TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B86

The order of reactor coolant heat transfer mechanisms, from the most efficient to the least efficient, is...

A. nucleate boiling, transition boiling, stable film boiling.

B. stable film boiling, nucleate boiling, transition boiling.

C. nucleate boiling, stable film boiling, transition boiling.

D. stable film boiling, transition boiling, nucleate boiling.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B87

The dominant mode of heat transfer that occurs when film boiling is present is...

A. convection.

B. radiation.

C. conduction.

D. induction.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B144

The heat transfer mode that uses direct contact transfer of kinetic energy from molecular motion is...

A. radiation.

B. convection.

C. transmission.

D. conduction.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B188

Which one of the following methods of heat transfer is defined as the exchange of energy between bodies through an intervening space by means of electromagnetic waves?

A. Conduction

B. Convection

C. Electrokinetics

D. Radiation

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B285

The heat transfer mode that accounts for the majority of core heat removal during a loss of coolant accident after total core voiding is...

A. conduction.

B. convection.

C. radiolysis.

D. radiation.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B482

The primary mode of heat transfer from the fuel cladding surface during steam blanketing conditions is...

A. radiation.

B. convection.

C. ionization.

D. conduction.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B882 (P584)

Refer to the drawing of a fuel rod and coolant flow channel at the beginning of a fuel cycle (see figure below).

Which one of the following is the primary method of heat transfer through the gap between the fuel pellets and the fuel cladding?

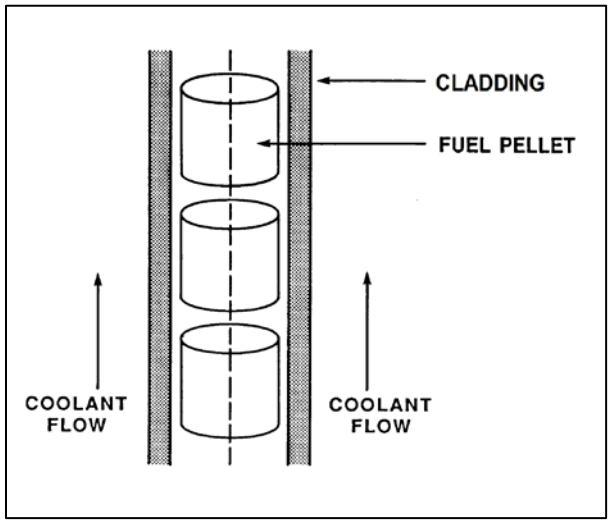
A. Conduction

B. Convection

C. Radiation

D. Natural circulation

ANSWER: A.



TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B1282

The dominant mode of heat transfer from the fuel-clad surface to the coolant during 100 percent power operation is...

A. radiation.

B. conduction.

C. forced convection.

D. natural convection.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B1483

Which one of the following is the order of reactor coolant heat transfer mechanisms, from the least efficient to the most efficient?

A. Film boiling, single-phase convection, nucleate boiling

B. Film boiling, nucleate boiling, single-phase convection

C. Single-phase convection, nucleate boiling, film boiling

D. Single-phase convection, film boiling, nucleate boiling

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B1582

During nuclear power plant operation at 100 percent power, which one of the following is the major mode of heat transfer occurring as steam travels from the reactor vessel to the main turbine?

A. Radiolysis

B. Radiation

C. Conduction

D. Convection

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B1982 (P985)

Reactor fuel rods are normally charged with _____ gas; which improves heat transfer by _____.

A. helium; convection

B. helium; conduction

C. nitrogen; convection

D. nitrogen; conduction

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B2282

Which one of the following describes a heat transfer process in which convection is the dominant mode of heat transfer?

A. From the reactor fuel to the core barrel during core uncovery.

B. Through the tube walls in a main condenser during normal operation at 100 percent power.

C. From the reactor fuel to the steam outlet of the reactor vessel during a station blackout.

D. From the fuel pellet centerline to the fuel clad during normal operation at 100 percent power.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B2782

The order of reactor coolant heat transfer mechanisms, from the least efficient to the most efficient, is...

