State Water Resources Control Board
Point-of-Use and Point-of Entry Treatment – Permanent Regulations

ATTACHMENT B
Cost Estimating Methodology

The State Administrative Manual, Section 6607 contains the standard methodology developed for use in estimating costs in regulations. The main components of that methodology are (I) statement of the mandate, (II) background or introductory material, (III) working data, assumptions, and calculations, and (IV) conclusions.

This document presents the cost estimating methodology for the proposed rulemaking – Point-of-Use (POU) and Point-of-Entry (POE) Treatment (SBDDW-17-003).

In summary, there are no additional costs to the regulated community associated with the adoption of this regulation. The proposed regulation provides an alternative means of treatment for eligible public water systems (PWS) to utilize for providing drinking water that complies with existing drinking water standards. Absent these regulations a PWS would typically be required to install centralized treatment to correct for deficiencies in water quality delivered to customers. These regulations provide a more economically feasible option for PWS, and therefore do not represent an actual cost – the existing water quality standards are the origins of any cost.

There are no additional state costs; therefore, there is no need to provide additional funding for any state costs to implement the regulation. Although the proposed regulation allows an eligible PWS to apply for and receive limited funding for POU or POE treatment through the state's funding mechanisms, the funding provided would be no more than the funding that would be provided for installation of more costly centralized treatment that would otherwise be required.

Note that the proposed regulations apply only to PWS, as defined pursuant to Health and Safety Code section 116275, which are not businesses or individuals. PWS are water companies providing drinking water to the public and, pursuant to Government Code section 11342.610, are exempt from the definition of a small business. As such, there will be no direct economic impact to businesses or individuals, although some water systems may contain businesses that may experience an indirect economic impact in the form of economic benefit.

I. Statement of the Mandate

The proposed regulation would not impose upon local agencies or school districts a mandate that requires state reimbursement because the proposed regulations are neither mandatory nor unique to local government, and will apply equally to public and private water systems.

Local agencies or school districts currently incur costs in their operation of PWS and the regulations will not result in a "new program or higher level of service" that requires

reimbursement pursuant to article XIIIB, section 6 of the California Constitution because the regulations apply generally to all individuals and entities that operate PWS in California and do not impose unique requirements on local governments. Similarly, PWS can pass on any costs of implementation of the regulation through increasing service fees. Therefore, no state reimbursement of costs is required.

Local regulatory agencies also may currently incur costs for their responsibility to enforce state regulations related to small PWS (fewer than 200 service connections) that they regulate. However, employing the proposed regulations would be no more onerous than enforcing the existing regulations that would otherwise apply. Therefore, the State Water Resources Control Board (State Water Board) determined that local regulatory agency costs resulting from the adoption and enforcement of this regulation would be, at most, insignificant. Furthermore, local agencies are authorized to assess fees to pay reasonable expenses incurred in enforcing statutes and regulations related to small PWS (Health & Saf. Code, § 101325). Therefore, no reimbursement of any incidental costs to local agencies in enforcing this regulation would be required (Gov. Code, § 17556(d)).

II. Background or Introductory Material

All suppliers of domestic water to the public are subject to regulations adopted by the U.S. Environmental Protection Agency (U.S. EPA) under the Safe Drinking Water Act of 1974, as amended (42 U.S.C. §300f et seq.), as well as by the State Water Board under the California Safe Drinking Water Act (SDWA) (Health & Saf. Code, div. 104, pt. 12, ch. 4, §116270 et seq.).

California has been granted primary enforcement responsibility, ("primacy") by U.S. EPA for public water systems in California. California has no authority to enforce federal regulations and may only enforce state regulations. Federal law and regulations require that California, in order to receive and maintain primacy, promulgate regulations that are no less stringent than the federal regulations. Pursuant to Health and Safety Code sections 116271, 116375, and 116350, the State Water Board has authority to adopt the subject regulations.

Pursuant to section 116270 of the Health and Safety Code, et al., it is the objective of the California SDWA for PWS to deliver drinking water to consumers that is, at all times, pure, wholesome, and potable. Drinking water is commonly delivered to consumers via distribution systems (e.g. water mains), with consumers' service lines being connected to the distribution system. When treatment is necessary due to source water contamination a PWS will typically utilize centralized treatment, ensuring the drinking water within the distribution system, as a whole, meets all drinking water standards.

