Advanced Water Treatment Operator Certification Development

Panel Discussion – Annual Spring Conference 2016
Sacramento, CA
March 22, 2016
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A Utility’s Perspective on Advanced Water Treatment Operator Certification

Angela Cheung, P.E., T5
Santa Clara Valley Water District
Who we serve

2 million people
15 cities
4,700 direct well owners
13 local water providers
Imported water provides 55% of our supply

**Water supply***

- **55%** Imported
- **30%** Local
- **5%** Recycled
- **10%** Conservation savings

* in average year
A comprehensive water system

- 10 dams and surface water reservoirs
- 3 drinking water treatment plants
- 1 advanced water purification center
- 3 pumping plants
- 140 miles of large transmission pipelines
- 275 miles of streams
- 400 acres of groundwater recharge ponds
SANTA CLARA COUNTY GROUNDWATER AT-A-GLANCE

a graphic representation not intended as a technical exhibit

Land Surface Elevation  Groundwater Elevation  Population

ELEVATION

100 ft

50

0

-50

-100 ft

POPULATION

2 million

1 million

0

Year  1900  1920  1940  1960  1980  2000  2020

Natural groundwater

Land subsided about 13 feet in San Jose between 1915 and 1970

Reservoirs constructed to capture more local water

Increased deliveries of imported water (federal)

First deliveries of imported water (state)
Recycled Water Goals and Targets

Recycled Water Use (acre-ft / year)

- 10% Recycled Water Countywide Target (2025 Board Goal)
- WSIMP Goal 2035

Non-Potable Reuse

Calendar Year:
- 1995
- 2005
- 2015
- 2025
- 2035
Silicon Valley Advance Water Purification Center
8 MGD Facility
Microfiltration – Reverse Osmosis – UV Disinfection

Incoming TDS = 750 ppm

Outgoing TDS = 40 ppm
Pathways to potable reuse
Purified Water Program-Potential Projects
SCVWD Operator Composition

- 50-year history with water treatment operators holding T licenses
- 32 operators T2 – T4, a few with T5s at WTPs
- 3 supervisors T5
- SVAWPC - allows both T & W operators but currently has only T operators
- State-wide 14,000 T operators vs. 6,000 W operators
Reg issue with T operators at RW plants

- Recycled water plants are allowed to use T or W operators.
- T operators can’t use experience at recycled water plant to qualify for higher certification.
- Similar issues for RW distribution systems that use D operators.
Potable Reuse Operator Training & Certification

- DDW to determine feasibility of DPR
  - Expert Panel formed in 2013
  - Expert Panel report due end of 2016
  - Advisory Group to Expert Panel
- Operator training and certification identified as a concern for DPR
- Ah hoc AWT Operator Certification Committee formed in 2015
Desired Outcome for SCVWD

- Address DPR operator training and certification concern - remove potential roadblock for DPR
- Help craft an AWT operator certification program that works for agencies big and small
- New certification provides benefits without being overly restrictive and affecting future qualified operator pool
- New certification required only for DPR facilities, voluntary for IPR and other facilities with AWT technologies
- Address current reg issues with T operators at RW facility
AWT Technologies – What technologies might be included in the certification program

Erin D. Mackey, Ph.D., P.E.
Brown and Caldwell
Current Water and Wastewater Certification Does Not Include “Advanced Treatment”

- More complex treatment train
- Unique O&M
- Potable reuse = Enhanced risk
Potable Reuse Is Based on Advanced Water Treatment for Wastewater Effluent Purification

Different processes and enhanced focus on Critical Control Points
What Do these Systems Look Like Compared to Conventional WTPs?

- Ozone and biologically active carbon
- Microfiltration.Ultrafiltration
- Reverse osmosis
- UV/AOP
Update on the AWT Certification Committee Progress

Gordon Williams, Ph.D., PE
East Bay Municipal Utility District
Confluence of Many Groups

- 2013: SB322 requires state to investigate DPR feasibility
- WateReuse CA DPR initiative
- Various industry surveys
- CA-NV Section, AWWA ad hoc group explores AWT operator certification

Certification Program Need

- Recycled Water Committee
- Certification Committee
- DDW DPR Expert Panel
- CUWA
- WateReuse Research Foundation
- Utility Input
Expert panel calls out the need for a new operator certification that bridges the boundary between water and wastewater operators
WateReuse Research Foundation Projects