A. transition boiling, stable film boiling, nucleate boiling.

B. transition boiling, nucleate boiling, stable film boiling.

C. stable film boiling, nucleate boiling, transition boiling.

D. stable film boiling, transition boiling, nucleate boiling.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.01 [3.2/3.2]
QID: B2882 (P2884)

Which one of the following describes a heat transfer flow path in which conduction is the dominant mode of heat transfer?

A. From the fuel rods to the core barrel during core uncovery.

B. From the main turbine exhaust steam to the atmosphere via main condenser cooling water and a cooling tower during normal operation.

C. From the fuel rods to the steam outlet of the reactor vessel during a station blackout.

D. From a fuel pellet to the fuel cladding via the fuel rod fill gas during normal operation.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.02 [2.4/2.6]
QID: B1185

In an operating cooling water system, an increased stagnant fluid film thickness _____ heat transfer because conduction heat transfer is _____ efficient than convective heat transfer.

A. enhances; more

B. enhances; less

C. inhibits; more

D. inhibits; less

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.02 [2.4/2.6]
QID: B1682

The buildup of fission product gases in a fuel rod causes the thermal conductivity of the fuel pellets to _____ and the thermal conductivity of the fill gas to _____.

A. decrease; decrease

B. decrease; increase

C. increase; decrease

D. increase; increase

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.02 [2.4/2.6]
QID: B2192 (P2195)

Which one of the following describes the fuel-to-coolant thermal conductivity for a fuel rod at the beginning of a fuel cycle (BOC) compared to the end of a fuel cycle (EOC)?

A. Greater at BOC, due to a higher fuel pellet density.

B. Greater at BOC, due to lower contamination of fuel rod fill gas with fission product gases.

C. Smaller at BOC, due to a larger gap between the fuel pellets and cladding.

D. Smaller at BOC, due to a smaller corrosion film on the surface of the fuel rods.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.02 [2.4/2.6]
QID: B2582

Which one of the following has the highest value for thermal conductivity?

A. Fuel pellet

B. Fuel clad

C. Fuel rod fill gas

D. Fission product gases

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.03 [2.7/2.8]
QID: B286

As fluid flow rate decreases through the tubes of a shell-and-tube heat exchanger, the laminar film thickness _____, which causes the heat transfer rate to _____.

A. increases; decrease

B. increases; increase

C. decreases; decrease

D. decreases; increase

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B149

Which one of the following describes parallel and/or counter-flow heat exchangers?

A. Counter-flow heat exchangers are more efficient than parallel-flow heat exchangers due to the high initial ΔT.

B. Counter-flow heat exchangers allow the exiting cooled fluid temperature to be below the exiting cooling fluid temperature.

C. Parallel-flow heat exchangers are more efficient than counter-flow heat exchangers due to the high initial ΔT.

D. Parallel-flow heat exchangers allow the exiting cooled fluid temperature to be below the exiting cooling fluid temperature.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B199

Which one of the following equations is representative of the heat transfer rate across the tubes of a heat exchanger?

Where:

h_t = fluid enthalpy inside tubes
h_{ss} = fluid enthalpy on heat exchanger shell side
T_t = fluid temperature inside tubes
T_{ss} = fluid temperature on heat exchanger shell side

A. $\dot{Q} = \dot{m}c_p(h_t - h_{ss})$

B. $\dot{Q} = UA(h_t - h_{ss})$

C. $\dot{Q} = \dot{m}c_p(T_t - T_{ss})$

D. $\dot{Q} = UA(T_t - T_{ss})$

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B1083

A counterflow lube oil heat exchanger is in operation when the cooling water flow rate is reduced to one-half its original value. Which one of the following will decrease as a result?

A. Lube oil outlet temperature

B. Cooling water outlet temperature

C. Lube oil differential temperature

D. Cooling water differential temperature

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B1283

Which one of the following equations includes the heat transfer coefficient of the tubes in a heat exchanger?

