TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B64

Which one of the following describes burnable poisons?

A. Fuel mixtures containing isotopes with large macroscopic cross sections for scattering to improve neutron thermalization.

B. Thermal neutron absorbing material added to the fuel during manufacturing to increase allowable core fuel load.

C. Thermal neutron absorbing material produced in the non-fissionable fuel isotopes by fast neutron absorption.

D. Fast neutron absorbing material loaded into the upper one-third of the core to aid in flattening the thermal neutron flux.

ANSWER: B.

TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B136

Burnable poisons are placed in a reactor to...

A. increase the amount of fuel that can be loaded into the core.

B. accommodate control rod depletion that occurs over core life.

C. compensate for the buildup of xenon-135 that occurs over core life.

D. ensure the reactor will always operate in an undermoderated condition.

ANSWER: A.

TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B264

Burnable poisons are loaded into a reactor to...

A. reduce the rod shadowing effect between shallow rods early in core life.

B. provide for flux shaping in areas of deep rods during high power operation.

C. increase the excess reactivity that can be loaded into the core during refueling.

D. ensure the moderator temperature coefficient of reactivity remains negative throughout core life.

ANSWER: C.

TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B364 (P362)

Which one of the following is <u>not</u> a function performed by burnable poisons in an operating reactor?

A. Provide neutron flux shaping.

B. Provide more uniform power density.

C. Offset the effects of control rod burnout.

D. Allow higher enrichment of new fuel assemblies.

ANSWER: C.

TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B1265

Gadolinium (Gd-155, Gd-157) is used instead of boron (B-10) as the __________ material; when compared to boron, gadolinium has a much __________ cross section for absorbing thermal neutrons.

A. control rod; larger

B. burnable poison; larger

C. control rod; smaller

D. burnable poison; smaller

ANSWER: B.

TOPIC: 292007
KNOWLEDGE: K1.01 [2.9/3.1]
QID: B2564

Why are burnable poisons installed in a reactor?

A. To compensate for control rod burnout during a fuel cycle.

B. To flatten the radial thermal neutron flux distribution near the end of a fuel cycle.

C. To ensure a negative moderator temperature coefficient exists early in a fuel cycle.

D. To shield some of the reactor fuel from thermal neutron flux until later in a fuel cycle.

ANSWER: D.

TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B564

At the beginning of a fuel cycle (BOC), the control rods are inserted relatively deep into the core at 100 percent power. At the end of a fuel cycle (EOC), the control rods are nearly fully withdrawn at 100 percent power.

Which one of the following is the primary reason for the change in the full power control rod position?

A. Reactivity from the power defect is much less at EOC.

B. Reactivity from the void coefficient is much greater at EOC.

C. The excess reactivity in the core is much less at EOC.

D. The integral control rod worth is much greater at EOC.

ANSWER: C.

TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B1163 (P1264)

Refer to the drawing of K_{eff} versus core age (see figure below).

The major cause for the change in K_{eff} from point 1 to point 2 is the…

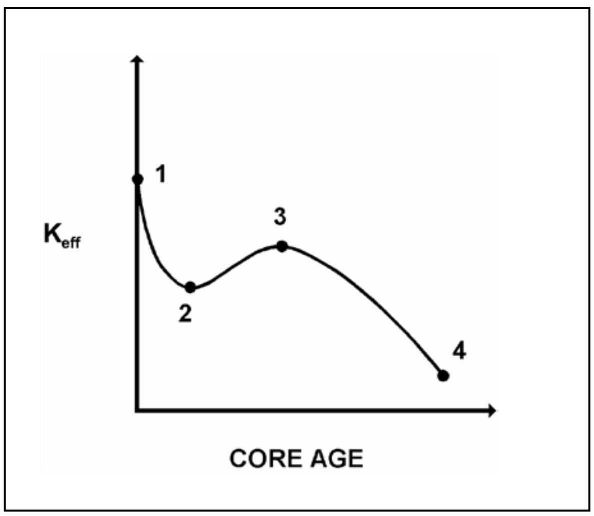
A. depletion of fuel.

B. burnout of burnable poisons.

C. initial heatup of the reactor.

D. buildup of fission product poisons.

ANSWER: D.



TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B1364

Refer to the drawing of K_{eff} versus core age (see figure below).

The major cause for the change in K_{eff} from point 2 to point 3 is the...