The proposed regulations will allow some PWS to implement POE or POU devices instead of centralized treatment. A POE treatment device provides necessary drinking water treatment of the distribution system water at or near the point the contaminated water enters a consumer's house or building, as opposed to providing centralized

treatment for the entire distribution system. Similarly, a POU treatment device(s) provides necessary treatment to a single tap (or taps) to reduce the contaminants at that tap(s) only.

Section 116380 of the Health and Safety Code mandates that the regulations the State Water Board adopts pursuant to section 116375 include requirements governing the use of POU and POE treatment by PWS. Section 116380 establishes specific general criteria, with section 116552 including additional criteria. In summary, the minimum criteria included:

- POU or POE treatment was limited to a PWS that; 1) can demonstrate that centralized treatment is not immediately economically feasible, 2) has fewer than 200 service connections, 3) meets federal SDWA regulations and guidance pertaining to POU and POE use, and 4) has submitted pre-applications with the State Water Board for funding for achieving compliance with the drinking water standards for which POU treatment would be proposed to address.
- State Water Board may not allow POU treatment by a PWS in lieu of centralized treatment unless the State Water Board has determined, following a public hearing, that there is no substantial community opposition to the installation of POU treatment devices. Additionally, a permit issued by the State Water Board to a PWS allowing POU treatment in lieu of centralized treatment, is limited to not more than three years, or until funding for centralized treatment is available (whichever occurs first).

III. Working Data, Assumptions, and Calculations

The proposed regulations have no fiscal impact to PWS because the regulations do not establish any mandatory costs of compliance. A PWS that qualifies for POU or POE costs will have the option of installing POU or POE instead of centralized treatment. Any costs to a PWS will result from their efforts to comply with an adopted maximum contaminant level (MCL) and those MCLs will have fiscal impact estimates developed during their adoption; the estimates typically assume the installation of more costly centralized treatment.

The proposed regulations may have economic impacts in the form of reduced costs to PWS that opt to install POU or POE instead of centralized treatment, increased spending on POU or POE devices, and reduced spending on centralized treatment systems.

There are no additional direct costs to the regulated community associated with the adoption of this regulation. The proposed regulation provides an alternative means of treatment for an eligible PWS to utilize for providing water that complies with drinking water standards. The proposed regulation requires that prior to receiving a permit allowing the use POU or POE treatment, the PWS must demonstrate that POU or POE treatment would be less costly than centralized treatment, which would otherwise

usually be required. Additionally, the proposed regulation would apply only to those PWS that choose to utilize POU or POE treatment in lieu of centralized treatment.

Economic impacts resulting from the adoption of this regulation were estimated by comparing the estimated costs to a PWS for installing and operating centralized treatment and the estimated costs to a PWS for installing and operating POU or POE devices. The State Water Board in March 2017 surveyed the Division of Drinking Water's district offices and the local primacy authorities to obtain lists of:

- PWS that have either installed POU or POE treatment and returned to compliance in accordance with the existing emergency POU/POE regulations
- PWS that have installed POU or POE treatment without adhering to the emergency POU/POE regulations
- PWS that are anticipated to attempt installation of POU or POE to return to compliance.

Estimated impacts from the regulation were developed using only the list of PWS that are anticipated to attempt installation of POU or POE or that installed devices during the current emergency regulations. PWS that installed POU or POE without adhering to existing regulations were not included as part of economic impact of the proposed regulations.

The proposed regulations will be located in California Code of Regulations, Title 22, Articles 2.5 and 2.7. The sections within Articles 2.5 and 2.7 contain a variety of requirements for PWS to achieve compliance with a drinking water standard using either POU or POE. Some of the requirements may result in an economic impact to a PWS, while other requirements may have a neutral or minor impact. To more easily estimate the economic impact the costs have been separated into the following categories: capital costs, operations and maintenance (O&M) costs, outreach and education (O&E) costs, and monitoring costs.

The State Water Board analyzed costs only for PWS with arsenic (As), nitrate (NO_3), and hexavalent chromium (Cr6) contamination. PWS with other contamination such as lead or uranium were few in number and service connections, and the State Water Board assumes that the economic impacts from these PWS are insignificant.

The following assumptions were also used to determine costs:

1. All PWS considering the use of POU or POE are single-source systems and would require only a single treatment plant if centralized treatment is installed.

2. The number of POU or POE devices a PWS will be required to install is the same as the number of service connections for that PWS.