A. $\dot{Q} = \dot{m}\Delta h$

B. $\dot{Q} = \dot{m}\Delta T$

C. $\dot{Q} = \dot{m}c_p\Delta T$

D. $\dot{Q} = UA\Delta T$

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B1782

Refer to the drawing of a lube oil heat exchanger (see figure below).

The lube oil heat exchanger is in operation when the cooling water flow rate is increased to twice its former value. Which one of the following will increase as a result?

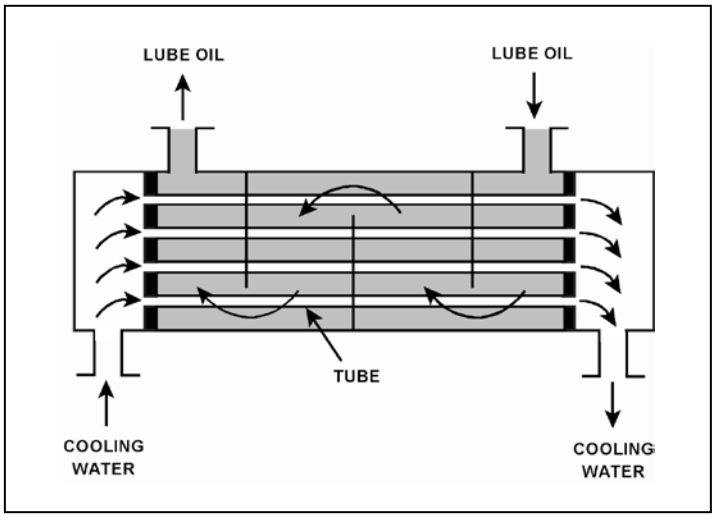
A. Lube oil outlet temperature

B. Cooling water outlet temperature

C. Lube oil differential temperature

D. Cooling water differential temperature

ANSWER: C.



TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B2583

During a nuclear power plant outage, 6 percent of the main condenser tubes were plugged. The following 100 percent power conditions existed before the outage:

Main condenser pressure = 1.1 psia
Cooling water inlet temperature = 60°F
Cooling water outlet temperature = 86°F

After the outage, the plant was returned to 100 percent power. The following 100 percent power conditions existed after the outage:

Main condenser pressure = 1.2 psia
Cooling water inlet temperature = 60°F
Cooling water outlet temperature = ?

If the total heat transfer rate in the main condenser is the same, which one of the following will be the approximate final cooling water outlet temperature?

A. 86°F

B. 88°F

C. 90°F

D. 92°F

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B3082 (P3034)

Refer to the drawing of a lube oil heat exchanger (see figure below).

Given the following heat exchanger parameters:

- Lube oil flow rate is 200 lbm/min.
- Lube oil enters the heat exchanger at 140°F.
- Lube oil leaves the heat exchanger at 100°F.
- Specific heat of the lube oil is 0.8 Btu/lbm-°F.
- Cooling water flow rate is 400 lbm/min.
- Cooling water enters the lube oil heat exchanger at 60°F.
- Specific heat of the cooling water is 1.0 Btu/lbm-°F.

What is the approximate temperature of the cooling water leaving the lube oil heat exchanger?

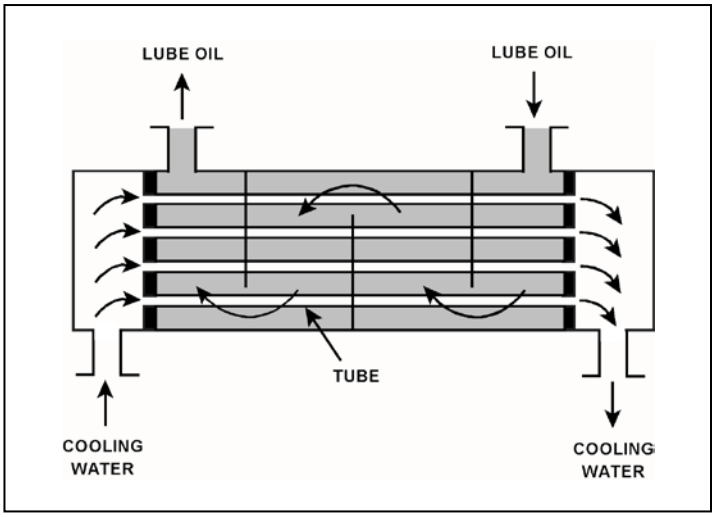
A. 76°F

B. 85°F

C. 92°F

D. 124°F

ANSWER: A.



