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Continuing Education Course #281
Environmental Review & Permitting
of Desalination Projects – Part 1

1. Which of the following water supply alternatives is not a typical component of well-balanced and diversified water supply portfolio?

○ a. Reuse of Recycled Water
○ b. Desalination
○ c. Iceberg Towing
○ d. Water Conservation

2. Which of the following statements regarding the environmental impacts of desalination projects as compared to conventional water treatment plants is incorrect?

○ a. Desalination plants use more source water to produce the same volume of drinking water.
○ b. Desalination plants generate discharge of lower salinity than conventional water treatment plants.
○ c. Desalination plants consume more electricity to produce the same volume of water.
○ d. Desalination plants use many of the same chemicals for source water conditioning as conventional water treatment plants.

3. Which of the following environmental impacts differentiates desalination from conventional water supply projects?

○ a. Traffic
○ b. Noise
○ c. Use of chemicals for source water conditioning
○ d. Carbon footprint of plant operations

4. Impingement occurs when aquatic organisms are trapped against the intake screens by the force of the flowing source water - True or False?

○ a. True
○ b. False

5. Which of the following statements is correct?

○ a. Impingement and entrainment of aquatic organisms are not unique to open intakes of desalination plants only.
○ b. Conventional water treatment plants do not have environmental impacts.
○ c. The magnitude of environmental impacts on aquatic organisms caused by impingement and entrainment does not vary from one desalination project to another.
○ d. Open intakes of desalination plants are equipped with screens, which preclude the majority of adult and aquatic organisms from entering desalination plants.

6. Which of the following intake features does not have the potential to solve environmental impacts associated with impingement and entrainment (I&E)?

○ a. Installation of deep offshore intake.
○ b. Use of bar screens with small size openings.

○ c. Installation of the intake in enclosed bay or estuary.
○ d. Intake design for low through-screen velocity.

7. What are the US EPA impingement and entrainment reduction requirements for intakes from power plants?
○ a. 80 to 95% reduction of entrainment and 60 to 90% reduction of impingement
○ b. 80 to 95% reduction of impingement and 60 to 90% reduction of entrainment
○ c. 100% reduction of impingement and entrainment
○ d. No impingement and entrainment reduction requirements specified.

8. Wedgewire screening technology is the only technology approved by US EPA as Best Technology Available for impingement and entrainment of aquatic species, provided adequate ambient conditions exist to promote cleaning of the screen face - True or False?
○ a. True
○ b. False

9. What is the minimum impingement reduction that velocity caps can provide based on year 2011 US EPA technology efficacy assessment?
○ a. 10%
○ b. 100%
○ c. 50%
○ d. 95%

10. Which of the following technologies have the potential to reduce both impingement and entrainment rather than only impingement or only entrainment?
○ a. Aquatic filter barriers
○ b. Velocity caps
○ c. Strobe lights
○ d. Air bubble curtains

11. Which of the following activities is not considered suitable to mitigate environmental impacts from the operation of desalination plant intakes?
○ a. Removal of kelp beds.
○ b. Restoration of wetlands.
○ c. Marine fish hatchery enhancement.
○ d. Development of artificial reefs.

12. What is the typical capacity of individual vertical intake wells for small desalination plants?
○ a. 1.5 to 3 MGD
○ b. 2 to 5 MGD
○ c. 0.1 to 1.1 MGD
○ d. 0.01 to 0.05 MGD

13. What is the typical capacity of high-production radial collector wells?
○ a. 2.0 to 5.0 MGD
○ b. 0.5 to 1.5 MGD
○ c. 8.0 to 20.0 MGD
○ d. 0.1 to 1.0 MGD

14. The operation of large intake wells located adjacent to wetlands could dry-up the wetlands - True or False?
○ a. True
○ b. False

15. Osmotic conformers are marine organisms which:
- a. Can tolerate any changes in the aquatic environment.
- b. Are not sensitive to increase in salinity.
- c. Have no mechanism to control osmosis.
- d. Cells can control cellular osmosis.

16. Ocean water salinity in US coastal waters is usually in a range of:?
- a. 33 to 35 ppt
- b. 26 to 32 ppt
- c. 40 to 42 ppt
- d. 44 to 46 ppt

17. What is domoic acid?
- a. Coagulant for seawater pretreatment.
- b. Substance released from power plant equipment.
- c. Algal toxin with potential impact on human health.
- d. Acid used for adjustment of the pH of the source seawater collected for desalination.

18. Which of the following substances could cause red discoloration of the desalination plant discharge?
- a. Sodium chloride contained in the concentrate.
- b. Ferric hydroxide in spent filter backwash water.
- c. Lime used for post-treatment of desalinated water.
- d. Chlorine.

19. The desalination plant carbon footprint does not depend on the sources used to generate the electricity supplied to the plant - True or False?
- a. True
- b. False

20. Desalination plant carbon footprint is directly proportional to the:?
- a. Distance between the desalination plant and the power grid supplying it with electricity.
- b. Chemical use of the desalination plant
- c. Salinity of the desalinated water
- d. Emission Factor of the electric grid.

21. What is the contribution of the carbon footprint of desalinated water to the total carbon footprint of the average American (expressed in percent)?
- a. 5%
- b. 20%
- c. Less than 1%
- d. More than 10%

22. Which of the activities listed below will not result in the reduction of the carbon footprint of desalination plants?
- a. Increase of the number of desalination plant operation and maintenance staff.
- b. Use of carbon dioxide for water production.
- c. On-site solar power generation.
- d. Green building design.

23. Pressure exchangers are devices that:
- a. can improve the quality of the desalinated water.
- b. are installed to increase salt rejection of the desalination membranes.

○ c. can recover and reuse over 30% of the initial energy applied for salt separation.
○ d. can filter intake seawater.

24. Desalination of warmer seawater requires more energy - True or False?
○ a. True
○ b. False

25. Which of the following plants holds the record for being the smallest site footprint desalination plant in the world?
○ a. The Carlsbad seawater desalination plant in California
○ b. The Tampa Bay desalination plant in Florida
○ c. The Ashkelon desalination plant in Israel
○ d. None of the above

26. What is the typical annual carbon dioxide sequestration rate of one tree expressed in kilograms of CO_2/year per tree?
○ a. 2.7 kg CO_2/year/tree.
○ b. 120 kg CO_2/year per tree.
○ c. 10 kg CO_2/year/tree
○ d. 27 kg CO_2/year/tree

27. Which of the following carbon footprint reduction activities has the lowest cost per ton of CO_2 reduced:
○ a. CO_2 sequestration in coastal wetlands.
○ b. Re-vegetation of Wildfire Zones.
○ c. Use of CO_2 for water production.
○ d. Onsite solar power generation.