

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 of electromagnetic waves through an intervening space"?

- 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.

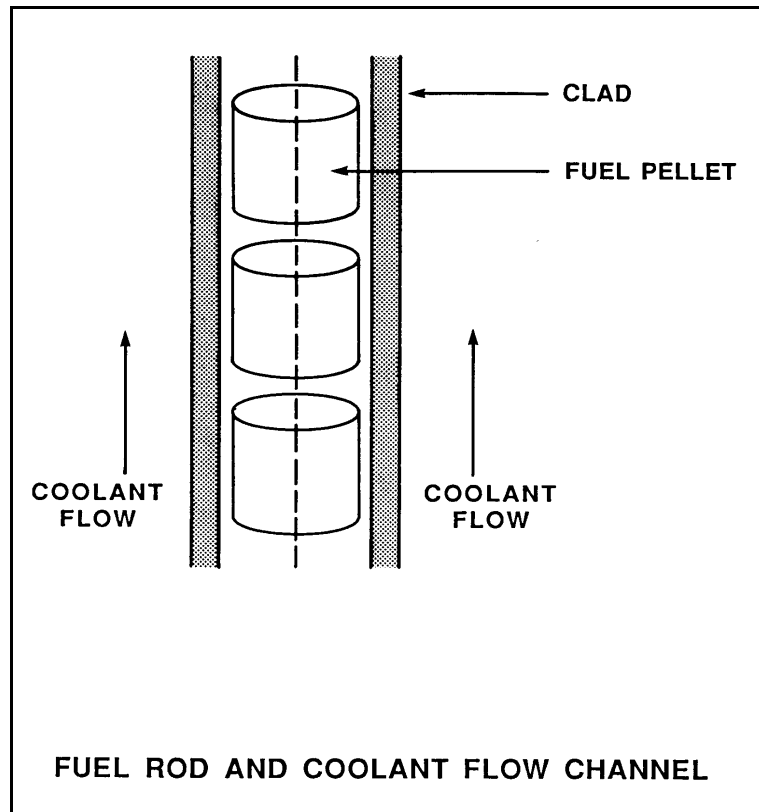
TOPIC: 293007  
KNOWLEDGE: K1.01 [3.2/3.2]  
QID: B882 (P584)

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 reactor fuel and the fuel clad?

- A. Conduction
- B. Convection
- C. Radiation
- D. Natural circulation

ANSWER: A.



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

The predominant mode of heat transfer from the fuel-clad surface to the coolant during full power operating conditions is...

- A. radiation.
- B. conduction.
- C. forced convection.
- D. natural convection.

ANSWER: C.

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

During normal nuclear power plant operating conditions, 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)

Nuclear reactor fuel rods are normally charged with \_\_\_\_\_ gas to improve the heat transferred by \_\_\_\_\_ from the fuel pellets to the cladding.

- 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 most significant mode of heat transfer?

- A. From the reactor fuel to the core barrel during core uncover.
- 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: B2882 (P2884)

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

- A. From the reactor fuel to the core barrel during core uncovering.
- 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 reactor fuel to the steam outlet of the reactor vessel during a station blackout.
- D. From a fuel pellet to the fuel clad 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: B2582

Which one of the following has the largest 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: B86

The order of reactor coolant heat transfer modes, 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: K1.03 [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 heat transfer rate to \_\_\_\_\_.

- A. increases; decrease
- B. increases; increase
- C. decreases; decrease
- D. decreases; increase

ANSWER: A.

TOPIC: 293007  
KNOWLEDGE: K1.03 [2.7/2.8]  
QID: B1483

Which one of the following is the order of core heat transfer modes, from the least desirable to the most desirable?

- 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: K1.03 [2.7/2.8]  
QID: B2782

The order of reactor coolant heat transfer modes, 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: K1.06 [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  $\Delta T$ .
- 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  $\Delta T$ .
- 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 of its former value. Which one of the following will decrease as a result?

- A. Lube oil outlet temperature
- B. Cooling water outlet temperature
- C. Lube oil  $\Delta T$
- D. Cooling water  $\Delta T$

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.

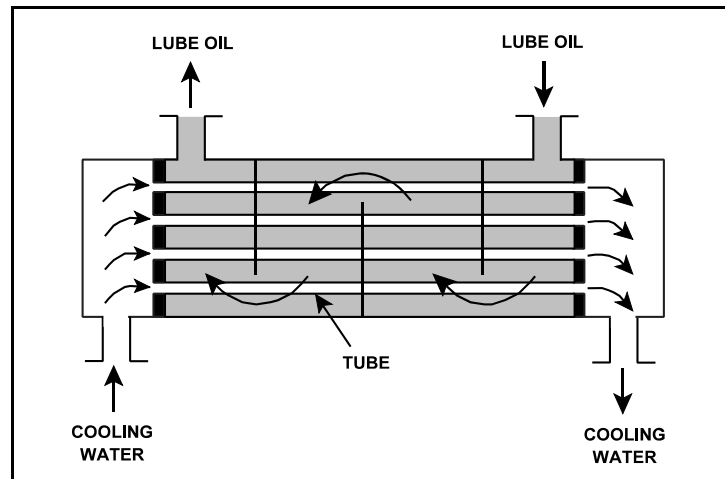
TOPIC: 293007  
KNOWLEDGE: K1.06 [2.7/2.8]  
QID: B1782

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  $\Delta T$
- D. Cooling water  $\Delta T$

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:	1.10 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:	1.20 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 lube oil cooling system conditions:

The lube oil flow rate in the lube oil heat exchanger is 200 lbm/min.

