科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P78

The possibility of water hammer in a liquid system is minimized by...

A. maintaining temperature above the saturation temperature.

B. starting centrifugal pumps with the casing vent valve fully open.

C. starting positive displacement pumps with the discharge valve closed.

D. venting systems prior to starting centrifugal pumps.

ANSWER: D.

下列何者將讓液體系統發生水錘現象的可能性降至最低？

A. 溫度維持在飽和溫度之上。

B. 在外殼排氣閥全開下啟動離心泵。

C. 在出口閥關閉下啟動正排量泵。

D. 啟動離心泵之前先將系統排氣。

答案：D.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P278

Which one of the following methods will increase the possibility and/or severity of water hammer?

A. Opening and closing system valves slowly

B. Venting fluid systems prior to starting a pump

C. Starting a centrifugal pump with the discharge valve fully open

D. Starting a centrifugal pump with the discharge valve fully closed

ANSWER: C.

下列哪項方法將提高水錘現象的發生可能性和/或嚴重性？

A. 緩慢開啟與關閉系統閥門。

B. 啟動泵之前，先將流體系統排氣。

C. 在出口閥全開下啟動離心泵。

D. 在出口閥全關下啟動離心泵。

答案：C.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P679 (B279)

A sudden stop of fluid flow in a piping system, due to rapid closure of an isolation valve, will most likely result in...

A. check valve slamming.

B. pump runout.

C. water hammer.

D. pressurized thermal shock.

ANSWER: C.

隔離閥快速關閉而造成管路系統流體突然停止流動，此情況最可能導致.....

A. 止回閥關閉

B. 泵超流(runout)

C. 水錘現象

D. 壓力熱震(pressurized thermal shock)

答案：C.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P879

One reason for keeping condensate out of the steam lines is to...

A. minimize corrosion buildup.

B. reduce heat losses.

C. eliminate steam traps.

D. prevent water/steam hammer.

ANSWER: D.

避免在蒸汽管路產生凝結水的原因之一是……

A. 減少累積腐蝕至最低。

B. 減少熱損失。

C. 無須使用蒸汽祛除器(steam trap)。

D. 避免水錘/蒸汽錘現象。

答案：D.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P1079

The possibility of water hammer will be increased by...

A. maintaining the discharge line filled with liquid on an automatically starting pump.

B. condensation in a steam line just prior to initiating flow.

C. warming steam lines prior to initiating steam flow.

D. slowly closing the discharge valve on an operating pump.

ANSWER: B.

下列何者將增加水錘現象發生率？

A. 自動啟動泵的出口管路持續裝滿液體。

B. 蒸汽管路於蒸汽開始流動前發生凝結。

C. 蒸汽管路於蒸汽開始流動前加熱。

D. 緩慢關閉運轉水泵的出口閥。

答案：B.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P1279

To minimize the possibility of water hammer when initiating flow in a system, the operator should...

A. vent the system prior to initiating flow.

B. vent the system only after flow has been initiated.

C. fully open the pump discharge valve prior to starting a pump.

D. rapidly open the pump discharge valve after a pump is running.

ANSWER: A.

系統開始流動時，欲將水錘現象發生可能性降至最低，運轉員應該……

A. 在開始流動前，先將系統排氣。

B. 唯有在開始流動後，才將系統排氣。

C. 啟動泵之前，讓其出口閥全開。

D. 泵開始運轉後，迅速開啟其出口閥。

答案：A.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P1879 (B2779)

Which one of the following describes why large steam lines are gradually warmed instead of suddenly admitting full steam flow?

A. To minimize the possibility of stress corrosion cracking of the steam lines

B. To minimize the total thermal expansion of the steam lines

C. To minimize the potential for water hammer in the steam lines

D. To minimize the heat loss from the steam lines

ANSWER: C.

下列何者描述了為何大型蒸汽管路要逐漸加熱，而不是突然增加至全蒸汽流量？

A. 為了使蒸汽管路的應力腐蝕破裂可能性降至最低。

B. 為了使蒸汽管路的總熱膨脹降至最低。

C. 為了使蒸汽管路發生水錘現象的可能性降至最低。

D. 為了使蒸汽管路的熱損失降至最低。

答案： C.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P2079 (B2081)

Which one of the following will minimize the possibility of water hammer?

A. Draining the discharge line of a centrifugal pump after shutdown

B. Draining condensate out of steam lines before and after initiating flow

C. Starting a centrifugal pump with its discharge valve fully open

D. Starting a positive displacement pump with its discharge valve partially closed

ANSWER: B.

下列何者將水錘現象的可能性降至最低？

A. 停機後，排盡離心泵出口管路的水份。

B. 在蒸汽開始流動前後，排盡蒸汽管路內的冷凝水。

C. 在出口閥全開下啟動離心泵。

D. 在出口閥部分關閉下啟動正排量泵。

答案：B.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P2279 (B2679)

Which one of the following operating practices minimizes the possibility of water hammer?

A. Change valve position as rapidly as possible.

B. Start a centrifugal pump with the discharge valve throttled.

C. Start a positive displacement pump with the discharge valve closed.

D. Vent a system only after initiating system flow.

ANSWER: B.

下列哪項運轉操作能將水錘現象的可能性降至最低？

A. 儘速改變閥位。

B. 在出口閥節流下啟動離心泵。

C. 在出口閥關閉下啟動正排量泵。

D. 只有在系統開始流動後，才讓系統排氣。

答案：B.

科目： 193006
知能類：K1.04 [3.4/3.6]
序號： P4042 (B4041)

Refer to the drawing of two lengths of 6-inch piping, each containing an identical automatic isolation valve. The actual pipe lengths are proportional to their symbols in the drawing

Water at 65°F is flowing at 1,000 gpm through each pipe. If the isolation valves suddenly and simultaneously close, valve A and its associated piping will experience a maximum pressure that is _____ the maximum pressure experienced by valve B and its associated piping. The pressure spike will dissipate quicker in the _____ length of pipe.

A. equal to; shorter

B. equal to; longer

C. less than; shorter

D less than; longer

ANSWER: A.

請參照下圖的兩條6吋管路，兩者有著相同的自動隔離閥。實際管路長度與圖中標示成正比。

65°F的水以1,000 gpm的流量流過兩管路。若隔離閥突然同時關閉，閥A與其附屬管路所生之最大壓力將_____閥B與其附屬管路所生之最大壓力。而管路長度愈_____，壓力突波(pressure spike)愈快消散。

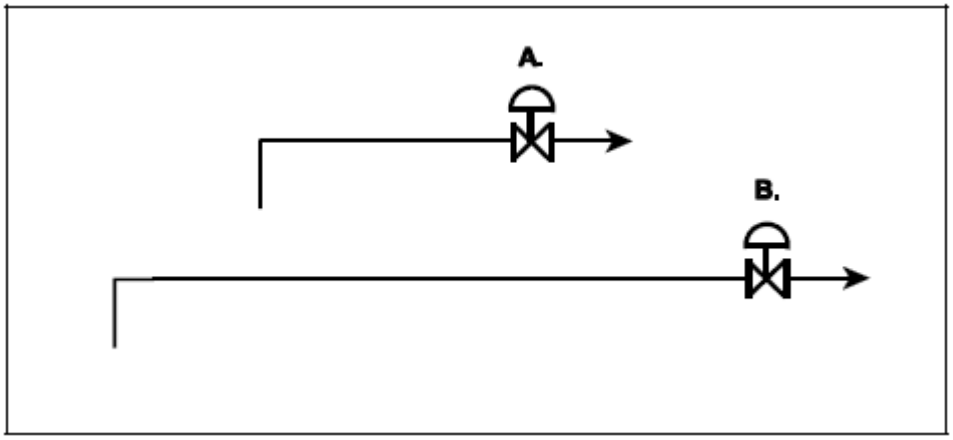
A. 等於；短

B. 等於；長

C. 小於；短

D. 小於；長

答案：A.



科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P380 (B383)

An 85 gpm leak has developed in a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 60.1 gpm

B. 51.7 gpm

C. 42.5 gpm

D. 33.3 gpm

ANSWER: A.

一於100 psig下運轉的冷卻水系統發生洩漏，洩漏率為85 gpm。系統壓力若降至50 psig，洩漏率約為多少？

A. 60.1 gpm

B. 51.7 gpm

C. 42.5 gpm

D. 33.3 gpm

答案：A.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P579

Mass flow rate equals volumetric flow rate (V) times...

A. specific volume.

B. density.

C. specific gravity.

D. velocity.

ANSWER: B.

質量流量等於體積流量(V)乘以……

A. 比容

B. 密度

C. 比重

D. 速度

答案：B.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P680 (B681)

A 55 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 27.5 gpm

B. 31.8 gpm

C. 38.9 gpm

D. 43.4 gpm

ANSWER: C.

一於100 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為55 gpm。系統壓力若降至50 psig，洩漏率約為多少？

A. 27.5 gpm

B. 31.8 gpm

C. 38.9 gpm

D. 43.4 gpm

答案：C.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P1382

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 80 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 40 psig?

A. 37.5 gpm

B. 43.5 gpm

C. 53 gpm

D. 59 gpm

ANSWER: C.

一於80 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為75 gpm。系統壓力若降至40 psig，洩漏率約為多少？

A. 37.5 gpm

B. 43.5 gpm

C. 53 gpm

D. 59 gpm

答案：C.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P1580 (B1979)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 15.0 gpm

B. 30.0 gpm

C. 42.4 gpm

D. 53.1 gpm

ANSWER: C.

一於150 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為60 gpm。系統壓力若降至75 psig，洩漏率約為多少？

A. 15.0 gpm

B. 30.0 gpm

C. 42.4 gpm

D. 53.1 gpm

答案：C.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P1679 (B2981)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 60 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 20 psig?

A. 33.3 gpm

B. 53.0 gpm

C. 57.7 gpm

D. 70.7 gpm

ANSWER: C.

一於60 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為100 gpm。系統壓力若降至20 psig，洩漏率約為多少？

A. 33.3 gpm

B. 53.0 gpm

C. 57.7 gpm

D. 70.7 gpm

答案：C.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P1779 (B1783)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 45 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 30 psig?

A. 25 gpm

B. 50 gpm

C. 67 gpm

D. 82 gpm

ANSWER: D.

一於45 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為100 gpm。系統壓力若降至30 psig，洩漏率約為多少？

A. 25 gpm

B. 50 gpm

C. 67 gpm

D. 82 gpm

答案：D.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P1986

A 47 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 23.5 gpm

B. 33.2 gpm

C. 36.5 gpm

D. 37.3 gpm

ANSWER: B.

