Quality and Productivity Commission

29th Annual Productivity and Quality Awards Program

Champions of Change: Together We Make a Difference

2015 APPLICATION

Title of Project (Limited to 50 characters, including spaces, using Arial 12 point font):

NAME OF PROJECT: WATER DISTRICTS MONITOR WHAT'S IN YOUR WATER

DATE OF IMPLEMENTATION/ADOPTION: OCTOBER 2013
(Must have been implemented at least one year - on or before July 1, 2014)

PROJECT STATUS: X Ongoing _____ One-time only

HAS YOUR DEPARTMENT PREVIOUSLY SUBMITTED THIS PROJECT? _____ Yes X No

EXECUTIVE SUMMARY: Describe the project in 15 lines or less using Arial 12 point font. State clearly and concisely what difference the project has made.

The use of chlorine to disinfect water produces disinfection byproducts such as Total Trihalomethanes (TTHM). People who drink water containing TTHM in excess of the drinking water standard over many years can experience liver, kidney, or central nervous system problems and increased risk of cancer. The U.S. Environmental Protection Agency (USEPA) set the standard for TTHM at 80 parts per billion (ppb). To meet the TTHM standard, the Los Angeles County Waterworks Districts (LACWD) conducted a pilot study to reduce TTHM using the new aeration innovative technology. The aeration technology uses unique characteristics of TTHM, i.e., volatile organic chemicals. This aeration system was installed in a tank located at the end of the system in Palmdale, CA where the highest potential for TTHM exists. Through this pilot study, LACWD was able to reduce the TTHM concentration by 80 percent in 20 days. This pilot study successfully demonstrated the effectiveness in removing TTHM through a sustainable and cost-effective technology.

(1) ACTUAL/ESTIMATED **ANNUAL** COST AVOIDANCE	(2) ACTUAL/ESTIMATED **ANNUAL** COST SAVINGS	(3) ACTUAL/ESTIMATED **ANNUAL** REVENUE	(1) + (2) + (3) = TOTAL **ANNUAL** ACTUAL/ESTIMATED BENEFIT	SERVICE ENHANCEMENT PROJECT
$ 17.8 MILLION	$	$	**$ 17.8 MILLION**	☐

ANNUAL = 12 MONTHS ONLY

SUBMITTING DEPARTMENT NAME AND COMPLETE ADDRESS
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Kimberly Y. Lyman

DATE 7/14/15

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DEPARTMENT HEAD'S NAME AND SIGNATURE
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Gail Farber

DATE 7/14/15

TELEPHONE NUMBER
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We Support Plain Language

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1st FACT SHEET – LIMITED TO 3 PAGES ONLY: Describe the **Challenge, Solution, and Benefits** of the project. State clearly and concisely what difference the project has made. Use Arial 12 point font

Challenge

The Los Angeles County Waterworks Districts (LACWD), a division of the Los Angeles County Department of Public Works, provides customers of five districts with water from local groundwater and purchased imported water. The largest district, District No. 40 in the Antelope Valley, serves approximately 170,000 people through 55,000 connections. Regions 4 and 34 comprise the largest system in District 40 and serve the City of Lancaster and the western portion of the City of Palmdale. This system contains the vast majority of District 40's facilities and customers, and accounts for approximately 90% of the total water usage.

The U.S. Environmental Protection Agency recently began implementing the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP Rule) to improve the drinking water quality and provide additional public health protection from disinfection byproducts. Total Trihalomethanes (TTHM) is one of the common occurring disinfection byproducts (DBPs) formed when naturally occurring organic and inorganic materials in the water react with chlorine and chloramine during disinfection. TTHM formation rate increases with increasing pH, temperature, water age and concentrations of chlorine, bromine and natural organic matters. The USEPA has set the standard for TTHM at 80 parts per billion (ppb). According to the USEPA, some people who drink water containing TTHM in excess of the standard over many years could experience liver, kidney, or central nervous system problems and increased risk of cancer.

Solution

In October 2013, the LACWD conducted a six month pilot study focusing on reducing TTHM using an aeration system. The Anaverde tank site, one of the seven tank sites located at the end of the distribution system in Palmdale was chosen for this pilot study. Historically, TTHM levels can be as high as 130 ppb in the summer due to high desert temperatures, and can be as high as 108 ppb in the winter due to reduced demand and subsequent increased water age in the Anaverde tanks. Through this pilot study, the LACWD evaluated the effectiveness of the aeration system and achieved the water quality goal by lowering the TTHM concentration in one of the Anaverde tanks to well below 64 ppb (80% of the standard).

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The aeration system used for this pilot study consists of the following: one floating spray nozzle with a flow rate of 1 MGD, one 15 horse power (hp) spray pump, one 2 hp ventilation blower with a flow rate of 750 cubic feet per minute, and one submersible mixer. The spray pump draws water from the bottom of the tank as the spray nozzle sprays the water at a 45 degree downward direction. As the water is being sprayed in the air, TTHM gets volatilized into the headspace of the tank. The ventilation blower, located on the top of the tank, blows fresh air into the tank and subsequently, the volatized TTHM in the air is pushed out of the tank through the tank vent.