3. The peaking factor for maximum day demand is 1.5, which is consistent with the peaking factor used to determine source capacity in California Code of Regulations, title 22, division 4, chapter 16, section 64554.

4. Average day demand is 150 gallons/person/day, which is a rounded value based on water usage data provided to the State Water Board by 386 California urban water suppliers during June, 2014, and increased by 10 percent.

5. All evaluated PWS produce drinking water in compliance with all drinking water standards other than the contaminant for which the PWS is installing treatment.

6. PWS treating for As use adsorptive media for POU, POE and centralized treatment.

7. PWS treating for NO3 use reverse osmosis for POU or POE treatment and ion exchange for centralized treatment

8. PWS treating for Cr6 use reverse osmosis for POU or POE treatment and ion exchange for centralized treatment.

9. PWS treating for NO3 and another contaminant were assumed to use solely reverse osmosis or ion exchange for nitrate.

10. Costs for POU and POE installed during the emergency regulations are not known, and those costs were estimated using the capital, O&M, and O&E estimating processes described later in this document.

11. Capital and O&M costs for POE are highly variable due to lack of standardized products and site-specific characteristics. POE cost estimates were instead determined using POU estimating processes; this adjustment should result in a greater difference in cost between centralized treatment and the proposed regulations, and thus the greatest amount of economic impact.

12. PWS not in compliance with drinking water standards for any of the analyzed contaminants are assumed to achieve compliance within 12 months of the POU/POE regulations becoming effective.

Capital Costs

Capital costs for POU and POE were estimated for PWS using a U.S. EPA POU and POE cost estimating tool (U.S. EPA, Office of Water, “Cost Evaluation of Point-Of-Use and Point-Of-Entry Treatment Units for Small Systems”, February 17, 2017) (Tool). The Tool was used with the majority of parameters set at their default values and the following adjustments:

1. As removal is achieved using adsorptive media devices.

2. NO3 and Cr6 removals are achieved using reverse osmosis devices

3. Installation time for devices is increased from two to four hours to conservatively allow for delays resulting from non-standard plumbing conditions, additional on-site education during and following installation, and longer travel time in rural California;

4. Ultra-violet disinfection is not provided and the water is assumed to not require any disinfection not already provided by the PWS;

5. Service connections are used for system size input;

6. Sampling and monitoring costs are not included; the State Water Board performed a separate analysis for monitoring costs and the results are detailed later in this document;

7. Any permit-related costs are included as part of the PWS' annual fee and are therefore not included as costs of the regulation;

8. Device replacement frequency is reduced from once every two years to once every three years and increased from a 0.5-hour visit to a two-hour visit – units are assumed to adequately function for the entire 3-year allowance period but may require increased travel time or customer interaction;

9. Adsorptive media cartridge replacement frequency is increased from once per year to twice per year to conservatively ensure increased protection to consumers.

10. The reverse osmosis sediment pre-filter, pre- and post-membrane GAC filters, and the reverse osmosis membrane replacement frequencies are increased from varying less-than-twice-per-year frequencies to twice per year; these changes are to conservatively ensure increased protections to consumers and to account for variation in source water contamination.

Capital costs for centralized treatment to remove As were estimated using average values from an As cost estimating document produced for the U.S. EPA (ALSA Tech, LLC, "Costs of Arsenic Removal Technologies for Small Water Systems: U.S. EPA Arsenic Removal Technology Demonstration Program", September 2011) (EPAAS). The treatment technology was assumed to be adsorptive media and designed to meet maximum day demand flows. The following cost assumptions are derived from the document:

1. Total capital costs for non-transient non-community PWS (NTNC) are $2,549 per gallon per minute (gpm) of design flow rate. The document identified three NTNC installations as POE devices that were not used for centralized treatment costs.

2. Total capital costs for community PWS (CWS) are $2,395 per gpm of design flow rate

Capital costs for centralized treatment to remove NO3 were estimated using a NO3 document prepared for the State Water Board (Center for Watershed Sciences, University of California, Davis, “Drinking Water Treatment for Nitrate, Technical Report 6”, July 2012). The treatment technology was assumed to be ion exchange and designed to meet maximum day demand flows. The following cost assumptions were derived from the document:

1. The system size is “very small” (25-500 people)

2. The average annualized capital cost is $0.75 per thousand gallons.

Capital costs for centralized treatment to remove Cr6 were estimated using a 2013 Cr6 treatment cost calculator developed by Water Quality & Treatment Solutions, Inc. The treatment technology was assumed to be strong-base ion exchange and designed to meet maximum day demand flows. The following assumptions were used to develop costs from the calculator:

1. The target Cr6 concentration in the treated water is 5 ppb. A target of 5 ppb should provide adequate operational protections to ensure that water delivered to customers is always less than the former MCL of 10 ppb.

