ____________ to compensate for the change in ____________.

A. increases; xenon reactivity

B. decreases; xenon reactivity

C. increases; power defect

D. decreases; power defect

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.15 [3.4/3.9]
QID: P1757

Why are control rod insertion limits established for power operation?

A. To minimize the worth of a postulated dropped control rod.

B. To maintain a negative moderator temperature coefficient in the reactor.

C. To provide adequate shutdown margin after a reactor trip.

D. To ensure sufficient positive reactivity is available to compensate for the existing power defect.

ANSWER: C.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P557

A nuclear reactor has been operating at 80% power for four weeks with the controlling rod group inserted 10% from the fully withdrawn position.

Which one of the following will be most significantly affected by inserting the controlling group an additional 5%? (Assume reactor power does not change.)

A. Total xenon reactivity

B. Radial power distribution

C. Quadrant (azimuthal) power distribution

D. Axial power distribution

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P1457

A nuclear reactor is operating at 75% power. Assuming reactor power does <u>not</u> change, which one of the following compares the effects of dropping a center control rod to the effects of partially inserting (50%) the same control rod?

A. A dropped rod causes a greater change in shutdown margin.

B. A dropped rod causes a smaller change in shutdown margin.

C. A dropped rod causes a greater change in axial power distribution.

D. A dropped rod causes a greater change in radial power distribution.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P1657

A nuclear reactor is operating at 75% power with all control rods fully withdrawn. Assuming reactor power does <u>not</u> change, which one of the following compares the effects of dropping (full insertion) a single center control rod to the effects of partially inserting (50%) the same control rod?

A. A partially inserted rod causes a greater change in axial power distribution.

B. A partially inserted rod causes a greater change in radial power distribution.

C. A partially inserted rod causes a greater change in shutdown margin.

D. A partially inserted rod causes a smaller change in shutdown margin.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P2157

A nuclear reactor is operating at 75% power with all control rods fully withdrawn. Assuming reactor power does not change, which one of the following compares the effects of dropping (full insertion) a single center control rod to the effects of partially inserting (50%) the same control rod?

A. A dropped rod causes a smaller change in axial power distribution.

B. A dropped rod causes a smaller change in radial power distribution.

C. A dropped rod causes a smaller change in shutdown margin.

D. A dropped rod causes a greater change in shutdown margin.

ANSWER: A.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P2257

A nuclear reactor is operating at 85% power with all control rods fully withdrawn. Assuming reactor power does not change, which one of the following compares the effects of partially inserting (50%) a single center control rod to the effects of dropping (full insertion) the same control rod?

A. A partially inserted rod causes a smaller change in axial power distribution.

B. A partially inserted rod causes a smaller change in radial power distribution.

C. A partially inserted rod causes a greater change in shutdown margin.

D. A partially inserted rod causes a smaller change in shutdown margin.

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P2457

A nuclear reactor is operating at 100% power at the beginning of a fuel cycle with all control rods fully withdrawn. Assuming the reactor does not trip, which one of the following compares the effects of dropping a control rod in the center of the core to dropping an identical control rod at the periphery of the core?

A. Dropping a center control rod causes a greater change in shutdown margin.

B. Dropping a center control rod causes a smaller change in shutdown margin.

C. Dropping a center control rod causes a greater change in axial power distribution.

D. Dropping a center control rod causes a greater change in radial power distribution.

ANSWER: D.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P2556

A nuclear reactor has been operating at 80% power for four weeks with the controlling rod group inserted 15% from the fully withdrawn position.

Which one of the following will be significantly affected by withdrawing the controlling rod group an additional 5%? (Assume reactor power does not change.)

A. Total xenon reactivity

B. Axial power distribution

C. Radial power distribution

D. Quadrant (azimuthal) power distribution

ANSWER: B.

TOPIC: 192005
KNOWLEDGE: K1.16 [2.8/3.1]
QID: P2857

A nuclear reactor is operating at steady state full power with all control rods fully withdrawn when one control rod at the core periphery falls completely into the core. Assuming no reactor trip and no operator action, which one of the following will have changed significantly as a result of the dropped rod?

A. Axial power distribution only

B. Axial power distribution and shutdown margin

C. Radial power distribution only

D. Radial power distribution and shutdown margin

ANSWER: C.