一於150 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為47 gpm。系統壓力若降至75 psig，洩漏率約為多少？

A. 23.5 gpm

B. 33.2 gpm

C. 36.5 gpm

D. 37.3 gpm

答案：B.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P2080 (B2080)

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 69 gpm

B. 60 gpm

C. 51 gpm

D. 40 gpm

ANSWER: A.

一於100 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為80 gpm。系統壓力若降至75 psig，洩漏率約為多少？

A. 69 gpm

B. 60 gpm

C. 51 gpm

D. 40 gpm

答案：A.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P2379 (B2381)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?

A. 27 gpm

B. 35 gpm

C. 40 gpm

D. 49 gpm

ANSWER: D.

一於150 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為60 gpm。系統壓力若降至100 psig，洩漏率約為多少？

A. 27 gpm

B. 35 gpm

C. 40 gpm

D. 49 gpm

答案：D.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P2779 (B2781)

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 20 gpm

B. 40 gpm

C. 49 gpm

D. 57 gpm

ANSWER: D.

一於150 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為80 gpm。系統壓力若降至75 psig，洩漏率約為多少？

A. 20 gpm

B. 40 gpm

C. 49 gpm

D. 57 gpm

答案：D.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P2980

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?

A. 36 gpm

B. 53 gpm

C. 56 gpm

D. 65 gpm

ANSWER: D.

一於150 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為80 gpm。系統壓力若降至100 psig，洩漏率約為多少？

A. 36 gpm

B. 53 gpm

C. 56 gpm

D. 65 gpm

答案：D.

科目： 193006
知能類：K1.06 [2.8/2.9]
序號： P580

Reactor coolant system (RCS) hot leg temperature is 568°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which twophase flow will first occur in the hot leg?

A. 1250 to 1201 psig

B. 1200 to 1151 psig

C. 1150 to 1101 psig

D. 1100 to 1051 psig

ANSWER: B.

反應器冷卻水系統(RCS)的熱端溫度為 568°F，少量漏水造成 RCS 壓力逐漸降低。下列哪項壓力範圍，涵蓋了熱端首度發生雙相流時的壓力？

A. 1250 至 1201 psig

B. 1200 至 1151 psig

C. 1150 至 1101 psig

D. 1100 至 1051 psig

答案：B.

科目： 193006
知能類：K1.06 [2.8/2.9]
序號： P1180

Reactor coolant system (RCS) hot leg temperature is constant at 538°F while RCS pressure is decreasing due to a small reactor coolant leak. Which one of the following RCS pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 1,100 to 1,151 psig

B. 1,050 to 1,001 psig

C. 1,000 to 951 psig

D. 950 to 901 psig

ANSWER: D.

反應器冷卻水系統(RCS)的熱端溫度維持在 538°F，反應器冷卻水少量漏水，造成 RCS 壓力逐漸降低。下列哪項壓力範圍，涵蓋了熱端首度發生雙相流時的壓力？

A. 1,100 至 1,151 psig

B. 1,050 至 1,001 psig

C. 1,000 至 951 psig

D. 950 至 901 psig

答案：D.

科目： 193006
知能類：K1.06 [2.8/2.9]
序號： P1480

Reactor coolant system (RCS) hot leg temperature is 520°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 950 to 901 psig

B. 900 to 851 psig

C. 850 to 801 psig

D. 800 to 751 psig

ANSWER: D.

反應器冷卻水系統(RCS)的熱端溫度為 520°F，少量漏水造成 RCS 壓力逐漸降低。下列哪項壓力範圍，涵蓋了熱端首度發生雙相流時的壓力？

A. 950 至 901 psig

B. 900 至 851 psig

C. 850 至 801 psig

D. 800 至 751 psig

答案：D.

科目： 193006
知能類：K1.06 [2.8/2.9]
序號： P2581

Reactor coolant system (RCS) hot leg temperature is 552°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which twophase flow will first occur in the hot leg?

A. 1,100 to 1,051 psig

B. 1,050 to 1,001 psig

C. 1,000 to 951 psig

D. 950 to 901 psig

ANSWER: B.

反應器冷卻水系統(RCS)的熱端溫度為 552°F，少量漏水造成 RCS 壓力逐漸降低。下列哪項壓力範圍，涵蓋了熱端首度發生雙相流時的壓力？

A. 1,100 至 1,051 psig

B. 1,050 至 1,001 psig

C. 1,000 至 951 psig

D. 950 至 901 psig

答案：B.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P3080 (B3181)

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 80 psig?

A. 26.5 gpm

B. 38.9 gpm

C. 56.4 gpm

D. 67.1 gpm

ANSWER: D.

一於100 psig下運轉的冷卻水系統洩漏至大氣，洩漏率為75 gpm。系統壓力若降至80 psig，洩漏率約為多少？

A. 26.5 gpm

B. 38.9 gpm

C. 56.4 gpm

D. 67.1 gpm

答案：D.

科目： 193006
知能類：K1.05 [2.9/3.0]
序號： P3780 (B3789)

Which one of the following describes the relationship between the main steam mass flow rate leaving a steam generator and the main feedwater mass flow rate entering the same steam generator at steady-state power operation? (Assume no auxiliary addition/removal of steam generator inventory.)

A. The mass flow rates will be the same only if downcomer level is constant.

B. The mass flow rates will be the same only if the reactor is operating near rated power.

C. The main steam mass flow rate is smaller than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

D. The main steam mass flow rate is greater than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

ANSWER: A.

已知蒸汽產生器以穩態功率運轉，關於離開蒸汽產生器的主蒸汽質量流率，與進入同一蒸汽產生器的主飼水質量流率，兩者的關係為何？(假設蒸汽產生器的水存量沒有額外增/減)

A. 唯有在降流區水位維持不變時，兩項質量流率才相同。

B. 唯有在反應器以近似額定功率運轉時，兩項質量流率才相同。

C. 主蒸汽質量流率小於主飼水質量流率，兩者差異在於蒸汽產生器之汽水分離器移除的水分。

D. 主蒸汽質量流率大於主飼水質量流率，兩者差異在於蒸汽產生器之汽水分離器移除的水分。

答案：A.

科目： 193006
知能類：K1.07 [2.7/2.7]
序號： P581

A nuclear power plant is recovering from a loss of offsite power that caused all reactor coolant pumps (RCPs) to stop. Pressurizer level indication is off-scale high.

Which one of the following is most likely to occur if the steam generator (S/G) temperatures are 50°F higher than their associated reactor coolant system (RCS) loop temperatures when an RCP is restarted?

A. Localized water hammer in the RCS.

B. Pressurized thermal shock to the S/Gs.

C. A large pressure spike throughout the RCS.

D. Inadvertent lifting of a S/G atmospheric relief valve.

ANSWER: C.

核能電廠失去外部電力，造成所有反應器冷卻水泵(RCP)停止運轉，如今電廠逐步恢復。調壓槽指示水位很高，並超出量表刻度(off-scale high)。

RCP 再度啟動時，蒸汽產生器(S/G)的溫度，較相關反應器冷卻水系統(RCS)迴路溫度高出 50°F，下列哪一選項最有可能發生？

A. RCS 發生區域水錘現象。

B. S/G 受到壓力熱震(pressurized thermal shock)。

C. 整個 RCS 出現龐大壓力突波。

D. S/G 大氣釋壓閥意外升起。

答案：C.

科目： 193006
知能類：K1.08 [2.8/1.8]
序號： P279 (B143)

A centrifugal water pump is being returned to service after maintenance. However, the operator fails to vent the pump.

Compared to normal operations, after the pump is started, the operator will see _____ flow rate and _____ discharge head.

A. higher; lower

B. higher; higher

C. lower; lower

D. lower; higher

ANSWER: C.

離心水泵於維修後恢復運轉。然而，運轉員卻忘了將泵排氣。

相較於正常運轉情形，運轉員於泵啟動後，將看到_____流率與_____出口水頭(discharge head)。

A. 較高；較低

B. 較高；較高

C. 較低；較低

D. 較低；較高

答案：C.

科目： 193006
知能類：K1.08 [2.8/2.8]
序號： P3481

Refer to the drawing of a cooling water system (see figure below).

The centrifugal pump is circulating water at 100°F. Which one of the following will cause the centrifugal pump to operate closer to a condition in which gas/vapor binding can occur?

A. Surge tank level is raised by 5%.

B. Service water flow rate is decreased by 5%.

C. The pump discharge valve is used to decrease cooling water system flow rate by 5%.

D. Makeup water containing a high concentration of total dissolved solids is added to the cooling water system.

ANSWER: B.

請參照下圖的冷卻水系統。

離心泵循環水溫為 100°F。下列何者運轉情況較易導致離心泵發生氣體/蒸汽氣鎖(gas/vapor binding)的情形？

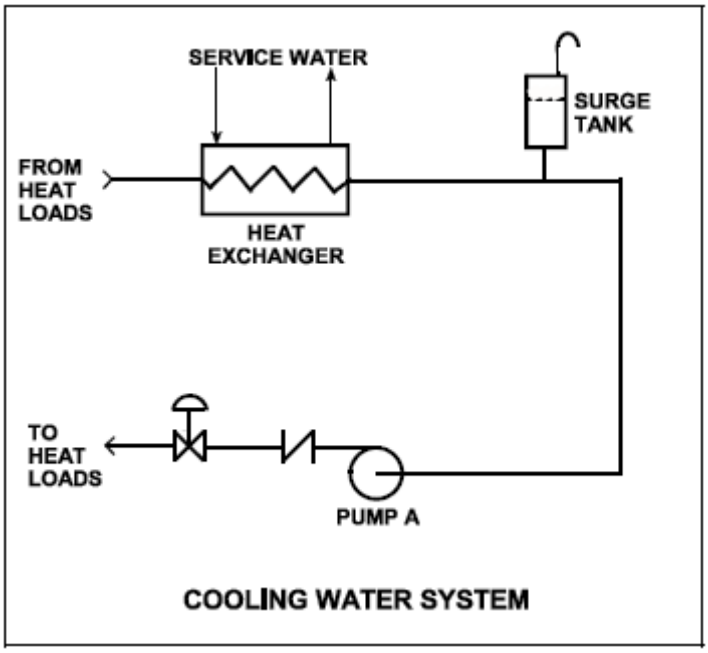
A. 緩衝槽(surge tank)水位升高 5%。

B. 冷卻水(service water)流率減少 5%。

C. 調整泵出口閥以減少 5%的冷卻水系統流率。

D. 將含有溶解固體含量高的補水，加入冷卻水系統。

答案：B.