TOPIC: 293007
KNOWLEDGE: K1.06 [2.7/2.8]
QID: B6143 (P6116)

A counter-flow heat exchanger is being used to cool the lube oil for a main turbine and generator.

The main turbine and generator was initially operating at 100 percent load with the following stable heat exchanger conditions:

$T_{oil\ in}$ = 174°F
$T_{oil\ out}$ = 114°F
$T_{water\ in}$ = 85°F
$T_{water\ out}$ = 115°F

Main turbine and generator load was reduced, and the heat exchanger cooling water mass flow rate was decreased to one-half of its initial value, resulting in the following stable current conditions:

$T_{oil\ in}$ = 178°F
$T_{oil\ out}$ = 138°F
$T_{water\ in}$ = 85°F
$T_{water\ out}$ = ?

Assume that the lube oil mass flow rate and the specific heats of both fluids did not change.

Which one of the following is the current cooling water outlet temperature?

A. 115°F

B. 125°F

C. 135°F

D. 145°F

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B484

Excessive amounts of entrained gases passing through a single-phase (liquid) heat exchanger are undesirable because...

A. flow blockage can occur in the heat exchanger.

B. the laminar layer will increase in the heat exchanger.

C. the heat exchanger heat transfer coefficient will increase.

D. the temperature difference across the heat exchanger tubes will decrease.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B1882 (P1184)

Why is bulk boiling in the tubes of a single-phase heat exchanger undesirable?

A. The bubble formation will break up the laminar layer in the heat exchanger tubes.

B. The thermal conductivity of the heat exchanger tubes will decrease.

C. The differential temperature across the tubes will decrease through the heat exchanger.

D. The turbulence will restrict fluid flow through the heat exchanger tubes.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B2184 (P2184)

Which one of the following pairs of fluids undergoing heat transfer in identical heat exchangers will yield the greatest heat exchanger overall heat transfer coefficient?

A. Oil to water.

B. Air to water.

C. Steam to water.

D. Water to water.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B2383 (P2384)

Which one of the following pairs of fluids undergoing heat transfer in identical heat exchangers will yield the smallest heat exchanger overall heat transfer coefficient?

A. Oil to water.

B. Air to water.

C. Steam to water.

D. Water to water.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B3084 (P3084)

A nuclear power plant is operating near 100 percent power. Main turbine extraction steam is being supplied to a feedwater heater. Extraction steam parameters are as follows:

Steam pressure = 414 psia
Steam flow rate = 7.5×10^5 lbm/hr
Steam enthalpy = 1,150 Btu/lbm

The extraction steam condenses to saturated water at 414 psia, and then leaves the feedwater heater via a drain line.

What is the heat transfer rate from the extraction steam to the feedwater in the feedwater heater?

A. 3.8×10^7 Btu/hr

B. 8.6×10^7 Btu/hr

C. 5.4×10^8 Btu/hr

D. 7.2×10^8 Btu/hr

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B3383 (P3384)

A nuclear power plant is initially operating at a steady-state power level with the following main condenser parameters:

Main condenser pressure = 1.2 psia
Cooling water inlet temperature = 60°F
Cooling water outlet temperature = 84°F

Due to increased condenser air inleakage, the overall heat transfer coefficient of the main condenser decreases by 25 percent. Main condenser heat transfer rate and cooling water temperatures are unchanged. Which one of the following is the steady-state main condenser pressure resulting from the reduced heat transfer coefficient?

A. 1.7 psia

B. 2.3 psia

C. 3.0 psia

D. 4.6 psia

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B3684 (P3684)

Which one of the following pairs of fluids undergoing heat transfer in identical heat exchangers will yield the greatest heat exchanger overall heat transfer coefficient?