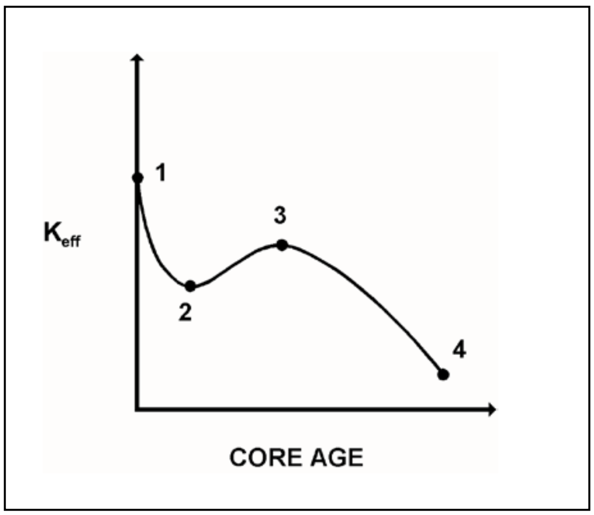
A. depletion of fuel.

B. depletion of control rods.

C. burnout of burnable poisons.

D. burnout of fission product poisons.

ANSWER: C.



TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B1563

Refer to the drawing of K_{eff} versus core age (see figure below).

The major cause for the change in K_{eff} from point 3 to point 4 is the...

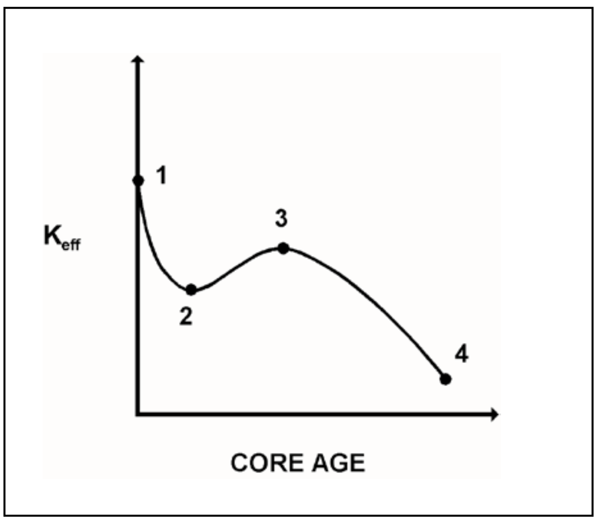
A. depletion of U-235.

B. depletion of U-238.

C. burnout of burnable poisons.

D. buildup of fission product poisons.

ANSWER: A.



TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B3264

Refer to the curve of K_{eff} versus core age for an operating reactor (see figure below).

The reactor has been operating at 100 percent power for several weeks and is currently operating between points 2 and 3 on the curve.

Assuming reactor recirculation flow rate remains the same, what incremental control rod operation(s) will be needed to maintain 100 percent power until point 3 is reached?

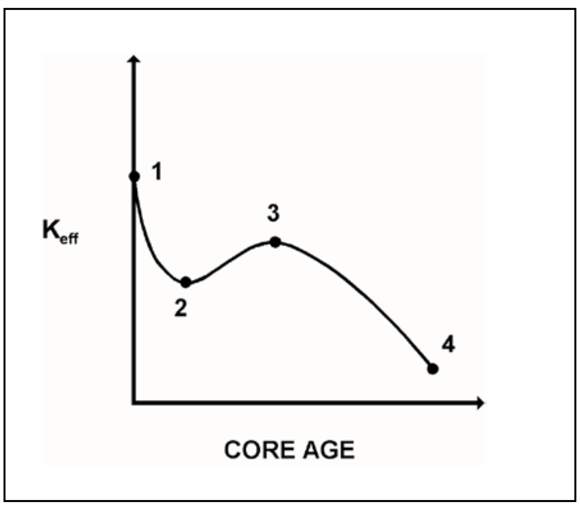
A. Withdrawal for the entire period.

B. Withdrawal at first, then insertion.

C. Insertion for the entire period.

D. Insertion at first, then withdrawal.

ANSWER: C.



TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B4832

Which one of the following contributes to the need for a much greater control rod density at 100 percent power near the beginning of a fuel cycle (BOC) compared to the end of a fuel cycle (EOC)?

A. The negative reactivity from burnable poisons is greater at BOC.

B. The negative reactivity from fission product poisons is smaller at BOC.

C. The positive reactivity contained in the fuel bundles is smaller at BOC.

D. The positive reactivity from a one-notch withdrawal of a typical control rod is greater at BOC.

ANSWER: B.

TOPIC: 292007
KNOWLEDGE: K1.03 [2.4/2.7]
QID: B7788

Which one of the following contributes to the need for a much smaller control rod density at steady-state 100 percent power near the end of a fuel cycle (EOC) compared to the beginning of a fuel cycle (BOC)?

A. The negative reactivity from burnable poisons is smaller at EOC.

B. The negative reactivity from fission product poisons is smaller at EOC.

C. The positive reactivity contained in the fuel bundles is smaller at EOC.

D. The positive reactivity from a one-notch withdrawal of a typical control rod is greater at EOC.

ANSWER: C.