SERVICE WATER
SURGE TANK
FROM HEAT LOADS
HEAT EXCHANGER
TO HEAT LOADS
PUMP A
COOLING WATER SYSTEM

科目： 193006
知能類：K1.10 [3.3/3.4]
序號： P80 (B79)

The piping system pressure change caused by suddenly stopping fluid flow is referred to as...

A. cavitation.

B. shutoff head.

C. water hammer.

D. flow head.

ANSWER: C.

流體突然停止流動而導致的管路系統壓力變化，稱為.....

A. 孔蝕作用

B. 關斷水頭

C. 水錘現象

D. 流動水頭(flow head)

答案：C.

科目： 193006
知能類：K1.10 [3.3/3.4]
序號： P381 (B380)

The major concern with starting a main feedwater pump with downstream fluid in a saturated condition is...

A. cavitation.

B. water hammer.

C. thermal shock.

D. positive reactivity addition.

ANSWER: B.

在下游液體處於飽和狀況下啟動主飼水泵時，最需要顧慮的是……

A. 孔蝕作用

B. 水錘現象

C. 熱震

D. 加入正反應度

答案：B.

科目： 193006
知能類：K1.10 [3.3/3.4]
序號： P2480 (B1180)

Which one of the following will increase the possibility of water hammer?

A. Opening and closing system valves very slowly

B. Venting liquid systems only after initiating system flow

C. Starting centrifugal pumps with the discharge valve closed

D. Starting positive displacement pumps with the discharge valve open

ANSWER: B.

下列何者將增加發生水錘現象的可能性？

A. 非常緩慢地開啟或關閉系統閥門。

B. 在液體系統啟動後才進行管路排氣。

C. 在出口閥關閉下啟動離心泵。

D. 在出口閥開啟下啟動正排量泵。

答案：B.

科目： 193006
知能類：K1.10 [3.3/3.4]
序號： P2880 (B1135)

The primary reason for slowly opening the discharge valves of large motor-driven centrifugal cooling water pumps after starting the pumps is to minimize the...

A. net positive suction head requirements.

B. potential for a water hammer.

C. motor running current requirements.

D. potential for pump cavitation.

ANSWER: B.

啟動大型馬達驅動的離心冷卻水泵後，緩慢開啟其出口閥的主要原因，在於將何者降至最低？

A. 所需淨正吸水頭。

B. 發生水錘現象的可能性。

C. 所需馬達運轉電流。

D. 泵發生孔蝕作用的可能性。

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P79

Cavitation in an operating pump may be caused by...

A. lowering the pump suction temperature.

B. throttling the pump suction valve.

C. increasing the pump backpressure.

D. increasing the pump suction pressure.

ANSWER: B.

下列何者可能造成運轉泵發生孔蝕作用？

A. 降低泵進水溫度。

B. 節流泵進口閥。

C. 提高泵背壓。

D. 增加泵進口壓力。

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P149

Cavitation of a centrifugal pump in an open system is indicated by _____ discharge pressure and _____ flow rate.

A. low; low

B. high; high

C. low; high

D. high; low

ANSWER: A.

於開放系統的離心泵發生孔蝕的現象是出口壓力_____與流率_____。

A. 低；低

B. 高；高

C. 低；高

D. 高；低

答案：A.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P382 (B80)

The condition that would most likely cause cavitation of an operating centrifugal pump is...

A. lowering the suction temperature.

B. throttling the pump suction valve.

C. throttling the pump discharge valve.

D. decreasing the pump speed.

ANSWER: B.

最有可能導致運轉中的離心泵發生孔蝕的情況是……

A. 降低進水溫度

B. 節流泵進口閥

C. 節流泵出口閥

D. 降低泵速

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P481

While on surveillance rounds, an operator notices that a centrifugal pump is making a great deal of noise (like marbles rattling inside the pump casing) and the discharge pressure is fluctuating.

This set of conditions indicates pump...

A. runout.

B. cavitation.

C. bearing deterioration.

D. packing deterioration.

ANSWER: B.

運轉員於執行偵測試驗時，留意到離心泵發出龐大噪音(如泵殼內側的彈擊聲響)，同時出口壓力來回晃動。

這種狀況表示泵……

A. 超流(runout)

B. 發生孔蝕作用

C. 軸承劣化

D. 迫緊劣化

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P882

Cavitation in an operating centrifugal pump may be caused by...

A. decreasing the pump suction temperature.

B. throttling down on the pump suction valve.

C. throttling down on the pump discharge valve.

D. decreasing the pump speed.

ANSWER: B.

造成運轉中離心泵發生孔蝕的原因，可能是……

A. 降低泵進水溫度

B. 泵進口閥往下節流

C. 泵出口閥往下節流

D. 降低泵速

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P1181

Which one of the following contains indications of cavitation?

A. Abnormally low discharge pressure and flow rate

B. Abnormally high discharge pressure and flow rate

C. Abnormally low discharge pressure and abnormally high flow rate

D. Abnormally high discharge pressure and abnormally low flow rate

ANSWER: A.

下列何者顯示已發生孔蝕作用？

A. 出口壓力及流率異常低。

B. 出口壓力及流率異常高。

C. 出口壓力異常低，流率異常高。

D. 出口壓力異常高，流率異常低。

答案：A.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P1381

Cavitation is the formation of vapor bubbles in the _____ of a pump and the subsequent collapse of these bubbles in the pump _____.

A. impeller; casing

B. impeller; discharge piping

C. volute; casing

D. volute; discharge piping

ANSWER: A.

孔蝕作用意指泵_____處形成汽泡，這些汽泡隨後於泵_____處突然破滅。

A. 葉輪；外殼

B. 葉輪；出口管路

C. 渦旋；外殼

D. 渦旋；出口管路

答案：A.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P1482

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

A. Starting pump B

B. Positioning the discharge valve to 75% open

C. Lowering the water level in the surge tank by 2 feet

D. Increasing heat exchanger service water flowrate by 10%

ANSWER: D.

請參照下圖的冷卻水系統，其中只有泵A在運轉，泵出口閥目前開啟50%。

若泵A發生孔蝕，下列何者將減少或消除泵A的孔蝕現象？

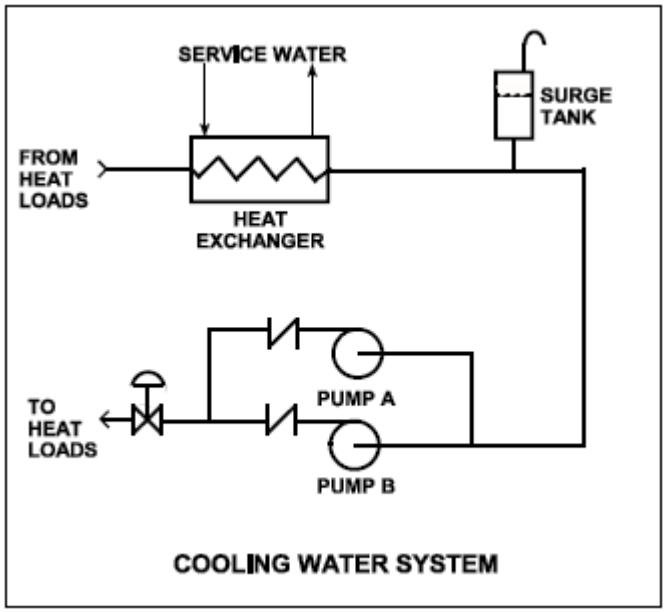
A. 啟動泵B。

B. 將出口閥位置調整至75%開度。

C. 將緩衝槽(surge tank)水位降低2呎。

D. 增加熱交換器的冷卻水(service water)流量10%。

答案：D.


SERVICE WATER
SURGE TANK
FROM HEAT LOADS
HEAT EXCHANGER
PUMP A
TO HEAT LOADS
PUMP B
COOLING WATER SYSTEM

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P1582 (B2680)

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

A. Starting pump B

B. Positioning the discharge valve to 75% open

C. Raising the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: C.

請參照下圖的冷卻水系統，其中只有泵A在運轉，泵出口閥目前開啟50%。

若泵A發生孔蝕，下列何者將減少或消除泵A的孔蝕作用？

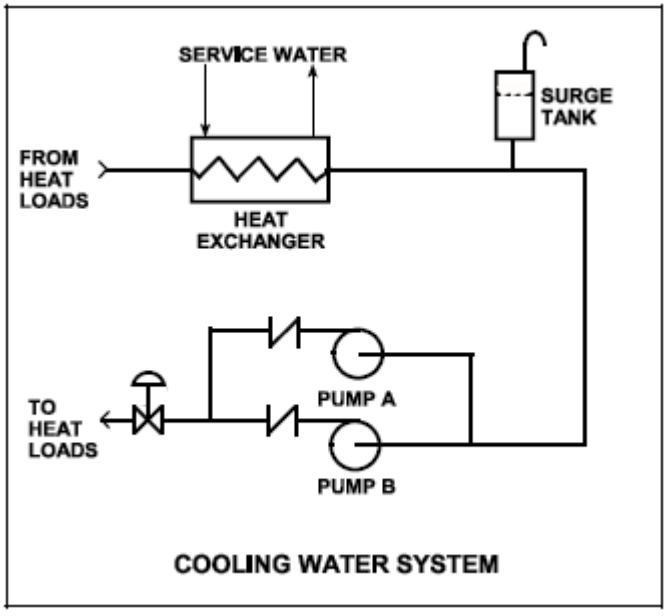
A. 啟動泵B。

B. 將出口閥位置調整至75%開度。

C. 將緩衝槽(surge tank)水位升高2呎。

D. 減少熱交換器冷卻水(service water)流量10%。

答案：C.



科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P1783

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

A. Starting pump B

B. Positioning the discharge valve to 40% open

C. Lowering the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: B.

請參照下圖的冷卻水系統，其中只有泵A在運轉，泵出口閥目前開啟50%。

若泵A發生孔蝕，下列何者將減少或消除泵A的孔蝕作用？

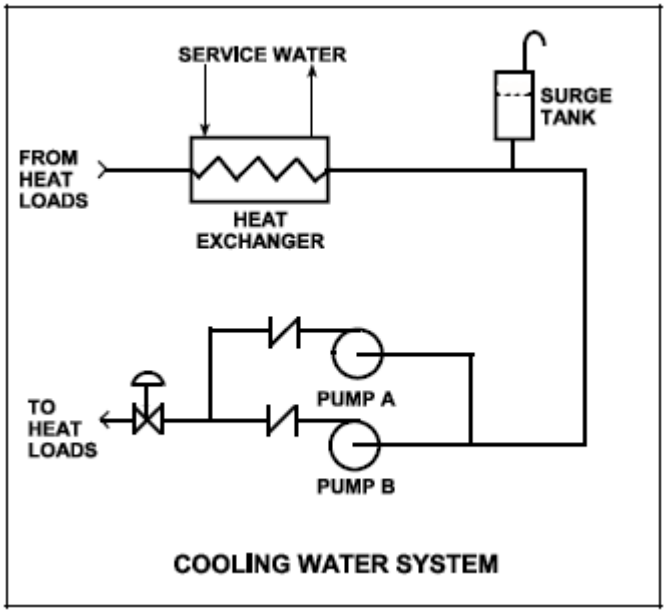
A. 啟動泵B。

B. 將出口閥位置調整至40%開度。

C. 將緩衝槽(surge tank)水位降低2呎。

D. 減少熱交換器冷卻水(service water)流量10%。

答案：B.



