

Designing Around Regulatory Requirements

Zone 7 Water Agency

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I. Background Information on Zone 7 Water Agency

Zone 7 Water Agency (which was named for the seventh flood zone Alameda County) provides flood protection for 425 square miles in Eastern Alameda County). Zone 7 is also a treated water wholesaler that sells 45,000 acre-feet of water per year to the following customers:

The City of Livermore;
California Water Service Company (for a portion of Livermore);
The City of Pleasanton; and
Dublin San Ramon Services District.

Zone 7 provides 5,000 acre-feet of untreated water to seventy-four agricultural and irrigation customers (primarily vineyards). The local wine industry generates estimated \$200 million revenue per year. In addition to these functions, Zone 7 serves as a Groundwater Basin Manager.

Zone 7 operates five major treatment facilities:

Del Valle is a conventional water treatment plant with a capacity of 44 MGD. Its features include dissolved air floatation and super pulsators and both solar and mechanical sludge dewatering.

Patterson Pass Ultra-Filtration treats up to 8 MGD. Its features include a solids upload clarifier; membrane filtration; and shared solids handling with the conventional plant.

Zone 7's well fields produce up to 40 MGD:

Mocho Groundwater Demineralization (6 MGD, with reverse osmosis and chloramination);

Chain of Lakes (8 MGD, with a common chloramination facility); and

Others (wellhead chloramination).

II. How Zone 7 Set Priorities

The impetus for Zone 7's approach to providing staff with the information they need to perform quality work was the realization that the Operations Plan that Zone 7 had submitted to the California Department of Public Health fulfilled the regulatory requirement but was not really used in-house. Individual treatment facilities had procedures, but Zone 7's Operations Plan primarily explained how facilities were operated. It was not used in the decision-making by operations

staff. We decided that the Operations Plan would be more valuable to staff if it included the procedures used to operate facilities.

This raised the question of which procedures needed to be documented and included in the Operations Plans for our facilities. Originally we hadn't conceived of using an Operations plan as a training document. However, as the standard operating procedures were developed, we realized that if we supplemented the step-by-step procedures with explanations, trouble-shooting directions, and regulatory references, an Operations Plan would also serve well as a training plan.

III. Our Approach

Our approach was to focus on the information our staff needed in order to reliably meet water quality regulations. We were guided by the Guidance Manual provided by the Department of Public Health; this listed several required procedures. However, it was a huge job, so we needed the assistance of both a hired consultant and in-house water quality staff in order to develop our Operations Plan and procedures.

The consultant also provided help with development of our procedures. We conducted working sessions that included consultant staff, two supervisors, and one engineer from our Water Quality staff. The work group met twice a week for several weeks, then once a week for several months. Supervisors would develop draft procedures with the assistance of operations staff; working sessions were used to refine these drafts.

The District's plan for this approach to developing standard operating procedures was approved by the California Department of Health Services in February of 2005. A two-week review process was established for internal review of the procedures developed by the work group. Review of the procedures was conducted by Zone 7's Safety staff, Water Quality Engineering or Laboratory staff, the Stormwater Manager, and the Facility Supervisors of the facility associated with each procedure. The template used for the procedures was the one provided on the Environmental Protection Agency website.

Examples of procedures required by DPH included the following:

1. An Action Plan for a Chlorination Disruption.

The previous Operations Plan simply stated that if the chlorine residual entering the distribution system went as low as 0.20 mg/L, the plant should be shut down. There was no mention of the fact that Zone 7 uses settled water chlorination for Contact Time compliance. The operators now have direction for securing the facility in the event that the disinfection interruption lasts fifteen minutes or more.

2. Chlorine Contact Time Compliance Calculation
3. Filter Operation and Control
4. On-Line Analyzer Monitoring and Alarms

Originally Zone 7's Safety staff reviewed all procedures. However, this proved to be a hindrance in the process. Instead, we now have standardized safety language in all procedures. Operations can add additional safety language if needed. At times specific procedures are reviewed by Safety staff if this is deemed prudent by the Facility Supervisor.

We chose to include only procedures required by the Department of Public Health in the Operations Plan. However, we have dozens of procedures written that Operations needs although they are not required by the Department of Public Health. For example, procedures relating to unplanned system discharges are required by the Regional Water Quality Control Board not DPH. Procedures developed by Zone 7 which go beyond DPH requirements include the following:

- Retailer Notification
- Unplanned Emergency Discharges
- Planned Discharges
- Fire Pump Alarm Notification

The current Operations Plan is only sixteen pages (an overview including twenty-seven Operations Plan elements). It references all required procedures. Only required procedures were sent to DPH. Revisions in the required procedures are sent to DPH annually.

Zone 7's Training Plan includes all procedures. The Operations Plan provided to operators includes both procedures required by DPH and others. The procedures that are not required by DPH are printed on blue paper so that operations know which are and are not required by DPH.

Zone 7 does not have a trainer for operations staff. Instead, our approach is for more experienced staff to provide mentoring. Both the trainer and the mentor are informed of the procedures that the trainee is covering. When the trainee believes he/she understands and can implement the procedure, the trainee checks this item on the Training Plan index, and then reviews the procedure with the Facility Supervisor. After verifying competence, the Facility Supervisor signs off the procedure on the Training Plan Index. The completed Index is placed in the employee's personnel file to document their training.

IV. Lessons Learned

Zone 7 learned that a deliberate, organized project that included both professional services and in-house support resulted in higher-quality procedures. The review process which was built into the project helped ensure that the procedures associated with the DPH Operations Plan, which is a legal document, were accurate, safe, and consistent with all regulations.

We learned that careful development of procedures is a time-intensive process, particularly for the supervisors (who already have a full-time job).

Having worked with a consultant to develop our first set of procedures, we are now completing procedures for a fifth facility using only in-house staff. While we benefited from the help of a consultant, many utilities no doubt have in-house water quality engineering support sufficient to get the project completed without support from an external consultant.

Conversion of an up-to-date Operations Plan and documented procedures into a Training Plan greatly upgraded the training of operations staff. For many years training had consisted of spending three months with whatever journey-level operator was available, without a curriculum or a process for documenting that training had been successfully provided. Now not only do we have a curriculum and higher quality procedures, but also the Facility Supervisor is involved in the training process.

V. Return on Investment

The cost of the services of a water quality engineering consultant to support the process was \$24,000 over a period of 1.5 to 2 years. The cost of the in-house staff time devoted to the process was not separately accounted for, but was significant. However, we are continuing to invest staff time in this process, because it is clear that we have increased our reliability by making sure that operators have the information they need to do quality work.