A. Oil to water.

B. Steam to water.

C. Air to water.

D. Water to water.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.07 [2.7/2.9]
QID: B5143 (P5144)

A nuclear power plant is operating near 100 percent power. Main turbine extraction steam is being supplied to a feedwater heater. Extraction steam parameters are as follows:

Steam pressure = 500 psia
Steam flow rate = 7.0×10^5 lbm/hr
Steam enthalpy = 1,135 Btu/lbm

The extraction steam condenses to saturated water at 500 psia, and then leaves the feedwater heater via a drain line.

What is the heat transfer rate from the extraction steam to the feedwater in the feedwater heater?

A. 3.2×10^8 Btu/hr

B. 4.8×10^8 Btu/hr

C. 5.3×10^8 Btu/hr

D. 7.9×10^8 Btu/hr

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.08 [3.0/3.1]
QID: B378

Which one of the following actions will decrease nuclear power plant efficiency?

A. Reducing the turbine inlet steam moisture content.

B. Reducing the condensate depression.

C. Increasing the turbine exhaust pressure.

D. Increasing the temperature of the feedwater entering the reactor vessel.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.08 [3.0/3.1]
QID: B1585

Which one of the following actions will increase nuclear power plant efficiency?

A. Increasing the turbine inlet steam moisture content.

B. Increasing the condensate depression.

C. Decreasing the turbine exhaust pressure.

D. Decreasing the temperature of the feedwater entering the reactor vessel.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.09 [2.5/2.7]
QID: B147

Which one of the following statements explains why condensate subcooling is necessary in the steam condensing phase of a nuclear power plant steam cycle?

A. To increase overall secondary efficiency.

B. To provide an improved condenser vacuum.

C. To allow use of a higher circulating water temperature.

D. To provide net positive suction head for the condensate pumps.

ANSWER: D.

TOPIC: 293007
KNOWLEDGE: K1.09 [2.5/2.7]
QID: B583

Which one of the following statements describes condensate depression in the main condenser?

A. Increasing condensate depression improves the available net positive suction head for the condensate pumps.

B. Decreasing condenser vacuum increases condensate depression.

C. Increasing circulating water temperature increases condensate depression.

D. Decreasing condensate depression decreases plant efficiency.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.09 [2.5/2.7]
QID: B883

A steam condenser is operating with 28 inches of Hg vacuum and a condensate outlet temperature of 88°F. Which one of the following is the value of condensate depression?

A. 8°F

B. 14°F

C. 24°F

D. 38°F

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.09 [2.5/2.7]
QID: B1084

The purpose of condensate depression in a nuclear power plant steam cycle is to...

A. maximize condenser vacuum.

B. maximize total plant efficiency.

C. minimize cavitation of the condensate pumps.

D. minimize thermal gradients in the condenser hotwell.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.09 [2.5/2.7]
QID: B2483

A steam condenser is operating with 28.5 inches of Hg vacuum and a condensate outlet temperature of 88°F. Which one of the following is the value of condensate depression?

A. 2°F

B. 9°F

C. 13°F

D. 17°F

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.10 [2.7/2.9]
QID: B684

The measure of heat input per unit time from the nuclear fuel to the reactor coolant in units of megawatts defines...

A. specific heat.

B. power density.

C. core thermal power.

D. percent reactor power.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.11 [2.6/3.1]
QID: B385

Which one of the following is the most accurate indication of mass flow rate through a reactor for calculating core thermal power during reactor power operation?

A. Core flow rate

B. Steam flow rate

C. The sum of feedwater and control rod drive flow rates

D. The sum of both recirculation loop flow rates

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.11 [2.6/3.1]
QID: B984

Which one of the following expressions describes core thermal power?