科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P2181

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

Which one of the following will cause pump A to operate closer to the conditions that will cause cavitation?

A. Starting pump B

B. Positioning the discharge valve to 40% open

C. Raising the water level in the surge tank by 2 feet

D. Increasing heat exchanger service water flow rate by 10%

ANSWER: A.

請參照下圖的冷卻水系統，其中只有泵A在運轉，泵出口閥目前開啟50%。

下列何種運轉狀態將導致泵A較易發生孔蝕現象？

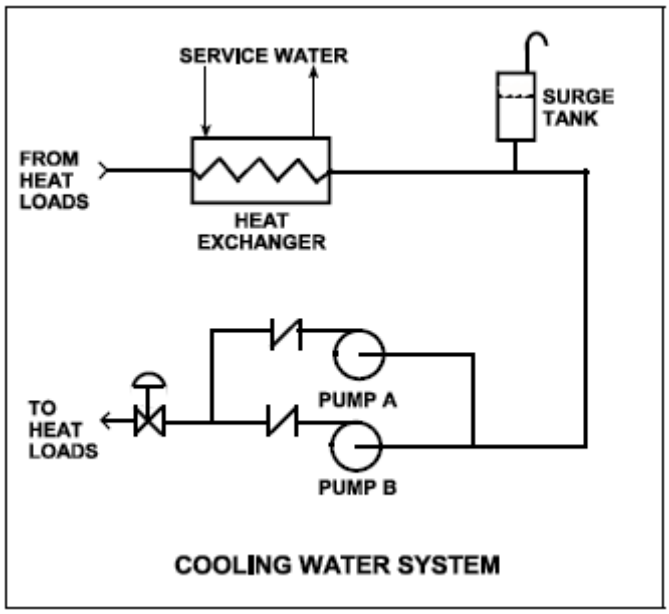
A. 啟動泵B。

B. 將出口閥位置調整至40%開度。

C. 將緩衝槽(surge tank)水位升高2呎。

D. 增加熱交換器冷卻水(service water)流量10%。

答案：A.



科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P2380

Refer to the drawing of a cooling water system in which both centrifugal pumps A and B are operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

A. Stopping pump B

B. Positioning the discharge valve to 75% open

C. Lowering the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: A.

請參照下圖的冷卻水系統，其中泵A與泵B都在運轉，泵出口閥目前開啟50%。

若泵A發生孔蝕，下列何者將減少或消除泵A的孔蝕作用？

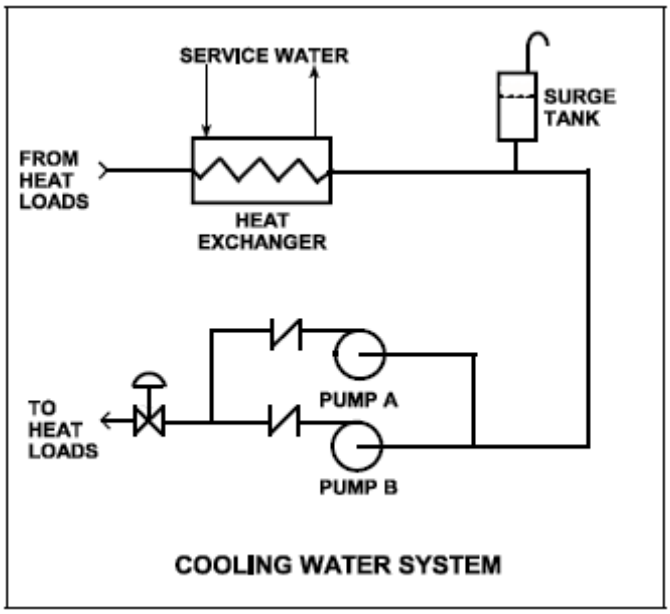
A. 停住泵B。

B. 將出口閥位置調整至75%開度。

C. 將緩衝槽(surge tank)水位降低2呎。

D. 減少熱交換器冷卻水(service water)流量10%。

答案：A.



科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P2680 (B280)

Cavitation is the formation of vapor bubbles in the _____ pressure area of a pump followed by the _____ of these bubbles within the pump casing.

A. low; expansion

B. low; collapse

C. high; expansion

D. high; collapse

ANSWER: B.

孔蝕作用是汽泡在泵的_____壓區形成，其後這些汽泡會在泵的外殼_____。

A. 低；膨脹(expansion)

B. 低；突然破滅(collapse)

C. 高；膨脹

D. 高；突然破滅

答案：B.

科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P2881

Refer to the drawing of a cooling water system in which both pumps A and B are operating and the pump discharge valve is currently 50% open (see figure below).

Which one of the following will cause pump A to operate closer to the conditions that will cause cavitation?

A. Stopping pump B

B. Positioning the discharge valve to 40% open

C. Raising the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: D.

請參照下圖的冷卻水系統，其中泵A與泵B都在運轉，泵出口閥目前開啟50%。
下列何種運轉狀態將導致泵A較易發生孔蝕現象？

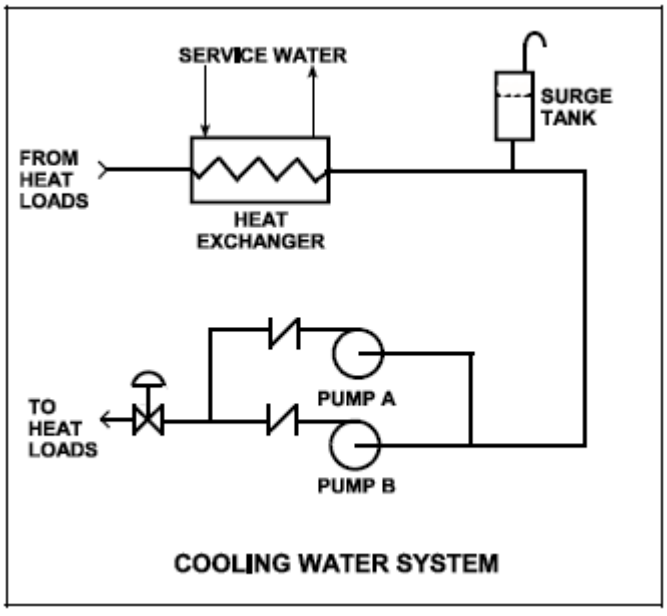
A. 停住泵B。

B. 將出口閥位置調整至40%開度。

C. 將緩衝槽(surge tank)水位升高2呎。

D. 減少熱交換器冷卻水(service water)流量10%。

答案：D.



科目： 193006
知能類：K1.11 [3.1/3.3]
序號： P2981 (B1880)

Which of the following completes the following statement?

Pump cavitation occurs when vapor bubbles are formed at the eye of a pump impeller...

A. because the localized flow velocity exceeds sonic velocity for the existing fluid temperature.

B. because the localized pressure exceeds the vapor pressure for the existing fluid temperature.

C. and enter a high pressure region of the pump where they collapse causing damaging pressure pulsations.

D. and are discharged from the pump where they expand into larger bubbles causing damaging pressure pulsations.

ANSWER: C.

請完成下列敘述。

泵之所以發生孔蝕，是汽泡於泵葉輪眼(eye of a pump impeller)形成時……

A. 因為在目前液體溫度下，區域流速超過音速。

B. 因為在目前液體溫度下，區域壓力超過蒸汽壓力。

C. 同時進入水泵高壓區域，這些氣泡於此處突然破滅(collapse)而引發有害的壓力脈波(pressure pulsations)。

D. 同時從水泵排出，這些氣泡於此處膨脹成較大氣泡而引發有害的壓力脈波。

答案：C.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P81

In an operating cooling water system with a constant water velocity, if water temperature decreases, indicated volumetric flow rate (gpm) will...

A. remain the same, because the density of the water has not changed.

B. increase, because the density of the water has increased.

C. remain the same, because the water velocity has not changed.

D. increase, because the viscosity of the water has increased.

ANSWER: C.

在水流速度固定的運轉中冷卻水系統，水溫降低時，體積流率(gpm)指示值將……

A. 維持不變，因為水的密度沒有改變。

B. 增加，因為水的密度增加。

C. 維持不變，因為水流速度沒有改變。

D. 增加，因為水的黏度(viscosity)增加。

答案：C.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P281

Flow instruments used to measure the mass flow rate of saturated steam are often density compensated because, for a steam pressure increase at a constant volumetric flow rate, steam density will _____ and the actual mass flow rate will _____.

A. decrease; increase

B. increase; decrease

C. increase; increase

D. decrease; decrease

ANSWER: C.

測量飽和蒸汽質量流率的流量計，常具備密度補償機制，這是因為在固定體積流率下，蒸汽壓力增加時，蒸汽密度將_____，實際的質量流率將_____。

A. 減少；增加

B. 增加；減少

C. 增加；增加

D. 減少；減少

答案：C.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P982

A density-compensated flow instrument is being used to measure mass flow rate in a steam system. If the pressure of the steam decreases, indicated mass flow rate will: (Assume volumetric flow rate is constant.)

A. increase for all steam conditions.

B. decrease for all steam conditions.

C. increase, but only if the steam is saturated (not superheated).

D. decrease, but only if the steam is saturated (not superheated).

ANSWER: B.

使用密度補償流量計來量測蒸汽系統的質量流率。若蒸汽壓力降低，質量流率指示值將……(假設體積流率固定不變)。

A. 在所有蒸汽情況下都增加。

B. 在所有蒸汽情況下都減少。

C. 唯有在飽和蒸汽時才增加(過熱蒸汽則否)。

D. 唯有在飽和蒸汽時才減少(過熱蒸汽則否)。

答案：B.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P1083

A steam generator transient causes main steam pressure to decrease although the actual steam mass flow rate to the main turbine remains constant. If the main steam flow instrument is not density compensated, indicated steam mass flow rate will...

A. increase due to the velocity increase of the steam.

B. increase due to the increased density of the steam.

C. decrease due to the velocity decrease of the steam.

D. decrease due to the decreased density of the steam.

ANSWER: A.

