

Centrally Managed POU
Treatment for Compliance
with the Arsenic Rule
Grimes Study

USEPA

December 1, 2004

Centrally Managed POU

- Cooperative agreement between NSF and the EPA OGWDW
- Supplemental funding
 - Kinetico
 - NSF

Project Purpose

- Identify, measure, and record conditions for successful implementation of centrally managed POU treatment for compliance with the SDWA

Project Management Group

- ASDWA (California)
- AWWA
- NRW (CRWA)
- NDWC
- WQA

Community Selection

- Size (25-100 connections)
- As 20 – 50 (<50)
- Otherwise in compliance
- Water quality
- Local/state support
- Not a collection of homes





Grimes Tap Water

- Water is withdrawn from a well and chlorinated. A storage tank regulates the water pressure.
- Water contains 23-30 ppb of Arsenic. It is all in the As +5 form due to chlorination.
- Water characteristics:
 - pH - 8-8.4
 - Iron - <100 ppb
 - TDS - 200 ppm
 - Silica – 24 ppm
- Water system administered by three town board members.

Demographics

- 122 Installations, 5 non participants (2RO)
- 104 Residences and 18 other sites
- Other sites are school, post office, library, community hall, 2 restaurants, a market, and two other businesses.
- Also two day care centers.

Equipment Selection Criteria

- Media preferred
- Automatic shut-off device or other meter
- Local experienced service provider
- Warranty
- Commercially available
- Certified to appropriate NSF/ANSI Standard
- Waste removal costs?

Equipment Selection

- Three finalists all using activate alumina
- Final selection decided by availability of experienced local provider acceptable to the community.

Equipment Selection

- System chosen is the Kinetico, Inc. model 8500.
- Media is iron-modified activated alumina.
- System uses two cartridges containing the activated alumina media, followed by a carbon filter for taste and odor treatment.
- System has an automatic shut-off device that activates at 500 gallons.



Accelerated Test Results

- Units will exceed rated capacity on Grimes water.
 - AA units 800 – 1100 gallons
 - FE units 1600 gallons
- Actual breakthrough data underestimated because of flow.
- Units passed CA WET/TCLP test.





Unit Installations

- Installations performed by local Kinetico dealer, a licensed plumber.
- Units installed July through October 2002.
- Meters installed with units to monitor usage.

Installation Issues

- Difficulty scheduling installations.
 - Community is in an agricultural area, installations took place during the harvest time.
- Old plumbing, plumbing not conforming to codes.
- No suitable location to install the faucet.
- Difficulty finding shut-off valves.
- Installers had to crawl under homes to connect lines to refrigerators.

Daily Water Consumption

n=59

	Mean	Range
Gal./Home	1.3	0 – 2.8
Gal./Person	0.5	0 - 2.8
14 < 0.2		

Monitoring

- 100 percent at installation
- Quarterly (weighted to end)
- Six month inspections
- Meters read at all sampling times
- Fecal coliforms
- HPC

Installation Sampling

- Arsenic in raw water ranged from 22 to 30 ppb
- No discernable trends over time, no difference between AM and PM samples
- No Fecal Coliforms detected in any samples
- HPC 188 cfu/ml geometric mean - stable

Monitoring Results

- 250 POU samples – all but six <2 ppb
- 5 < 10 ppb
- 2 > 10 ppb
- 80 no Fecal Coliforms
- 80 HPC 320 cfu/ml geometric mean

Operation and Maintenance

- Treatment units will belong to the community of Grimes.
- Residents will contact a member of the town water board for replacement cartridges. They must be installed by a member of the board.
- Cartridges will be provided to Grimes at a discount for three years after study.
- California Department of Health Services and the community will decide if this approach will work for compliance.

Waste Disposal

- Spent cartridges passed the USEPA Toxicity Characteristic Leaching Procedure (TCLP) and the State of California Waste Extraction Test (WET) for disposal of solid wastes.
- Cartridges can be disposed in household trash.

Monitoring Costs

- Recommend automatic shut off
- 0.25 hours labor
- \$15 analytical
- Kits
- <0.25 hours labor
- \$2 material

Cost Summary

Monthly Costs <i>7%/7yrs</i>	Central	POU 6 Mo change	POU 12 MO Change, 1 sample
AA	\$31.42	\$18.00	\$14.67
FE	\$28.37	\$15.32	\$12.82

Community Survey

Stratus Consulting

- 91 surveys – 72 returned (78%)
- Mean age – 54 range 24 – 96
- Mean household 2.1 people, 1.7 children
- Men 55%, Women 45%
- English 60%, Spanish 40%
- Associates degree + 20%
- HS + 25%
- HS 17%

Community Survey cont.

- Always use POU - 69%
- Usually use POU – 23%
- Agreeable to POU – 84%
- Unsure of POU – 11%
- Not acceptable – 5%
- Water safer – 77%
- Tastes better – 75%

Community Survey cont.

- Not inconvenienced – 94%
- POU willing to pay/mo. - \$8
- Central willing to pay/mo. - \$12
- Most willing to pay

Summary

- Technology works
- Community administrative infrastructure important
- Automatic shut off preferred over metering or frequent sampling
- Community accepts this approach
- Community of this size may not be cost effective or too complex

Summary Cont.

- Treatment units will belong to Grimes.
- California DHS and community to decide if this approach will work.
- Cartridges will be provided to Grimes at a discount for three years after study.
- POU treatment won't achieve “comprehensive” treatment
- POU may provide overall reduced exposure.