The lube oil enters the heat exchanger at 140°F.

The lube oil leaves the heat exchanger at 100°F.

The specific heat of the lube oil is 0.8 Btu/lbm-°F.

The cooling water flow rate is 400 lbm/min.

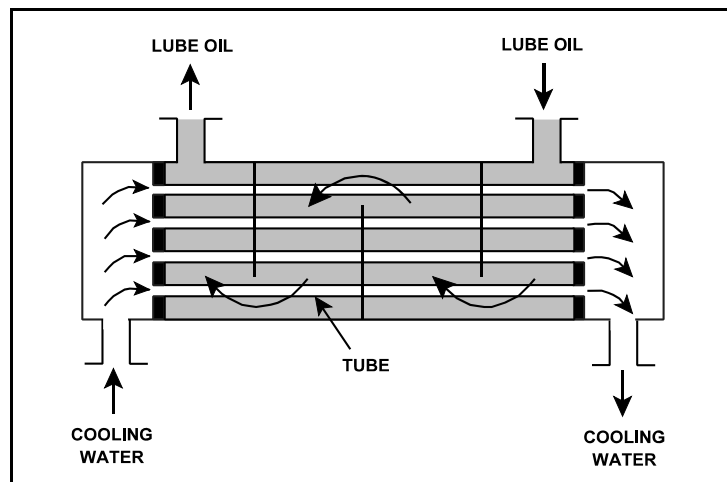
The cooling water enters the lube oil heat exchanger at 60°F.

The specific heat of the cooling water is 1.0 Btu/lbm-°F.

What is the approximate temperature of the cooling water leaving the lube 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 system 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:

$$\begin{aligned}T_{\text{oil in}} &= 174^{\circ}\text{F} \\T_{\text{oil out}} &= 114^{\circ}\text{F} \\T_{\text{water in}} &= 85^{\circ}\text{F} \\T_{\text{water out}} &= 115^{\circ}\text{F}\end{aligned}$$

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:

$$\begin{aligned}T_{\text{oil in}} &= 178^{\circ}\text{F} \\T_{\text{oil out}} &= 138^{\circ}\text{F} \\T_{\text{water in}} &= 85^{\circ}\text{F} \\T_{\text{water out}} &= ?\end{aligned}$$

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  $\Delta T$  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: B2084

The following 100 percent power conditions existed before a nuclear power plant outage:

Main condenser pressure:	1.20 psia
Cooling water inlet temperature:	60°F
Cooling water outlet temperature:	92°F

During the outage, 6 percent of the main condenser tubes were plugged. After the outage, the following 100 percent power conditions exist:

Main condenser pressure:	1.31 psia
Cooling water inlet temperature:	60°F
Cooling water outlet temperature:	?

Which one of the following is the approximate cooling water outlet temperature after the outage?

- A. 92°F
- B. 94°F
- C. 96°F
- D. 98°F

ANSWER: B.

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

Which one of the following pairs of fluids undergoing heat transfer in typical cross-flow design heat exchangers will yield the greatest heat exchanger overall heat transfer coefficient? (Assume comparable heat exchanger sizes and fluid flow rates.)

- A. Oil to water in a lube oil cooler
- B. Air to water in an air compressor after-cooler
- C. Steam to water in a turbine exhaust steam condenser
- D. Water to water in a cooling water heat exchanger

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 typical cross-flow design heat exchangers will yield the smallest heat exchanger overall heat transfer coefficient? (Assume comparable heat exchanger sizes and fluid flow rates.)

- A. Oil to water in a lube oil cooler
- B. Air to water in an air compressor after-cooler
- C. Steam to water in a turbine exhaust steam condenser
- D. Water to water in a cooling water heat exchanger

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:  $7.5 \times 10^5$  lbm/hr  
Steam enthalpy: 1,150 Btu/lbm

Assume the extraction steam condenses to a saturated liquid at 414 psia and then leaves the feedwater heater via a drain line.

Assuming an ideal heat transfer process, what is the heat transfer rate from the extraction steam to the feedwater in the feedwater heater?

- A.  $3.8 \times 10^7$  Btu/hr
- B.  $8.6 \times 10^7$  Btu/hr
- C.  $5.4 \times 10^8$  Btu/hr
- D.  $7.2 \times 10^8$  Btu/hr

ANSWER: C.

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

A nuclear power plant was 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

As a result of 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 approximate resulting pressure in the main condenser?

- 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 typical cross-flow design heat exchangers will yield the greatest heat exchanger overall heat transfer coefficient? (Assume comparable heat exchanger sizes and fluid flow rates.)