蒸汽產生器的暫態造成主蒸汽壓力降低，但是通往主汽機的實際蒸汽質量流率維持不變。如果主蒸汽流量計沒有密度補償，蒸汽的質量流率指示值將.....

A. 因蒸汽流速增加而增加。

B. 因蒸汽密度增加而增加。

C. 因蒸汽流速降低而降低。

D. 因蒸汽密度降低而降低。

答案：A.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P1182

A cooling water system is supplying 1.0 x 10^6 lbm/hour of flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the mass flow rate that will be supplied by the system if cooling water temperature increases to 140°F?

A. 7.5 x 10^5 lbm/hr

B. 8.3 x 10^5 lbm/hr

C. 9.0 x 10^5 lbm/hr

D. 9.9 x 10^5 lbm/hr

ANSWER: D.

冷卻水系統供應流率為 1.0 x 10^6 lbm/hr、水溫為 100°F 的冷卻水。假設體積流率不變，冷卻水溫度若升高至 140°F，該系統供應的質量流率將為多少？

A. 7.5 x 10^5 lbm/hr

B. 8.3 x 10^5 lbm/hr

C. 9.0 x 10^5 lbm/hr

D. 9.9 x 10^5 lbm/hr

答案：D.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P1780

A reactor coolant system is supplying 1.0 x 10^8 lbm/hour of coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the approximate mass flow rate that will be supplied by the system if cooling water temperature increases to 400°F?

A. 1.2 x 10^8 lbm/hr

B. 1.1 x 10^8 lbm/hr

C. 9.2 x 10^7 lbm/hr

D. 8.7 x 10^7 lbm/hr

ANSWER: D.

反應器冷卻水系統供應流率為 1.0 x 10^8 lbm/hr、水溫為 100°F 的冷卻水。假設體積流率不變，冷卻水溫度若升高至 400°F，該系統供應的質量流率約為多少？

A. 1.2 x 10^8 lbm/hr

B. 1.1 x 10^8 lbm/hr

C. 9.2 x 10^7 lbm/hr

D. 8.7 x 10^7 lbm/hr

答案：D.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P2182

A reactor coolant system is supplying 1.0 x 10^8 lbm/hr of coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the approximate mass flow rate that will be supplied by the system if coolant temperature increases to 500°F?

A. 1.2 x 10^8 lbm/hr

B. 1.1 x 10^8 lbm/hr

C. 8.7 x 10^7 lbm/hr

D. 7.9 x 10^7 lbm/hr

ANSWER: D.

反應器冷卻水系統供應流率為 1.0 x 10^8 lbm/hr、水溫為 100°F 的冷卻水。假設體積流率不變，冷卻水溫度若升高至 500°F，該系統供應的質量流率約為多少？

A. 1.2 x 10^8 lbm/hr

B. 1.1 x 10^8 lbm/hr

C. 8.7 x 10^7 lbm/hr

D. 7.9 x 10^7 lbm/hr

答案：D.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P2681

A cooling water system is supplying 2,000 lbm/min coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the approximate mass flow rate that will be supplied by the system if cooling water temperature increases to 140°F?

A. 1,964 lbm/min

B. 1,980 lbm/min

C. 2,020 lbm/min

D. 2,036 lbm/min

ANSWER: B.

冷卻水系統供應流率為 2,000 lbm/min、水溫為 100°F 的冷卻水。假設體積流率不變，冷卻水溫度若升高至 140°F，該系統供應的質量流率約為多少？

A. 1,964 lbm/min

B. 1,980 lbm/min

C. 2,020 lbm/min

D. 2,036 lbm/min

答案：B.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P2882

A steam generator transient causes main steam pressure to increase although the actual steam mass flow rate to the main turbine remains constant. If the main steam flow instrument is not density compensated, the increased main steam pressure will cause indicated steam mass flow rate to...

A. increase due to the velocity increase of the steam.

B. increase due to the increased density of the steam.

C. decrease due to the velocity decrease of the steam.

D. decrease due to the decreased density of the steam.

ANSWER: C.

蒸汽產生器的暫態造成主蒸汽壓力升高，但是通往主汽機的實際蒸汽質量流率維持不變。如果主蒸汽流量計沒有密度補償，主蒸汽壓力升高將造成蒸汽質量流率指示值.....

A. 因蒸汽流速增加而增加。

B. 因蒸汽密度增加而增加。

C. 因蒸汽流速降低而降低。

D. 因蒸汽密度降低而降低。

答案：C.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P3081 (B3032)

The volumetric flow rate of cooling water entering a heat exchanger is 500 gpm. Given the following:

Cooling water pressure entering and leaving the heat exchanger is 10 psig.
Cooling water inlet temperature is 90°F.
Cooling water outlet temperature is 160°F.
Heat exchanger inlet and outlet piping have the same diameter.

What is the approximate volumetric flow rate of the cooling water exiting the heat exchanger?

A. 496 gpm

B. 500 gpm

C. 504 gpm

D. 509 gpm

ANSWER: D.

冷卻水進入熱交換器的體積流率為 500 gpm。

已知下列條件：

冷卻水進出熱交換器的壓力為 10 psig。
冷卻水進口溫度為 90°F。
冷卻水出口溫度為 160°F。
熱交換器進口與出口管路直徑相同。

冷卻水離開熱交換器時的體積流率約為多少？

A. 496 gpm

B. 500 gpm

C. 504 gpm

D. 509 gpm

答案：D.

科目： 193006
知能類：K1.12 [2.5/2.6]
序號： P3783 (B3733)

A condensate pump is taking suction on a main condenser hotwell, containing water at 100°F, and discharging the water at a volumetric flow rate of 100,000 gpm to the main feedwater system. The main feedwater system heats the water to 400°F before it enters the steam generators. Assume there is no leakage, and no bypass or recirculation flow paths are in use.

What is the approximate volumetric flow rate of the feedwater entering the steam generators?

A. 100,000 gpm

B. 105,000 gpm

C. 109,000 gpm

D. 115,000 gpm

ANSWER: D.

一冷凝水泵從主冷凝器熱井(水溫為 100°F)抽水，並以 100,000 gpm 的體積流率排水至主飼水系統。主飼水系統將水加熱至 400°F 後才送入蒸汽產生器。假設沒有漏水、亦無使用旁通或再循環水流路徑。

進入蒸汽產生器的飼水體積流率約為多少？

A. 100,000 gpm

B. 105,000 gpm

C. 109,000 gpm

D. 115,000 gpm

答案：D.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P147

Operating two pumps in parallel instead of operating a single pump will result in a...

A. large increase in system head and a small increase in flow rate.

B. small increase in system head and a small increase in flow rate.

C. small increase in system head and a large increase in flow rate.

D. large increase in system head and a large increase in flow rate.

ANSWER: C.

利用兩個併聯運轉水泵取代單一運轉水泵時，將導致.....

A. 系統水頭大幅增加，流率小幅增加。

B. 系統水頭與流率均小幅增加。

C. 系統水頭小幅增加，流率大幅增加。

D. 系統水頭與流率均大幅增加。

答案：C.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P280

The major effect of starting a second centrifugal pump in parallel with an operating centrifugal pump in an open system is increased...

A. system pressure.

B. system flow rate.

C. pump discharge pressure.

D. pump flow rate.

ANSWER: B.

開放系統中，已有一離心泵運轉中，當啟動併聯的第二離心泵時，其主要效應為何？

A. 系統壓力增加

B. 系統流率增加

C. 泵出口壓力增加

D. 泵流率增加

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P282

To decrease the flow rate through an operating positive displacement pump, an operator should...

A. throttle the pump discharge valve partially closed.

B. throttle the pump suction valve partially closed.

C. decrease the pump net positive suction head.

D. decrease the pump speed.

ANSWER: D.

運轉員欲減少運轉中正排量泵的流率時，應該……

A. 節流部分關閉的泵出口閥。

B. 節流部分關閉的泵進口閥。

C. 減少泵的淨正吸水頭。

D. 減少泵轉速。

答案：D.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P981

Which one of the following will decrease the head loss experienced in an operating cooling water system?

A. Starting a second pump in parallel with the operating pump

B. Shifting two heat exchangers from parallel to series operation

C. Replacing a 10 foot section of 10-inch diameter pipe with a 20 foot section of 10-inch diameter pipe

D. Replacing a 20 foot section of 10-inch diameter pipe with a 20 foot section of 12-inch diameter pipe

ANSWER: D.

下列何者將減少運轉中冷卻水系統所發生的水頭損失？

A. 啟動與運轉水泵併聯的第二泵。

B. 將兩個併聯運轉的熱交換器，切換成串聯運轉。

C. 將直徑 10 吋的 10 呎管路，更換成同直徑的 20 呎管路。

D. 將直徑 10 吋的 20 呎管路，更換成直徑 12 吋的同長度管路。

答案：D.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P1282

Two centrifugal pumps and two positive displacement pumps are able to be cross connected to provide flow in a system. Each pump will produce 100 gpm at 1,000 psig and each pump has a design maximum pressure of 1,500 psig.

If system pressure is 1,200 psig, which one of the following will produce the greatest system flow rate?

A. Two positive displacement pumps in series

B. Two positive displacement pumps in parallel

C. Two centrifugal pumps in series

D. Two centrifugal pumps in parallel

ANSWER: B.

兩個離心泵與兩個正排量泵能交互連接以供水給系統。各泵於 1,000 psig 的壓力下，將產生 100 gpm 的流率，最大設計壓力為 1,500 psig。

如果系統壓力為 1,200 psig，下列何者將產生最大的系統流率？

A. 兩個正排量泵串聯。

B. 兩個正排量泵併聯。

C. 兩個離心泵串聯。

D. 兩個離心泵併聯。

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P1683

Two centrifugal pumps and two positive displacement pumps are able to be cross-connected to provide makeup water flow to a system. Each pump will produce 100 gpm at 1,000 psig backpressure.

If system pressure is 800 psig, which one of the following combinations will produce the greatest flow rate to the system?

A. Two centrifugal pumps in parallel

B. Two centrifugal pumps in series

C. Two positive displacement pumps in parallel

D. Two positive displacement pumps in series

ANSWER: A.

兩個離心泵與兩個正排量泵能交互連接，藉此供應系統補水。各泵於 1,000 psig 背壓下，將產生 100 gpm 的流率。

如果系統壓力為 800 psig，下列何者將產生最大的系統流率？

A. 兩個離心泵併聯。

B. 兩個離心泵串聯。

C. 兩個正排量泵併聯。

D. 兩個正排量泵串聯。

答案：A.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P1784 (B1725)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the lowest makeup flow rate to the cooling water system if system pressure is at 1,700 psig?