A. $\dot{Q}_{Core} = \dot{Q}_{Feedwater} - \dot{Q}_{Steam} - \dot{Q}_{CRD} - \dot{Q}_{Recirc} + \dot{Q}_{Ambient} + \dot{Q}_{RWCU}$

B. $\dot{Q}_{Core} = \dot{Q}_{Steam} - \dot{Q}_{Feedwater} + \dot{Q}_{CRD} + \dot{Q}_{Recirc} - \dot{Q}_{Ambient} - \dot{Q}_{RWCU}$

C. $\dot{Q}_{Core} = \dot{Q}_{Steam} - \dot{Q}_{Feedwater} - \dot{Q}_{CRD} - \dot{Q}_{Recirc} + \dot{Q}_{Ambient} + \dot{Q}_{RWCU}$

D. $\dot{Q}_{Core} = \dot{Q}_{Steam} - \dot{Q}_{Feedwater} - \dot{Q}_{CRD} - \dot{Q}_{Recirc} - \dot{Q}_{Ambient} - \dot{Q}_{RWCU}$

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.11 [2.6/3.1]
QID: B2984 (P2985)

A reactor is operating at power. The feedwater flow rate to the reactor vessel is 7.0×10^6 lbm/hr at a temperature of 440°F. The steam exiting the reactor vessel is at 1,000 psia with 100 percent steam quality.

Ignoring all other heat gain and loss mechanisms, what is the core thermal power?

A. 1,335 MW

B. 1,359 MW

C. 1,589 MW

D. 1,612 MW

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.11 [2.6/3.1]
QID: B6843

When performing a heat balance calculation to determine core thermal power, the measured thermal power is _____ by a value associated with the recirculation pumps; the adjustment is needed because _____ of the flow energy added to the reactor coolant by the recirculation pumps is converted to thermal energy of the reactor coolant.

A. decreased; nearly all

B. decreased; a small fraction

C. increased; nearly all

D. increased; a small fraction

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.12 [2.6/3.1]
QID: B1384

Given the following data for a steam condenser:

Total tube area	= 500,000 ft^2
Cooling water flow rate	= 200,000 gpm
Condenser pressure	= 1.0 psia
Specific heat of cooling water (c_p)	= 1.0 Btu/lbm-°F
Cooling water inlet temperature	= 60°F
Cooling water outlet temperature	= 80°F
Steam condensing rate	= 3,000,000 lbm/hr
Mass of cooling water	= 8.34 lbm/gal

What is the condenser heat load (MW)?

A. 587 MW

B. 629 MW

C. 671 MW

D. 733 MW

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B150

Given the following data for a steam condenser:

Total tube area	=	500,000 ft^2
Cooling water flow rate	=	200,000 gpm
Condenser pressure	=	1.0 psia
Specific heat of cooling water (c_p)	=	1.0 Btu/lbm-°F
Cooling water inlet temperature	=	60°F
Cooling water outlet temperature	=	85°F
Steam condensing rate	=	3,000,000 lbm/hr
Mass of cooling water	=	8.34 lbm/gal

What is the condenser heat load (MW)?

A. 704 MW

B. 734 MW

C. 784 MW

D. 834 MW

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B386 (P384)

The power range nuclear instruments were just adjusted to 100 percent power, as determined by a heat balance calculation. Which one of the following would result in indicated reactor power being <u>greater</u> than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was higher than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The feedwater flow rate used in the heat balance calculation was lower than actual feedwater flow rate.

D. The steam pressure used in the heat balance calculation was higher than actual steam pressure.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B1684 (P3944)

The power range nuclear instruments were adjusted to 100 percent based on a calculated heat balance. Which one of the following would cause indicated reactor power to be lower than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 10°F lower than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The feedwater flow rate used in the heat balance calculation was 10 percent lower than actual feedwater flow rate.

D. The steam pressure used in the heat balance calculation was 50 psi lower than actual steam pressure.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2183 (P2185)

The power range nuclear instruments have been adjusted to 100 percent based on a heat balance calculation. Which one of the following will result in indicated reactor power being lower than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 20°F higher than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The feedwater flow rate used in the heat balance calculation was 10 percent higher than actual feedwater flow rate.

D. The steam pressure used in the heat balance calculation was 50 psi lower than actual steam pressure.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2284 (P2685)

The power range nuclear instruments have been adjusted to 100 percent based on a calculated heat balance. Which one of the following will result in indicated reactor power being lower than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 20°F higher than actual feedwater temperature.