- **WRRF 13-03**: Critical Control Point Assessment to Quantify Robustness and Reliability of Multiple Treatment Barriers of DPR Scheme (Hazen and Sawyer/SPI)
- **WRRF 15-05**: Developing Curriculum and Content for DPR Operator Training (Hazen and Sawyer/SCVWD/Carollo)
1. **“Bolt-on”:** Certification should be a “bolt-on” to either a wastewater or water treatment operator certification

2. **More than just technologies:** Certification should include regulatory framework, source water understanding, and advanced monitoring, sampling, and analysis

3. **Bridging the divide:** efforts should be made to bridge the water and wastewater components, potentially including both under the same permit
Recommendations

1. Centered on AWT technologies

2. Stand-alone or "add-on" to both water or wastewater operator certification

3. One test per level of certification

4. Broad program to ensure adequate population of operators
Other Possible Frameworks

CUWA proposed framework

DW-OCP
- T1
- T2
- T3
- T4
- T5

PR or AWT Supplement
- PR1/AWT1
- PR2/AWT2
- PR3/AWT3
- ...

WW-OCP
- Grade I
- Grade II
- Grade III
- Grade IV
- Grade V

WRRF 13-13 proposed framework
AWT Ops Cert Committee Makeup

* 30 Committee Members
* 31 Public Participants
* 2 CA-NV Section, AWWA Staff
15 different utilities represented
Majority in operations or operations management
Committee Tasks To-Date

* Research available training materials
* Conduct Stakeholder Survey to focus committee scope and confirm market receptivity
* Research background for job
Q14: If an Advanced Water Treatment Certification program were offered, would your company / agency likely ...

- Require your operators to...
- Encourage your operators to...
- Maintain current...
- Maintain current...

- Answered: 306   Skipped: 164
Q12: What treatment technologies would you want included in an Advanced Water Treatment Program (Select all that apply)?

- Answered: 282
- Skipped: 188
Recommended to CA-NV Section, AWWA to move forward with certification development

Voluntary certification program

Use a broad definition for the job function

Include three focus areas for certification:
1. Advanced Separation Processes (low and high pressure membranes)
2. Advanced Disinfection/Oxidation (UV/Ozone)
3. Advanced Monitoring, Controls, and Response

Use a facilitated subject matter expert (SME) workshop format for the job analysis
Creating a New Certification Program

Steven Garner
California-Nevada Section, AWWA
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Simplified Process Flowchart

Phase 1: Program Analysis
Phase 2: Job Analysis
Phase 3: Program Development
Phase 4: Examination Development
Phase 5: Examination Delivery
Phase 6: Market Certification Program
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 1 Program Analysis Flowchart

Phase 1

- Research the nature of work appropriate for consideration within the AWT program
- Program Analysis
- Research the resources applicable for development of professionals within the AWT program

List of jobs / functions

Select jobs / functions to be included within the AWT program

List of selected jobs / functions to be processed in the Job Analysis

Select resources to be included within the AWT program

List of selected resources to be used in the Exam Development

List of resources
Example of a Job Analysis

Water Treatment Operator

Content Domain

Water Treatment Processes
- Coagulation/Flocculation
  - Knowledge of chemical coagulants
  - Ability to add chemicals
  - Ability to calculate pressure differentials
  - Knowledge of filter porosity

Filtration
- Ability to adjust equipment

Equipment Operation
- Pumps
  - Ability to read charts and meters
  - Knowledge of electrical and mechanical principles

Flow Meters
- Knowledge of process control instrumentation

Laboratory Procedures
- Chlorine residual
- Knowledge of lab equipment and techniques
- Knowledge of proper chemical handling
- Ability to perform laboratory calculations
- Jar test
- Ability to calculate volume conversions

Knowledge, Skill, Ability
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 2 Job Analysis Flowchart

Determine the Knowledge, Skills and Abilities (KSA) expected of a person holding the job(s)

Conduct Interviews
Conduct Surveys
Consult with SMEs

Review Job Descriptions

List of selected Content Domains, Tasks, KSAs

Job Analysis

Determine the resources appropriate for the Need to Know / Range of Knowledge requirements