A. One PDP and one CP in series (CP supplying PDP)

B. One PDP and one CP in parallel

C. Two CPs in series

D. Two CPs in parallel

ANSWER: D.

兩個相同離心泵(CP)與兩個相同正排量泵(PDP)在一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結以提供多重組態。在單一泵排列(alignment)中，每泵將在系統壓力1,000 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭： 1,500 psig
最大設計壓力： 2,000 psig

正排量泵
最大設計壓力： 2,000 psig

若系統壓力為1,700 psig，下列何種泵組態將提供最低補水流率至冷卻水系統?

A. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

B. 一正排量泵與一離心泵併聯。

C. 兩離心泵串聯。

D. 兩離心泵併聯。

答案：D.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P1979

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the system if system pressure is at 800 psig?

A. One PDP and one CP in series (CP supplying PDP)

B. One PDP and one CP in parallel

C. Two CPs in series

D. Two CPs in parallel

ANSWER: D.

兩個相同離心泵(CP)與兩個相同正排量泵(PDP)在一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結以提供多重組態。在單一泵排列(alignment)中，每泵將於系統壓力1,000 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭： 1,500 psig
最大設計壓力： 2,000 psig

正排量泵
最大設計壓力： 2,000 psig

若系統壓力為800 psig，下列何種泵組態將提供系統最高的補水流率?

A. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

B. 一正排量泵與一離心泵併聯。

C. 兩離心泵串聯。

D. 兩離心泵併聯。

答案：D.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P2282 (B2281)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 4-inch diameter pipe and an 8-inch diameter pipe. Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 4-inch and 8-inch diameter pipes?

	4-inch Pipe (lbm/sec)	8-inch Pipe (lbm/sec)
A.	20	80
B.	25	75
C.	30	70
D.	33	67

ANSWER: A.

溫度及壓力分別為90°F及50 psig的水，以100 lbm/sec的流率，流經直徑10吋的管路。此管路分流至兩條管路，一條直徑4吋，一條直徑8吋。除了管路大小之外，任何會限制水流的因素均不考慮，下列何者約為4吋與8吋直徑管路的流率？

	4吋管路 (lbm/sec)	8吋管路 (lbm/sec)
A.	20	80
B.	25	75
C.	30	70
D.	33	67

答案：A.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P2383 (B2324)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the system if system pressure is at 500 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: B.

兩個相同離心泵(CP)與兩個相同正排量泵(PDP)在一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結提供多重組態。在單一泵排列(alignment)中，每泵將在系統壓力為1,200 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭： 1,500 psig
最大設計壓力： 2,000 psig

正排量泵
最大設計壓力： 2,000 psig

若系統壓力為500 psig，則下列何種泵組態將提供系統最高的補水流率?

A. 兩離心泵串聯。

B. 兩離心泵併聯。

C. 兩正排量泵併聯。

D. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P2481 (B2479)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 3-inch diameter pipe and a 6-inch diameter pipe. Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 3-inch and 6-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

	3-inch Pipe (lbm/sec)	6-inch Pipe (lbm/sec)
A.	10	90
B.	20	80
C.	25	75
D.	33	67

ANSWER: B.

溫度及壓力分別為90°F與50 psig的水，以100 lbm/sec的流率，流經直徑10吋的管路。此管路分流至兩條管路，一條直徑3吋，一條直徑6吋。除了管路大小之外，任何會限制水流的因素均不考慮，下列何者約為3吋與6吋直徑管路的流率(假設每條管路的流體速度相同)？

	3吋管路 (lbm/sec)	6吋管路 (lbm/sec)
A.	10	90
B.	20	80
C.	25	75
D.	33	67

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P2582 (B2581)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 6-inch diameter pipe and an 8-inch diameter pipe.

Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 6-inch and 8-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

	6-inch Pipe (lbm/sec)	8-inch Pipe (lbm/sec)
A.	24	76
B.	32	68
C.	36	64
D.	40	60

ANSWER: C.

溫度及壓力分別為90°F及50 psig的水，以100 lbm/sec的流率，流經直徑10吋的管路。此管路分流至兩條管路，一條直徑6吋，一條直徑8吋。

除了管路大小之外，不考慮任何限制水流因素，下列何者約為6吋與8吋直徑管路的流率(假設每條管路的流速相同)？

	6吋管路 (lbm/sec)	8吋管路 (lbm/sec)
A.	24	76
B.	32	68
C.	36	64
D.	40	60

答案：C.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P2783 (B2723)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig
Flow rate with no backpressure: 180 gpm

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the cooling water system if system pressure is at 1,700 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: C.

兩個相同離心泵(CP)與兩個相同正排量泵(PDP)從一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結提供多重組態。在單一泵排列(alignment)中，每泵將在系統壓力1,200 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭： 1,500 psig
最大設計壓力： 2,000 psig
無背壓流率： 180 gpm

正排量泵
最大設計壓力： 2,000 psig

若系統壓力為1,700 psig，下列何種泵組態將提供最高補水流率至冷卻水系統?

A. 兩離心泵串聯。

B. 兩離心泵併聯。

C. 兩正排量泵併聯。

D. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

答案：C.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P3183

A four-loop nuclear power plant uses four identical reactor coolant pumps (RCPs) to supply reactor coolant flow through the reactor vessel. The plant is currently operating at 20% power with all RCPs in operation.

Which one of the following describes the stable RCS flow rate through the reactor vessel following the trip of one RCP? (Assume that no operator actions are taken and the reactor does not scram.)

A. Less than 75% of the original flow rate.

B. Exactly 75% of the original flow rate.

C. Greater than 75% of the original flow rate.

D. Unpredictable without pump curves for the RCPs.

ANSWER: C.

一座四迴路核能電廠，利用四個相同的反應器冷卻水泵(RCP)，供應反應器冷卻水流以通過反應爐。電廠目前以 20%功率運轉，所有 RCP 均在運轉。

下列何者描述在一台反應器冷卻水泵跳脫後，通過反應爐的反應器冷卻水系統(RCS)穩定流率(假設運轉員沒有採取行動，反應器亦無急停)？

A. 小於原始流率的 75%。

B. 等於原始流率的 75%。

C. 大於原始流率的 75%。

D. 沒有反應器冷卻水泵曲線，無從預測。

答案：C.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P3582

A reactor shutdown has been performed because of a leak from the reactor coolant system (RCS) to a steam generator (SG) via a tube leak.

Given the following initial conditions:

SG pressure is 1,000 psia.
RCS pressure is 2,200 psia.
RCS average temperature is 500°F.
Leak rate from the RCS to the SG is 100 gpm.

If RCS pressure is decreased to 1,600 psia, with no other changes in plant parameters, what will be the approximate leak rate from the RCS to the SG?

A. 50 gpm

B. 71 gpm

C. 79 gpm

D. 85 gpm

ANSWER: B.

反應器因為其冷卻水系統(RCS)至蒸汽產生器(SG)的管路發生洩漏而停機。

已知初始條件如下：

SG 壓力為 1,000 psig。
RCS 壓力為 2,200 psig。
RCS 平均溫度為 500°F。
RCS 至 SG 的洩漏率為 100 gpm。

如果 RCS 壓力降至 1,600 psig，電廠參數沒有其他變化下，RCS 至 SG 的洩漏率約為多少？

A. 50 gpm

B. 71 gpm

C. 79 gpm

D. 85 gpm

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P3683 (B3681)

Two identical single-speed centrifugal pumps (CPs) and two identical single-speed positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Discharge pressure at shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig
Flow rate with no backpressure: 180 gpm

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following makeup water pump configurations will supply the highest initial flow rate to a cooling water system that is drained and depressurized?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: B.

兩個相同的單速離心泵(CP)與兩個相同的單速正排量泵(PDP)從一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結提供多重組態。在單一泵排列(alignment)中，每泵將在系統壓力為1,200 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭： 1,500 psig
最大設計壓力： 2,000 psig
無背壓流率： 180 gpm

正排量泵
最大設計壓力： 2,000 psig

下列何種補水泵組態，將提供最高初始流率至減壓洩水的冷卻水系統？

A. 兩離心泵串聯。

B. 兩離心泵併聯。

C. 兩正排量泵併聯。

D. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

答案：B.

科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P4243 (B4242)

Refer to the drawing of a venturi in a main steamline (see figure below). The venturi inlet and outlet pipe diameters are equal.

A main steamline break downstream of the venturi causes the main steam mass flow rate through the venturi to increase. Soon, the steam reaches sonic velocity in the throat of the venturi.

How will the main steam mass flow rate through the venturi be affected as the steam pressure downstream of the venturi continues to decrease?

A. It will continue to increase at a rate that is dependent on the steam velocity in the throat of the venturi.

B. It will continue to increase at a rate that is dependent on the differential pressure (P1 - P2) across the venturi.

C. It will not continue to increase because the steam velocity cannot increase above sonic velocity in the throat of the venturi.

D. It will not continue to increase because the differential pressure (P1 - P2) across the venturi cannot increase further once the steam reaches sonic velocity in the throat of the venturi.

ANSWER: C.

請參照下圖中，位於主蒸汽管路的文氏管。該文氏管的進口及出口管徑相同。

主蒸汽管路於文氏管下游處斷裂，造成通過文氏管的主蒸汽質量流率增加。蒸汽隨即於文氏管喉部到達音速。

隨著文氏管下游的蒸汽壓力持續降低，通過文氏管的主蒸汽質量流率，將受到何種影響？

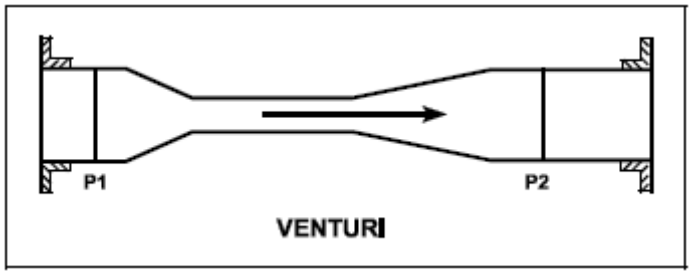
A. 繼續增加，其增加速率端視文氏管喉部的蒸汽速度而定。

B. 繼續增加，其增加速率端視文氏管兩端差壓(P1 – P2)而定。

C. 不會繼續增加，因為文氏管喉部的蒸汽速度無法超過音速。

D. 不會繼續增加，因為蒸汽於文氏管喉部到達音速時，文氏管兩端的差壓(P1 – P2)無法增加。

答案：C.



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科目： 193006
知能類：K1.15 [3.1/3.3]
序號： P4343 (B4342)

Two identical single-speed centrifugal pumps (CPs) and two identical single-speed positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Discharge pressure at shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig
Flow rate with no backpressure: 180 gpm

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the lowest initial flow rate of makeup water to a cooling water system that is drained and depressurized?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: D.