- A. Oil to water in a lube oil cooler
- B. Steam to water in a feedwater heater
- C. Water to air in a ventilation heating unit
- D. Water to water in a cooling water heat exchanger

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:  $7.0 \times 10^5$  lbm/hr  
Steam enthalpy: 1,135 Btu/lbm

Assume the extraction steam condenses to a saturated liquid at 500 psia and then leaves the feedwater heater via a drain line.

Assuming an ideal heat transfer process, what is the heat transfer rate from the extraction steam to the feedwater in the feedwater heater?

- A.  $3.2 \times 10^8$  Btu/hr
- B.  $4.8 \times 10^8$  Btu/hr
- C.  $5.3 \times 10^8$  Btu/hr
- D.  $7.9 \times 10^8$  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 turbine inlet steam moisture content
- B. Reducing condensate depression
- C. Increasing turbine exhaust pressure
- D. Increasing temperature of feed-water 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 turbine inlet steam moisture content
- B. Increasing condensate depression
- C. Decreasing turbine exhaust pressure
- D. Decreasing temperature of feed water 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 to 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 (subcooling) 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 condenser is operating at 28 inches of Hg vacuum and a condensate outlet temperature of 88°F. Which one of the following most closely approximates the value for the 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 the turbine/condenser phase of 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 condenser is operating at 28.5 inches of Hg vacuum with a condensate outlet temperature of 88°F. Which one of the following is the approximate 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 a nuclear reactor core 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 nuclear reactor for calculating core thermal power during reactor power operation?

- A. Core flow rate
- B. Steam flow rate
- C. The sum of feed water 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.  $\dot{Q}_{\text{core}} = \dot{Q}_{\text{Feedwater}} - \dot{Q}_{\text{Steam}} - \dot{Q}_{\text{CRD}} - \dot{Q}_{\text{Recirc}} + \dot{Q}_{\text{Ambient}} + \dot{Q}_{\text{RWCU}}$
- B.  $\dot{Q}_{\text{core}} = \dot{Q}_{\text{Steam}} - \dot{Q}_{\text{Feedwater}} + \dot{Q}_{\text{CRD}} + \dot{Q}_{\text{Recirc}} - \dot{Q}_{\text{Ambient}} - \dot{Q}_{\text{RWCU}}$
- C.  $\dot{Q}_{\text{core}} = \dot{Q}_{\text{Steam}} - \dot{Q}_{\text{Feedwater}} - \dot{Q}_{\text{CRD}} - \dot{Q}_{\text{Recirc}} + \dot{Q}_{\text{Ambient}} + \dot{Q}_{\text{RWCU}}$
- D.  $\dot{Q}_{\text{core}} = \dot{Q}_{\text{Steam}} - \dot{Q}_{\text{Feedwater}} - \dot{Q}_{\text{CRD}} - \dot{Q}_{\text{Recirc}} - \dot{Q}_{\text{Ambient}} - \dot{Q}_{\text{RWCU}}$

ANSWER: C.

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

A nuclear reactor is operating at power. The feedwater flow rate to the reactor vessel is  $7.0 \times 10^6$  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 MWt
- B. 1,359 MWt
- C. 1,589 MWt
- D. 1,612 MWt

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. increased; a small fraction
- B. increased; nearly all
- C. decreased; a small fraction
- D. decreased; nearly all

ANSWER: D.

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 <sup>2</sup>
Cooling water flow rate	= 200,000 gpm
Condenser pressure	= 1 psia
Specific heat of cooling water ( $c_p$ )	= 1 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 in megawatts thermal (MWt)?

- A. 587 MWt
- B. 629 MWt
- C. 671 MWt
- D. 733 MWt

ANSWER: A.

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

Given the following data for a typical steam condenser, select the approximate heat load rejected in megawatts thermal.

Total tube area	= 500,000 ft <sup>2</sup>
Cooling water flow rate	= 200,000 gpm
Condenser pressure	= 1 psia
Specific heat of cooling water ( $c_p$ )	= 1 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

- A. 704 MWt
- B. 734 MWt
- C. 784 MWt
- D. 834 MWt

ANSWER: B.

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

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 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

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 10°F lower than the actual feed water 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 the actual feedwater flow rate.
- D. The steam pressure used in the heat balance calculation was 50 psi lower than the 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 feed water flow rate used in the heat balance calculation was 10 percent higher than actual 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 term used in the heat balance was 10 percent lower than actual.
- C. The steam and feedwater flow rates used in the heat balance calculation were 10 percent higher than actual flow rates.
- 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 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 feed water temperature used in the heat balance calculation was 20°F lower than actual feed water 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 feed water 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 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 reactor recirculation pump heat input term was omitted from the heat balance calculation.
- B. The feed water temperature used in the heat balance calculation was 20°F lower than actual feed water 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 feed water 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 feed water to be 10 Btu/lbm higher than actual feed water enthalpy.
- B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.
- C. The steam and feed water 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?

	<u>Reactor Core Mass Flow Rate</u>	<u>Feedwater Temperature</u>	<u>Reactor Vessel Pressure</u>	<u>Reactor Vessel Water Level</u>
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 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 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.