Map resources to Knowledge, Skills and Abilities (KSA)

Documented resource mapping to KSAs
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 3 Program Development Flowchart

Phase 3

1. Develop Operational Management Processes
2. Determine Committee Governance
3. Program Development
4. Identify Stakeholders
5. Develop Administration Procedures
6. Determine Target Market(s)
7. Develop Policies & Procedures
8. Address Legal Issues
9. Address Regulatory Considerations
10. Develop Risk Assessment / Plan
11. Establish Financials (target price point, budgeted revenue / expenses)
12. Determine Role for Contractors in the Program Development
13. Address Competition
14. Develop Reciprocity Process
15. Develop Revocation Process
16. Develop Appeal Process
17. Develop Renewal Process
18. Governing Rules
19. Minimum Applicant Qualifications
20. Exam Application
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 4 Examination Development Flowchart
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 5 Examination Delivery Flowchart

Examination Delivery

- Applicant submits application to sit for exam
  - Qualified to sit for exam?
    - No
      - Explain / assist applicant on path to meet qualifications
    - Yes
      - Take Exam
        - Pass Exam
          - Yes
            - Certificate
          - No
            - Applicant prepares for next exam

- Applicant prepares for next exam
  - No
    - Certificant prepares for renewal cycle
  - Yes
CA-NV Section, AWWA
Advanced Water Treatment Certification Program
Phase 6 Market Certification Program Flowchart

Market Certification Program

Develop Market Plan

Develop Messaging

Create Tiered Market List

Implement the Market Plan

Phase 6

Market Plan

Messages

Market List
Status: Advanced Water Treatment Certification  
CA-NV Section, AWWA

• Phase 1: Program Analysis  COMPLETED  
  + Education options in the market discovered and summarized  
  + Job descriptions gathered and summarized  
  + Survey = needs analysis and certification interest

• Phase 2: Job Analysis  IN PROGRESS  
  + Subject matter experts selected  
  + Facilitated workshop conducted  
  + Validation steps underway

• Phase 3: Program Development  IN PROGRESS

• Phase 4: Examination Development  PENDING Phase 3
Panel Discussion
What are your thoughts?

Questions? Contact Steven Garner
SGarner@ca-nv-awwa.org
(916) 889-8465
Q12: What treatment technologies would you want included in an Advanced Water Treatment Program (Select all that apply)?

<table>
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<tr>
<th>Answer Choices</th>
<th>Responses</th>
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<tr>
<td>Membrane Filtration</td>
<td>80.50%</td>
</tr>
<tr>
<td>Reverse Osmosis</td>
<td>76.24%</td>
</tr>
<tr>
<td>Membrane Bioreactors</td>
<td>47.87%</td>
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<tr>
<td>Biologically Activated Carbon</td>
<td>42.55%</td>
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<tr>
<td>Advanced Oxidation - UV</td>
<td>63.12%</td>
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<tr>
<td>Advanced Oxidation - Ozone</td>
<td>55.32%</td>
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<tr>
<td>UV Disinfection</td>
<td>74.11%</td>
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<tr>
<td>Ozone Disinfection</td>
<td>56.03%</td>
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<tr>
<td>Adsorption / Ion Exchange Processes</td>
<td>47.16%</td>
</tr>
<tr>
<td>Source Water Control</td>
<td>51.42%</td>
</tr>
<tr>
<td>Brine / Waste Stream Management</td>
<td>52.13%</td>
</tr>
<tr>
<td>Post Treatment Conditioning</td>
<td>47.16%</td>
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Total Respondents: 282
Q14: If an Advanced Water Treatment Certification program were offered, would your company / agency likely ...

Answered: 306  Skipped: 164

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<td>Require your operators to pursue this certification, in addition to what they currently hold</td>
<td>17.65% 54</td>
</tr>
<tr>
<td>Encourage your operators to pursue this certification, but not require it</td>
<td>53.92% 165</td>
</tr>
<tr>
<td>Maintain current business practices, however, I would be interested in obtaining the certification for my personal benefit</td>
<td>17.65% 54</td>
</tr>
<tr>
<td>Maintain current business practices, and I would not obtain the certification</td>
<td>10.78% 33</td>
</tr>
<tr>
<td>Total</td>
<td>306</td>
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