兩個相同的單速離心泵(CP)與兩個相同的單速正排量泵(PDP)從一通氣儲水槽取水，並提供補水給冷卻水系統。這些泵能交互連結以提供多重組態。在單一泵排列(alignment)中，每泵將在系統壓力為1,200 psig下供應100 gpm。

已知下列資料：

離心泵
關斷水頭出口壓力： 1,500 psig
最大設計壓力： 2,000 psig
無背壓流率： 180 gpm

正排量泵
最大設計壓力： 2,000 psig

下列何種補水泵組態，將提供最低的補水初始流率，給減壓洩水的冷卻水系統？

A. 兩離心泵串聯。

B. 兩離心泵併聯。

C. 兩正排量泵併聯。

D. 一正排量泵與一離心泵串聯(離心泵供水至正排量泵)。

答案：D.

科目/題號：193006/1 (2016新增)
知能類：K1.04 [3.4/3.6]
序號：P6742 (B6741)

Refer to the drawing of two lengths of 16-inch diameter pipe, each containing an identical automatic isolation valve. The actual pipe lengths are proportional to their symbols in the drawing.
Water is flowing at 10,000 gpm through each pipe when both isolation valves instantly close.
Consider two cases:

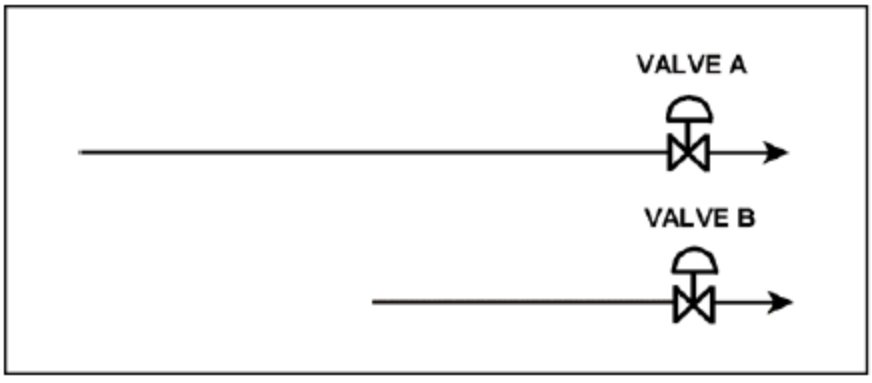
Case 1: The water temperature upstream of both valves is 65°F.
Case 2: The water temperature is 85°F upstream of valve A, and 65°F upstream of valve B.

For which case(s), if any, will valve A experience a pressure spike that is greater than the pressure spike at valve B?
A. Case 1 only
B. Case 2 only
C. Both cases
D. Neither case
ANSWER: D.

參考圖示兩段直徑為16-inch的管路，各具有相同的自動隔離閥。管路實際長度與圖示成正比。
當瞬間關閉這兩個隔離閥時，各段管路皆有水以10,000gpm流過，考慮以下兩種狀況：

狀況1：這兩個閥上游的水溫是65°F
狀況2：閥A上游的水溫是85°F，閥B上游的水溫是65°F

在何狀況下閥A會承受比閥B更高的壓力突波？
A.僅狀況1
B.僅狀況2
C.兩者都會
D.兩者都不會
答案： B



科目/題號：193006/2 (2016 新增)
知能類：K1.04 [3.4/3.6]
序號：P7620 (B7620)

Which one of the following will result in a higher probability and/or severity of water hammer in a flowing water system?
A. Gradual pipe bends rather than sharp pipe bends.
B. Shorter pipe lengths rather than longer pipe lengths.
C. Lower initial flow rates rather than higher initial flow rates.
D. Shorter valve stroke times rather than longer valve stroke times.
ANSWER: D.

下面何者會導致一流體系統有較高可能性與/或嚴重性的水錘效應？
A.平緩的彎管，而不是急劇的彎管
B.長度較短的管，而不是長度較長的管
C.初始流量率較低者，而不是初始流量率較高者
D.閥行程時間較短者，而不是閥行程時間較長者

答案： D

科目/題號：193006/3 (2016新增)
知能類：K1.05 [2.9/3.0]
序號：P380 (B383)

An 85 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?
A. 33 gpm
B. 41 gpm
C. 52 gpm
D. 60 gpm
ANSWER: D.

一冷卻水系統以100 psig運轉，發生85 gpm洩漏到大氣中。當系統壓力下降至50psig時，下列何者為洩漏率近似值？
A. 33 gpm
B. 41 gpm
C. 52 gpm
D. 60 gpm

答案： D

科目/題號：193006/4 (2016新增)
知能類：K1.05 [2.9/3.0]
序號：P3080 (B3181)

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 80 psig?
A. 26 gpm
B. 39 gpm
C. 56 gpm
D. 67 gpm
ANSWER: D.

一冷卻水系統以100 psig運轉，發生75 gpm洩漏到大氣中。當系統壓力下降至80psig時，下列何者為洩漏率近似值？
A. 26 gpm
B. 39 gpm
C. 56 gpm
D. 67 gpm

答案： D

科目/題號：193006/5 (2016新增)
知能類：K1.05 [2.9/3.0]
序號：P3780

Which one of the following describes the relationship between the main steam mass flow rate leaving a steam generator and the main feedwater mass flow rate entering the same steam generator at steady-state power operation? (Assume no other addition/removal of steam generator inventory.)
A. The mass flow rates will be the same only if downcomer level is constant.
B. The mass flow rates will be the same only if the reactor is operating near rated power.
C. The main steam mass flow rate is smaller than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.
D. The main steam mass flow rate is greater than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.
ANSWER: A.

下列何者描述一個穩態功率運轉下，離開蒸汽產生器的主蒸汽質量流量率與進入相同蒸汽產生器的主飼水質量流量率之關係？(假定蒸汽產生器的存量沒有其他外加或移除)
A.只有在降流區水位是恆定的情況下，質量流量率才會是相同的
B.只有在反應器接近額定功率運轉時，質量流量率才會是相同
C.主蒸汽質量流量率小於主飼水質量流量率，差了蒸汽產生器的汽水分離器去除的水分總量
D.主蒸汽質量流量率大於主飼水質量流量率，差了蒸汽產生器的汽水分離器去除的水分總量

答案： A

科目/題號：193006/6 (2016新增)
知能類：K1.05 [2.9/3.0]
序號：P5342 (B5342)

A heat exchanger has the following initial cooling water inlet temperature and differential pressure (ΔP) parameters:
Inlet Temperature = 70°F
Heat Exchanger ΔP = 10 psi
Six hours later, the current heat exchanger cooling water parameters are:
Inlet Temperature = 85°F
Heat Exchanger ΔP = 10 psi
In comparison to the initial cooling water mass flow rate, the current mass flow rate is...
A. lower, because the density of the cooling water has decreased.
B. higher, because the velocity of the cooling water has increased.
C. the same, because the changes in cooling water velocity and density offset.
D. the same, because the heat exchanger cooling water ΔP is the same.
ANSWER: A.

熱交換器其初始冷卻水入口溫度和壓力差（ΔP）參數如下：
進口溫度=70°F
熱交換器壓差ΔP= 10psi
6小時後，該熱交換器的冷卻水的參數為：
入口溫度=85°F
熱交換器壓差ΔP= 10psi
相較於初始冷卻水的質量流率，目前的質量流率為何？
A.較低，因為冷卻水的密度已降低
B.較高，因為冷卻水的流速已提高
C.相同，因為冷卻水的流速與密度的變化相互抵消
D.相同，因為熱交換器冷卻水的壓差ΔP相同

答案： A

科目/題號：193006/7 (2016新增)
知能類：K1.05 [2.9/3.0]
序號：P7342 (B7342)

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?
A. 70 gpm
B. 65 gpm
C. 53 gpm
D. 47 gpm
ANSWER: B.

一冷卻水系統以150 psig運轉，發生80 gpm洩漏到大氣中。當系統壓力下降至100psig時，下列何者為洩漏率的近似值？
A. 70 gpm
B. 65 gpm
C. 53 gpm
D. 47 gpm

答案： B

科目/題號：193006/8 (2016新增)
知能類：K1.06 [2.8/2.9]
序號：P7649 (B7649)

If the quality of a flowing steam-water mixture is known, what additional information, if any, is needed to determine the percent moisture content of the steam-water mixture?
A. The mass flow rate of the mixture.
B. The specific volume of the mixture.
C. The pressure and/or temperature of the mixture.
D. No additional information is needed.
ANSWER: D.

如果已知一流動的蒸汽-水混合物的乾度，若還有需要是什麼額外資訊，以確定蒸汽-水混合物中的水份含量？
A 混合物的質量流量率
B 混合物的比容
C 混合物的溫度和/或壓力
D.不需要其他資訊

答案： D

科目/題號：193006/9 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P4543 (B4542)

Refer to the drawing of a main water header that splits into two parallel headers (see figure below).
Header A has a 2-inch diameter and header B has a 3-inch diameter. The velocity of the water in both headers is the same.
If the main water header has a flow rate of 500 gpm, what is the approximate flow rate in each of the parallel headers?

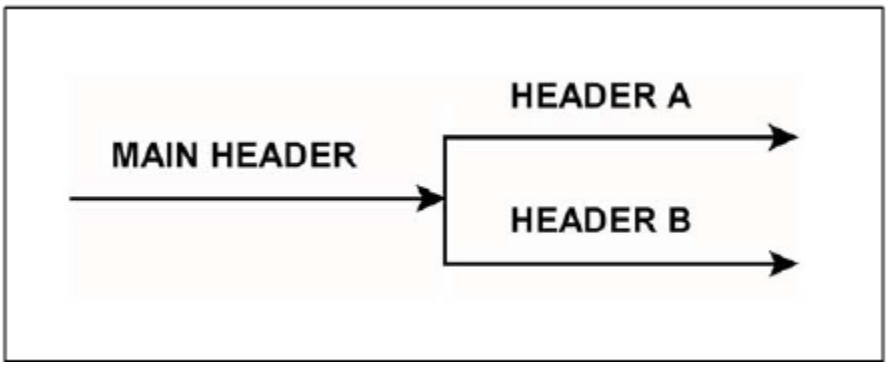
	Header A (gpm)	Header B (gpm)
A.	125	375
B.	154	346
C.	200	300
D.	222	278

ANSWER: B.