In order to conduct this pilot study, the Ana Verde Tank was filled and valved off from the distribution system. Water quality samples were taken on a weekly basis to monitor when the TTHM concentration would peak. Once it was determined that the TTHMs had reached its maximum potential in the tank, the aeration system was started up and daily water quality sampling began. A sample was taken before the aeration system was initially turned on, and once the aeration system was running for four hours, a second sample was taken to see how much TTHM reduction could be achieved in less than a day. LACWD found that the TTHM concentration decreased from 138 ppb to 131 ppb in the span of these four hours.

Daily water quality sampling continued for three weeks after the aeration system was turned on. In the first week, the LACWD was able to achieve the water quality goal of a TTHM concentration less than 64 ppb. LACWD continued to operate the aeration system to see how much TTHM reduction could be achieved. During the span of this study, the TTHM concentration reduced from 138 ppb to 28 ppb in 20 days and with a flow rate of 1 million gallon per day (MGD), the aeration system was able to aerate the 2.1 million gallon (MG) tank a total of 10 times.

Benefits

With the Stage 2 DBP Rule in place and the deadline for compliance monitoring approaching, LACWD evaluated many different options for compliance with the new drinking standard. One of the alternative solutions for meeting the new drinking standard was treating the water using Granular Activated Carbon (GAC) filters.

A filter with GAC is a proven option to remove certain chemicals, particularly organic chemicals, from water. However, the GAC option would require extensive new facilities at an expected cost of about $17.8 million in LACWD Region 4 and 34. Customer water bills may have increased by close to 50% to implement the GAC option. Also, generation of GAC is very energy intensive and disposal of spent GAC could pose a threat to the environment.

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LINKAGE TO THE COUNTY STRATEGIC PLAN (DETAIL IS REQUIRED FOR COUNTY DEPARTMENTS): Use Arial 12 point font

Rather than spending millions of dollars on a new water treatment system, the aeration system can be installed at a fraction of the cost for GAC treatment. And from this pilot study, it was proven that the aeration system could be applied to all areas in the LACWD that contained higher amounts of TTHM. The aeration system was clearly the best solution for meeting the standards, given that the pilot study goal of reducing the TTHM concentration to below 64 ppb was achieved in just seven days.

Linkage to the County Strategic Plan

This pilot study using an aeration system to remove TTHMs is noteworthy for the following accomplishments: innovative, sustainable, efficient, and cost-effective. This project will help fulfill the County-wide Strategic Plan of Operational Effectiveness/Fiscal Sustainability (Goal 1) and Integrated Services Delivery (Goal 3) by improving the water service reliability for the District's customers in the City of Lancaster and the western portion of the City of Palmdale.

Figure 1: Floating Spray Nozzle TTHM Removal System Inside Tank

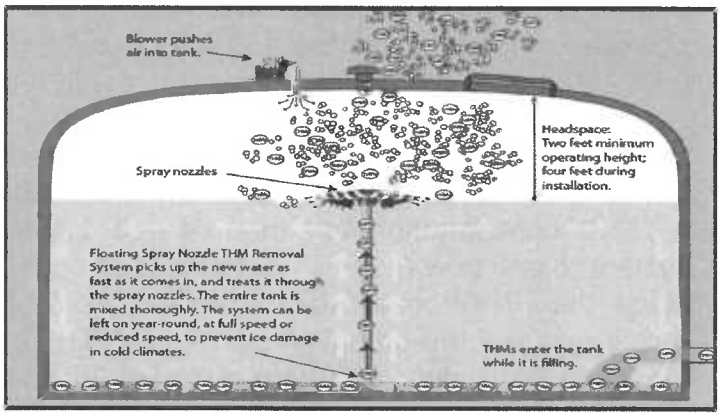

Figure 2: Floating spray nozzle TTHM removal system

Figure 3: Floating Spray Nozzle TTHM Removal System Operating Inside Tank

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COST AVOIDANCE, COST SAVINGS, AND REVENUE GENERATED (ESTIMATED BENEFIT): If you are claiming cost benefits, include a calculation on this page. You must include an explanation of the County cost savings, cost avoidance or new revenue that matches the numbers in the box. Remember to keep your supporting documentation. Use Arial 12 point font

Cost Avoidance: Costs that are eliminated or not incurred as a result of program outcomes.

Cost Savings: A reduction or lessening of expenditures as a result of program outcomes.

Revenue: Increases in existing revenue streams or new revenue sources to the County as a result of program outcomes.

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	Annual Cost of Construction / Installation	Annual Cost of O &M	Total
Installation of GAC Treatment at Quartz Hill Plant	$4.2 million	$13.6 million	$17.8 million
Installation of Aeration System	$7,000	$12,000	$19,000
		Cost Avoidance =	$17.8 million

The Quartz Hill Plant is the source of surface water that is supplied to LACWD District 40 Region 4 and 34, where the most potential for exceedingly high Total Trihalomethane (TTHM) concentrations can occur. The annual costs for installing GAC Treatment at this plant would be $17.8 million, while the annual cost of installing an Aeration system is $19,000 per year. This results in an annual cost avoidance of $17.8 million.