2. The well utilization is 100%.

3. The raw water Cr6 concentration is 20 ppb. 20 ppb was used to represent a source that would likely be unable to find operations alternatives to treatment (e.g. blending) due to the high concentration of Cr6. The water systems identified as likely to use POU or POE to treat for Cr6 were not individually queried for raw water Cr6 concentrations in water delivered delivered to customers.

4. All other water quality and operations assumptions were left as default values.

5. Cost outputs from the calculator consist of an upper and lower end cost. The lower end cost was used in the estimates as PWS eligible for POU or POE typically have limited funds and are likely to use the most affordable option.

6. Cost calculator outputs for capital costs did not meaningfully vary for sources with less than 100 gpm of design flow and a total capital cost of $700,000 was assumed for those sources.

To amortize the total capital costs and determine the estimated annualized capital costs to install As treatment, the State Water Board used the capital recovery method with an interest rate (*i* in decimal format) of 7% (i.e., 0.07) and an amortization period (n) of 20 years, where annualized capital cost = (initial capital cost) x (amortization factor).

$$Amortization\ factor = \frac{i \times (1 + i)^n}{[(1 + i)^n - 1]} = 0.0944$$

Using these assumptions and calculations the State Water Board estimates that the annual capital costs of using centralized treatment is $0.63 million dollars, and the combined annual capital cost of using POU or POE is $0.09 million dollars. Additional information, including an estimated cost per service connection, is included in Table 1.

Table 1: Estimated Annual Costs for POU/POE and Centralized Treatment

Type of Costs		POU/POE	Centralized Treatment	Difference
Capital Costs	Per connection: Total costs:	$71 $93,225	$480 $630,206	$409 $536,981
O&M	Per connection: Total costs:	$273 $358,806	$2,807 $3,685,757	$2,534 $3,326,951
O&E	Per connection: Total costs:	$17 $22,433	$0 $0	- $17 - $22,433
Total costs	**Per connection:** **Total costs:**	**$361** **$474,464**	**$3,287** **$4,315,963**	**$2,926** **- $3,841,499**

O&M Costs

O&M costs for POU and POE were estimated for PWS using the Tool. The Tool was used with the majority of parameters set at their default values and the adjustments previously described in Capital Costs.

O&M costs for centralized treatment to remove As were estimated using EPAAS. The annual amount of water used was based on the average day demand over 365 days. The following cost assumptions are derived from the document:

1. Total O&M costs for NTNC are $12.06 per 1,000 gallons.

2. Total O&M costs for CWS are $4.61 per 1,000 gallons.

O&M costs for centralized treatment to remove NO3 were estimated using a NO3 document prepared for the State Water Board (Center for Watershed Sciences, University of California, Davis, “Drinking Water Treatment for Nitrate, Technical Report 6”, July 2012). The annual amount of water used was based on the average day demand over 365 days. An average annual O&M cost of $1.22 per thousand gallons was derived from the document.

O&M costs for centralized treatment to remove Cr6 were estimated using a 2013 Cr6 treatment cost calculator developed by Water Quality & Treatment Solutions, Inc. The assumptions previously described in the capital cost section were used to develop costs from the calculator. Cost calculator outputs for O&M costs for sources with flows less than 100 gpm did not meaningfully vary, and an annual O&M cost of $153,000 was assumed for those sources.

Using these assumptions and calculations the State Water Board estimates that the annual O&M costs of using centralized treatment is $3.69 million dollars, and the combined annual capital cost of using POU or POE is $0.36 million dollars. Additional information, including an estimated cost per service connection, is included in Table 1.

O&E Costs

O&E costs for POU were estimated for PWS using the Tool. The Tool was used with the majority of parameters set at their default values and the adjustments previously described in Capital Costs. NTNC and transient water systems were assumed to have negligible O&E costs and not included in the evaluation. Costs for O&E are only assumed to occur as part of the device selection and installation process. O&E costs following installation are assumed part of O&M costs.

Using these assumptions and calculations the State Water Board estimates that the annual costs of O&E using POU treatment or POE treatment are $0.02 million dollars. Additional information, including an estimated cost per service connection, is included in Table 1.

