2015 CalDesal Conference Ocean Desalination DDW Regulatory Considerations

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Outline

- Agency's involved
- Applicable Rules
- Source Evaluation
- Alternative Filtration Technology
- Design Considerations
- Permitting Process
- Recommendations

Agency's Involved

- Permits are Required from Various Agency
  - Coast Commission
  - State Lands Commission
  - State Water Resources Control Board
  - Regional Water Quality Control Board
  - Energy Commission
  - Department of Fish and Wildlife
  - Public Utilities Commission
  - **Division of Drinking Water**
  - Local and Regional Permits
  - Coast Guard
  - U.S. Army Corps of Engineers
  - Other

Applicable Rules

- General guidelines
  - Surface Water Treatment Rule (SWTR)
    - California Code of Regulation Title 22 Chapter 17
  - Long-Term 2 Enhanced SWTR (LT2)
    - Federal Register 6136 Section 141.719
  - Microbial and Source Water Monitoring
    - California Code of Regulation Title 22 Chapter 15
  - Disinfection By-Products Rules (DBPR)
    - California Code of Regulation Title 22 Chapter 15.5
  - California Water Works Standards
    - California Code of Regulation Title 22 Chapter 16
  - Lead and Copper Rule (LCR)
    - California Code of Regulation Title 22 Chapter 17.5
  - Cross-Connection Control Regulations
    - California Code of Regulation Title 17

Source Evaluation

- Conduct watershed sanitary survey (Title 22 §64665)
  - Physical and hydrogeological description of watershed
  - Identify all sources of actual or potential contamination, including biotoxins
    - Ocean outfalls, surface water outlets, harbor facilities, sewage pump stations
  - Describe watershed management strategies
    - pathogen control
    - e.g., control measures to prevent dumping of wastes from boats in harbors
  - Must be updated every five years
  - Ocean modeling may be generated as part of the Watershed Sanitary Survey

Source Evaluation

- Initial Monitoring Requirements (24 month period)
  - weekly (for smaller systems monthly) for total and fecal coliform, enterococcus and turbidity.
  - For LT2 compliance, monthly sampling for Cryptosporidium, E. coli and turbidity is required.
  - Quarterly sampling for all Title 22 constituents, boron, total organic carbon and gross beta.
  - During and following storm events, special sampling for total and fecal coliform, enterococcus and turbidity.
- Some laboratory methods for drinking water are not acceptable methods for seawater due to salt interference
  - Discuss this issue with your laboratory

Source Evaluation

- Detailed characterization of watershed for pathogen control is not necessary if plant design is based on worst case scenario
  - SWTR Minimum: 2-log Crypto, 3-log Giardia, 4-log virus
  - Worst case: 5.5-log Crypto, 5-log Giardia, 6-log virus
- If there is correlated data of increased coliform or turbidity
  - an additional 1 log reduction of Giardia and Virus may be required following a rain event of greater than 0.5 in. or the raw water turbidity is greater than 5 NTU.
  - The increased inactivation would continue for minimum of 24 hours following the rain event or increase of turbidity.

Alternative Filtration Technology Approval

- Filtration Requirements
  - Title 22 §64653 (e-i)
  - Demonstrate minimum of 2-log Crypto, 2-log Giardia, 1-log virus removal and
  - Meet turbidity performance standard:
    - ≤ 0.1 NTU in 95% of measurements each month
    - Not exceed 1.0 NTU at any time
    - Not exceed 0.5 NTU in more than two consecutive samples
- Approved Alternative Filtration
  - http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/AFTSummaryTable-August2011.pdf

Alternative Filtration Technology Approval

- RO membranes that have not been accepted as an alternative filtration technology will be granted pathogen removal credit equal to log reduction (rounded down to nearest whole number)
  - Typically TDS is used as the segregate for log reduction
  - Currently no RO membranes have received pathogen log removal credit
- No bypass or provision for blending raw water with treated water allowed

Design Considerations

- Monitoring for specific conductance (EC) of each RO unit or bank of units
  - Set triggers for alarm and automatic unit shutdown
  - Establish relationship between conductivity (EC) and total dissolved solids (TDS)
  - The more log removal required through the RO, the lower the number of vessels per cluster for integrity testing
  - Membrane Integrity Testing
    - Direct (daily test)
    - Indirect (continuous)
- May consider MF or UF as the pretreatment to meet log reduction requirements

Design Considerations

- California Waterworks Standards
  - ANSI/NSF 60 certification of all chemicals
  - ANSI/NSF 61 certification of all components
- Provisions for corrosion control (in regards to the LCR)
  - After RO may need to add alkalinity or adjust pH
  - Next round of lead and copper monitoring include sample sites representing the area served by the desalination plant
- Cross-connection Control Regulations in Title 17,
  - Examples of possible cross-connections include:

    CIP System, Brine disposal system, Finished Water Overflow/Drain, etc.

Permitting Process

- Domestic Water Supply Permit

  Application Instructions are available: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/permits/ApplicantPermitInstructions.pdf

  1. **Contact DDW and discuss plans** http://www.waterboards.ca.gov/drinking_water/programs/documents/ddwem/DDWdistrictofficesmap.pdf
  2. Review applicable regulations and requirements
  3. Consider all alternatives
  4. Comply with Technical, Managerial and Financial (TMF) Requirements (only required for new systems)
  5. Prepare the permit technical report (by an engineer)
  6. Plans & Specifications
  7. Draft operations plan
  8. Document CEQA compliance http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/ERU.shtml
  9. Submit a permit application with all required information

Permitting Process

- Permit Technical Report
  - General water system information
  - Source water information
    - Watershed Sanitary Survey
  - Treatment and design information
    - Alternative Technology Approval
  - Distribution system information
- http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Permits.shtml

Recommendations

- Early and continuous engagement and communication is essential
- Understand regulatory requirements and ensure that design adequately considers requirements
- Include factor of safeties in design to account for unknown or unexpected changes in water quality or facility performance
  - Examples include clearwell sizing for adequate CT credits under extreme conditions
- Provide sufficient time for proper review and discussion
- Get as many things that can be completed early approved early in the process
  - Water quality monitoring plan
  - TMF if new system

Recommendations

- Establish a facility disinfection plan and execute prior to membrane installation. Use a systematic approach, starting at most upstream facility and working downstream
  - Once RO membranes are installed very difficult to redisinfect if needed
- Be aware of possible cross connections
  - For CIPs typically have a double block and bleed valve system
- Be prepared to adjust and modify approach throughout process
- Recognize that these are new types of treatment plants which no one has experience with and there won't be a clear establish process

Question?

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