B. The reactor recirculation pump heat input value used in the heat balance was 10 percent lower than actual reactor recirculation pump heat input.

C. The feedwater flow rate used in the heat balance calculation was 10 percent higher than actual feedwater flow rate.

D. The operator miscalculated the enthalpy of the steam exiting the reactor vessel to be 10 Btu/lbm higher than actual.

ANSWER: A.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2484

The power range nuclear instruments have just been adjusted to 100 percent based on a calculated heat balance. Which one of the following will result in indicated reactor power being lower than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 20°F lower than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The ambient heat loss value used in the heat balance calculation was only half the actual ambient heat loss.

D. The feedwater flow rates used in the heat balance calculation were 10 percent higher than actual flow rates.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2684 (P2485)

The power range nuclear instruments have been adjusted to 100 percent based on a heat balance calculation. Which one of the following will result in indicated reactor power being higher than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 20°F higher than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The feedwater flow rate used in the heat balance calculation was 10 percent lower than actual feedwater flow rate.

D. The ambient heat loss term was omitted from the heat balance calculation.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2785

The power range nuclear instruments were just calibrated at 100 percent power, as determined by a heat balance calculation. Which one of the following would result in indicated reactor power being lower than actual reactor power?

A. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

B. The feedwater temperature used in the heat balance calculation was 20°F lower than actual feedwater temperature.

C. The reactor vessel pressure used in the heat balance calculation was 30 psia higher than actual reactor vessel pressure.

D. The steam and feedwater flow rates used in the heat balance calculation were 10 percent higher than actual flow rates.

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B2884 (P137)

The power range nuclear instruments have been adjusted to 100 percent based on a calculated heat balance. Which one of the following will result in indicated reactor power being greater than actual reactor power?

A. The operator miscalculated the enthalpy of the feedwater to be 10 Btu/lbm higher than actual feedwater enthalpy.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The steam and feedwater flow rates used in the heat balance calculation were 10 percent lower than actual flow rates.

D. The steam pressure used in the heat balance calculation was 50 psi higher than actual steam pressure.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B5043

Two of the parameters listed below are used for calculating core thermal power using the standard heat balance method. Which one of the following identifies the two parameters?

	Reactor Core Mass Flow Rate	Feedwater Temperature	Reactor Vessel Pressure	Reactor Vessel Water Level
A.	Yes	No	Yes	No
B.	No	Yes	Yes	No
C.	Yes	No	No	Yes
D.	No	Yes	No	Yes

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B6043 (P6044)

The power range nuclear instruments were adjusted to indicate 100 percent based on a heat balance calculation. Which one of the following would cause indicated reactor power to be higher than actual reactor power?

A. The steam pressure used in the heat balance calculation was 50 psi higher than actual steam pressure.

B. The ambient heat loss value used in the heat balance calculation was twice the actual ambient heat loss.

C. The feedwater flow rate used in the heat balance calculation was 10 percent lower than actual feedwater flow rate.

D. The feedwater temperature used in the heat balance calculation was 20°F higher than actual feedwater temperature.

ANSWER: B.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B7639

A nuclear power plant is operating with the following stable reactor vessel (RV) and feedwater (FW) parameters:

RV pressure = 1,000 psia
RV steam flow rate = 1.0×10^7 lbm/hr (dry, saturated steam)
FW inlet temperature = 470°F

Based on the above information, what is the thermal power output of the reactor?

A. 740 MW

B. 1,328 MW

C. 2,169 MW

D. 3,497 MW

ANSWER: C.

TOPIC: 293007
KNOWLEDGE: K1.13 [2.3/2.9]
QID: B7750

A reactor is operating with the following parameters:

Feedwater inlet temperature = 400°F
Feedwater mass flow rate = 6.0×10^6 lbm/hr
Reactor outlet steam pressure = 960 psia
Reactor outlet steam quality = 100 percent

What is the approximate thermal power output of the reactor in megawatts (MW)?

A. 660 MW

B. 1,157 MW

C. 1,441 MW

D. 2,101 MW

ANSWER: C.