參考一主水集管分成兩個平行集管圖(見下圖)。集管A直徑為2-inch且集管B直徑為3-inch。兩個集管中水的速度是相同的。
如果主集管流量率為500gpm，則兩個平行集管的流量率各約為多少？

	集管A (gpm)	集管B (gpm)
A.	125	375
B.	154	346
C.	200	300
D.	222	278

答案： B



科目/題號：193006/10 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P4643 (B4642)

A length of pipe in a cooling water system uses a reducer fitting to decrease the pipe diameter from 6 inches to 4 inches. The flow rate in the 6-inch diameter section of pipe is 200 gpm. What is the flow rate in the 4-inch diameter section of pipe?
A. 133 gpm
B. 200 gpm
C. 300 gpm
D. 450 gpm
ANSWER: B.

在一冷卻水系統的某段管，安裝一漸縮管使管徑從6- inch減到4- inch。在6 -inch管段的流量率為200 gpm。則在4- inch管段的流量率為多少？
A. 133 gpm
B. 200 gpm
C. 300 gpm
D. 450 gpm

答案： B

科目/題號：193006/11 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P4743

A four-loop PWR nuclear power plant uses four identical single-speed reactor coolant pumps (RCPs) to supply reactor coolant flow through the reactor vessel. The plant is currently shut down with one RCP in operation.
Which one of the following describes the stable reactor coolant flow rate through the reactor vessel following the start of a second RCP?
A. Less than twice the original flow rate.
B. Exactly twice the original flow rate.
C. More than twice the original flow rate.
D. Cannot be determined without additional information.
ANSWER: A.

一個四迴路壓水式核能電廠，採用四台相同的單速反應爐冷卻水泵(RCPs)以供應流經反應器的冷卻水。該電廠目前正停機但有一台RCP運轉中。以下何者描述啟動第二台RCP後，流經反應爐槽的穩定冷卻水流量率？
A.小於兩倍的原始流量率
B.等於兩倍的原始流量率
C.大於兩倍的原始流量率
D.在沒有其它額外資訊下無法決定

答案： A

科目/題號：193006/12 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P5543 (B5542)

A vented water storage tank contains 60 feet of water at 70°F. A cracked weld at the bottom of the tank results in a leak rate of 12 gpm. If makeup water flow rate is 5 gpm, at what water level will the tank stabilize?
A. 38.7 feet
B. 25.0 feet
C. 10.4 feet
D. 0.0 feet
ANSWER: C.

一個排氣儲水槽內有70°F，60 feet高的水。在水槽底部有一銲道裂縫造成12gpm的洩漏率。假設補水流量率為5gpm，則水槽會穩定在何水位？
A. 38.7 feet
B. 25.0 feet
C. 10.4 feet
D. 0.0 feet

答案： C

科目/題號：193006/13 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P5943 (B5942)

A vented water storage tank contains 64 feet of water at 70°F. A cracked weld at the bottom of the tank results in a leak rate of 12 gpm. At what water level will the leak rate be 3 gpm?
A. 48 feet
B. 32 feet
C. 16 feet
D. 4 feet
ANSWER: D.

一個排氣儲水槽內有70°F、64 feet高的水，在水槽底部有一銲道裂縫造成12gpm的洩漏率。在何水位時其洩漏率會減為3gpm？
A. 48 feet
B. 32 feet
C. 16 feet
D. 4 feet

答案： D

科目/題號：193006/14 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P6143 (B6142)

A plant shutdown will be performed because of leakage from the main condenser cooling water system into the main condenser via a tube leak.
Given the following initial conditions:
- Main condenser pressure is 1.7 psia.
- Atmospheric pressure is 14.7 psia
- Main condenser cooling water pressure at the location of the tube leak is 18 psig.
- Cooling water leak rate into the main condenser is 80 gpm.

If the main condenser is brought to atmospheric pressure, with no changes to the main condenser cooling water system parameters, what will be the approximate rate of cooling water leakage into the main condenser?
A. 36 gpm
B. 52 gpm
C. 61 gpm
D. 72 gpm
ANSWER: C.

因主冷凝器冷凝管洩漏造成冷卻水進入主冷凝器，電廠將執行停機。若已知下面的初始條件：
- 主冷凝器壓力1.7 psia.
- 大氣壓力14.7 psia.
- 在管束洩漏處的主冷凝器冷卻水壓力為18 psig
- 冷卻水洩漏到主冷凝器的洩漏率為80 gpm

如果主冷凝器壓力上升到大氣壓力，在不改變主冷凝器冷卻水系統的參數下，冷卻水洩漏到主冷凝器的流量率約為多少？
A. 36 gpm
B. 52 gpm
C. 61 gpm
D. 72 gpm

答案： C

科目/題號：193006/15 (2016新增)
知能類： K1.15 [3.1/3.3]
序號： P6543 (B6542)

An ideal positive displacement pump is operating in an open system with the following initial parameters:

Suction pressure = 10 psig
Discharge pressure = 25 psig
Flow rate = 100 gpm

If the pump discharge pressure increases to 40 psig, the pump flow rate will...

A. remain constant.
B. decrease in direct proportion to the change in pump differential pressure.
C. decrease in direct proportion to the square of the change in pump differential pressure.
D. decrease in direct proportion to the square root of the change in pump differential pressure.

ANSWER: A.

一台理想的正排量泵運轉於一開放系統中，初始參數如下：

進口壓力= 10 psig
出口壓力= 25psig
流量率= 100 gpm

如果泵的出口壓力升高到40psig，則泵的流量率將會是多少？

A.保持固定
B.依泵壓差變化成正比減少
C.依泵壓差變化的平方成正比減少
D.依泵壓差變化的平方根成正比減少

答案： A

科目/題號：193006/16 (2016新增)
知能類：K1.15 [3.1/3.3]
序號： P6743 (B6742)

A centrifugal pump is operating at a constant speed in a closed system with the following initial parameters:

Suction pressure = 10 psig
Discharge pressure = 25 psig
Pump flow rate = 500 gpm

If the pump discharge flow control valve is throttled such that the pump discharge pressure increases to 40 psig, the change in pump flow rate will be...
A. directly proportional to the square of the change in pump differential pressure.
B. directly proportional to the square root of the change in pump differential pressure.
C. inversely proportional to the square root of the change in pump differential pressure.
D. impossible to determine from the provided information.
ANSWER: D.

一定速離心泵運轉於一封閉系統中，初始參數如下：

進口壓力= 10 psig
出口壓力= 25 psig
泵流量率=500 gpm

如果泵的出口流量受控制閥節流，使得泵的出口壓力升高到40 psig，則泵流量率的變化將會是…？
A.與泵壓差變化的平方成正比
B.與泵壓差變化的平方根成正比
C.與泵壓差變化的平方根成反比
D.無法從所提供的資訊來決定

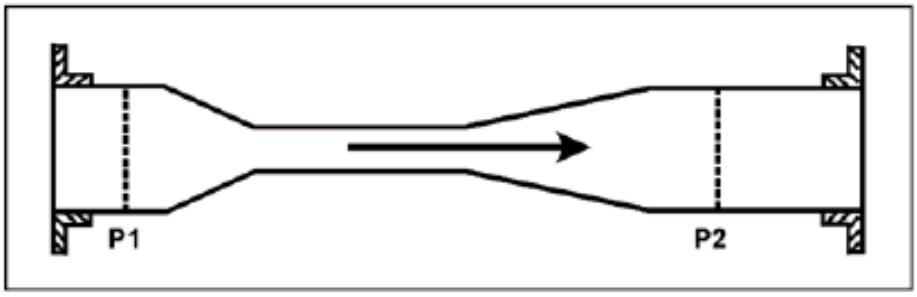
答案： D.

科目/題號：193006/17 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P6843 (B6842)

Refer to the drawing of a venturi in a steam line (see figure below). The venturi inlet and outlet pipe diameters at P1 and P2 are equal.
Currently, steam is flowing through the venturi, reaching sonic velocity in the throat of the venturi. If the steam inlet pressure (P1) remains constant while the downstream pressure (P2) decreases, the mass flow rate of the steam will _____; and the velocity of the steam at the venturi outlet will _____.
A. increase; increase
B. increase; remain the same
C. remain the same; increase
D. remain the same; remain the same
ANSWER: C.

參考蒸汽管路內的文氏管圖(見下圖)。文氏管的入口和出口在 P1 和 P2 的管徑相同。目前蒸汽流經文氏管時，在文氏管喉部的流速達到音速。如果下游壓力(P2)減小時，其蒸汽入口壓力(P 1)仍維持不變，則蒸汽的質量流量率將會_____；而文氏管出口處的蒸汽流速將會_____。
A.增加；增加
B.增加；維持不變
C.維持不變；增加
D.維持不變；維持不變

答案： C



科目/題號：193006/18 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P7143

The following are current parameter values for an operating PWR nuclear power plant:

Steam generator (SG) pressure = 1,000 psia

Main feed pump (MFP) discharge pressure = 1,220 psia

If SG pressure does not change, what MFP discharge pressure will increase main feedwater mass flow rate by 10 percent? (Assume MFP inlet temperature remains the same. Also, assume all valves/components that contribute to head loss downstream of the MFP remain in their current configuration.)

A. 1,242 psia
B. 1,266 psia
C. 1,293 psia
D. 1,342 psia

ANSWER: B.

以下為一壓水式核能電廠運轉參數：

蒸汽產生器（SG）壓力=1,000 psia

主飼水泵（MFP）出口壓力=1,220 psia

如果SG壓力不變，主飼水泵(MFP)出口壓力多少時將可提高主飼水10%質量流量率？(假設MFP進口溫度保持不變。並假設所有造成MFP下游水頭損失的閥門/組件維持目前的配置)

A. 1,242 psia
B. 1,266 psia
C. 1,293 psia
D. 1,342 psia

答案： B

科目/題號：193006/19 (2016新增)
知能類：K1.15 [3.1/3.3]
序號：P7543 (B7542)

Which one of the following will increase the head loss occurring in an operating cooling water system?
A. Shifting two heat exchangers from parallel to series operation.
B. Increasing the flow rate in the system by throttling open a flow control valve.
C. Replacing a 20 feet section of 10-inch diameter pipe with a 10 feet section of 10-inch diameter pipe.
D. Replacing a 20 feet section of 10-inch diameter pipe with a 20 feet section of 12-inch diameter pipe.
ANSWER: A.

下面何者將會增加冷卻水系統運轉中的水頭損失？
A.將兩個並聯的熱交換器更換成串聯運轉
B.節流開啟流量控制閥，以增加系統流量率
C.將20feet長、管徑10-inch的管路，更換為10feet長、管徑10-inch的管路
D.將 20feet 長、管徑 10-inch 的管路，更換為 20feet 長、管徑 12-inch 的管路

答案： A