Monitoring Costs

The State Water Board informally surveyed 13 laboratories certified by the Environmental Laboratory Accreditation Program (ELAP) throughout California to obtain average sample analysis pricing for As, NO3, and Cr6. The average prices for As, NO3, and Cr6 sample analysis are $23, $22, and $70, respectively. The following assumptions and calculations were used to determine annual costs:

- Source water monitoring costs are not included because those costs are included in the cost of a given MCL and are unrelated to treatment costs. Monitoring frequencies for source water monitoring do not differ depending on treatment type.

- PWS using centralized treatment would only require a single centralized treatment plant to remove contamination from drinking water.

- Costs of collecting and transporting the samples for all treatment options were assumed to be incorporated into existing routine sampling patterns (e.g. monthly bacteriological sampling)

- PWS using centralized treatment are required to perform monthly treated water sampling in accordance with CCR, title 22, section 64432.8.

- PWS using POE or POU treatment are required to perform annual sampling from every connection in accordance with the proposed regulations.

Using these assumptions and calculations the State Water Board estimates that the annual monitoring costs of using centralized treatment is $0.02 million dollars, and the

combined annual capital cost of using POU or POE is $0.48 million dollars. Additional information, including an estimated cost per service connection, is included in Table 2.

Table 2: Estimated Annual Monitoring Costs for POU/POE and Centralized Treatment

Contaminant	Number of Impacted PWS	Number of POU/POE	POU/POE	Centralized Treatment	Difference
Arsenic	28	623	$14,329	$7,728	- $6,601
Nitrate	26	314	$6,908	$6,864	- $44
Hexavalent chromium	7	376	$26,320	$5,880	- $20,440
Total:	**61**	**1,313**	**$47,557**	**$20,472**	**- $27,085**

Summary

Estimated costs to a PWS from a contaminant were determined during the development of drinking water standards for that contaminant. The proposed regulations only provide an alternative method to achieving compliance with a drinking water standard, and thus do not provide an estimated, quantified benefit, but rather an estimated, quantified reduction to a potential cost. The benefit to installing any treatment option is measured in the original regulations in the form of public health improvements.

The economic impact estimated in this document represents an assumed maximum implementation of POU or POE technology to resolve drinking water quality issues; some of the anticipated water systems will not successfully achieve compliance using the proposed regulations, and the actual cost impact will reduce. The State Water Board recognizes that there will be additional indirect impacts to manufacturers and sellers of POU, POE and centralized treatment systems – some sales of POU and POE devices will be at the cost of sales of centralized treatment systems. The State Water Board does not have sufficient information to estimate the economic impact from this behavior.

The State Water Board recognizes that additional economic behavior may result from risk-averse customers that receive a single household POU device but wish to consume drinking water from other home water access points (e.g. bathroom faucet, hose bibs). Those customers may independently purchase additional POU devices for their home. Related, some customers may currently purchase bottled water for domestic purposes and, following installation of a POU or POE device, stop purchasing bottled water. The State Water Board does not have any information regarding the frequency of this behavior and did not attempt to estimate the resulting economic impact.

IV. Conclusion

There are no costs associated with the proposed regulation in that the State Water Board is proposing to promulgate regulations whose underlying intent is to reduce costs that may be incurred by applicable PWS to meet drinking water standards.

The proposed regulation would not impose a mandate on local agencies or school districts that requires state reimbursement. Local agencies or school districts will not incur any additional costs as a result of the adoption of this regulation, and the regulations will apply equally to public and private water systems (County of Los Angeles v. State of California, et al., 43 Cal.App 3d 46 (1987).).

Because there are no additional state costs, there is no need to provide additional funding for any state costs. The State Water Board estimates that there will be no change to the Division of Drinking Water's Safe Drinking Water Account fees and caps. The fees, caps, and annual adjustments are specified in statute under sections 116565, 116577, 116585, and 116590, California Health and Safety Code. The proposed regulations apply only to PWS, as defined pursuant to Health and Safety Code section 116275, which are not businesses or individuals. PWS are water companies providing drinking water to the public and, pursuant to Government Code Section 11342.610, are exempt from the definition of a small business. Therefore, the regulation will not have a direct economic impact on private persons or businesses. Indirect economic impact will likely occur due to PWS passing on the costs of compliance to their customers, which may include private persons or businesses.