# EPA National Drinking Water Regulation for Arsenic
# Retrospective Cost Analysis

## Introduction

The goal of this project is to determine the realized cost of reducing arsenic levels to meet the standard for EPA's National Drinking Water Regulation for Arsenic. The rule affected both community water systems (CWS) and non-transient non-community water systems (NTNC). The following questions are designed to provide EPA with information on the realized system unit costs which will be used to estimate the annual national system treatment costs for the Arsenic Rule. Specifically, we want to know what different size systems did to reduce arsenic levels to meet the arsenic standard and the actual costs of the treatment. We would also like to know if the EPA identified all the technologies that were available to systems to reduce arsenic levels. For treatment technologies identified by the EPA, we would like to know how EPA estimates of capital and operating and maintenance costs of the technology compare to the realized costs.

For ease of comparison, the framework has been structured similar to one used by the EPA in their cost analysis of the Arsenic Rule prior to the rule's promulgation. However, we would appreciate your feedback on whether this is the right approach to take for obtaining the realized costs. We also provided additional space for you to include information on any treatment technologies and the cost of these technologies that were not identified by the EPA.

Finally, we also have some general questions about how technology and costs have changed since the rule was promulgated.

## Questions about Community Water System Treatment Costs

1. How many community water systems (CWS) had to reduce arsenic levels to meet the standard for the Arsenic Rule?

   a. Systems with populations < 100 _____
   b. Systems with populations 101-500 _____
   c. Systems with populations 501-1000 _____
   d. Systems with populations 1001-3300 _____
   e. Systems with populations 3301-10,000 _____
   f. Systems with populations 10,001-50,000 _____
   g. Systems with populations 50,001-100,000 _____
   h. Systems with populations 100,001-1,000,000 _____
   i. Systems with populations > 1,000,000 _____

2. What percentage of the CWS affected by the arsenic regulation were ground water systems?

   a. Systems with populations < 100 _____%
   b. Systems with populations 101-500 _____%
   c. Systems with populations 501-1000 _____%
   d. Systems with populations 1001-3300 _____%

e. Systems with populations 3301-10,000 _____%
f. Systems with populations 10,001-50,000 _____%
g. Systems with populations 50,001-100,000 _____%
h. Systems with populations 100,001-1,000,000 _____%
i. Systems with populations > 1,000,000 _____%

3. What percentage of the CWS affected by the arsenic regulation were surface water systems?

a. Systems with populations < 100 _____%
b. Systems with populations 101-500 _____%
c. Systems with populations 501-1000 _____%
d. Systems with populations 1001-3300 _____%
e. Systems with populations 3301-10,000 _____%
f. Systems with populations 10,001-50,000 _____%
g. Systems with populations 50,001-100,000 _____%
h. Systems with populations 100,001-1,000,000 _____%
i. Systems with populations > 1,000,000 _____%

4. What percentage of the CWS affected by the arsenic regulation were ground water and surface water systems?

a. Systems with populations < 100 _____%
b. Systems with populations 101-500 _____%
c. Systems with populations 501-1000 _____%
d. Systems with populations 1001-3300 _____%
e. Systems with populations 3301-10,000 _____%
f. Systems with populations 10,001-50,000 _____%
g. Systems with populations 50,001-100,000 _____%
h. Systems with populations 100,001-1,000,000 _____%
i. Systems with populations > 1,000,000 _____%

5. Do you have information on the number of entry points by groundwater system? If so, is it possible to provide treatment information by entry point?

6. Could you provide information on how many systems blended water and then treated the water at one entry point?

7. What operational decision(s) did systems make to comply with the Arsenic Rule? An operational change is a change that was made in direct response to the Arsenic Rule either to come into compliance, or to avoid being out of compliance.

I. Install a New Treatment Technology
a. Systems with populations < 100 _____
b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____

e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

II. Modify Existing Treatment Technology
a. Systems with populations < 100 _____
b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____
e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

III. Use a Non-Treatment Approach. These might include blending water, purchasing water, increasing treatment time (for treatments already in place), or the abandonment of a water source.
a. Systems with populations < 100 _____
b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____
e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

IV. Find a New Water Source. This might include replacing a current water source with a new well or surface water source, or purchasing water (either from an existing supplier or from another system).
a. Systems with populations < 100 _____
b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____
e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

V. Consolidate or Regionalize through partnership with another system(s). Includes physical interconnection and/or operations and maintenance.
a. Systems with populations < 100 _____

b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____
e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

VI. Other, please describe:
a. Systems with populations < 100 _____
b. Systems with populations 101-500 _____
c. Systems with populations 501-1000 _____
d. Systems with populations 1001-3300 _____
e. Systems with populations 3301-10,000 _____
f. Systems with populations 10,001-50,000 _____
g. Systems with populations 50,001-100,000 _____
h. Systems with populations 100,001-1,000,000 _____
i. Systems with populations > 1,000,000 _____

8. For each system size, what was the average daily flow prior to the treatment decision? If the water was untreated, what was the average daily flow of the untreated water prior to the treatment?

I. Surface Water (non-purchased)
a) Systems with populations < 100 _____ mgd
b) Systems with populations 101-500 _____ mgd
c) Systems with populations 501-1000 _____ mgd
d) Systems with populations 1001-3300 _____ mgd
e) Systems with populations 3301-10,000 _____ mgd
f) Systems with populations 10,001-50,000 _____ mgd
g) Systems with populations 50,001-100,000 _____ mgd
h) Systems with populations 100,001-1,000,000 _____ mgd
i) Systems with populations > 1,000,000 _____ mgd

II. Ground Water (non-purchased)
a) Systems with populations < 100 _____ mgd
b) Systems with populations 101-500 _____ mgd
c) Systems with populations 501-1000 _____ mgd
d) Systems with populations 1001-3300 _____ mgd
e) Systems with populations 3301-10,000 _____ mgd
f) Systems with populations 10,001-50,000 _____ mgd
g) Systems with populations 50,001-100,000 _____ mgd
h) Systems with populations 100,001-1,000,000 _____ mgd
i) Systems with populations > 1,000,000 _____ mgd

III. Purchased Water (treated)

a) Systems with populations < 100 _____ mgd
b) Systems with populations 101-500 _____ mgd
c) Systems with populations 501-1000 _____ mgd
d) Systems with populations 1001-3300 _____ mgd
e) Systems with populations 3301-10,000 _____ mgd
f) Systems with populations 10,001-50,000 _____ mgd
g) Systems with populations 50,001-100,000 _____ mgd
h) Systems with populations 100,001-1,000,000 _____ mgd
i) Systems with populations > 1,000,000 _____ mgd

IV. Purchased Water (untreated)

a) Systems with populations < 100 _____ mgd
b) Systems with populations 101-500 _____ mgd
c) Systems with populations 501-1000 _____ mgd
d) Systems with populations 1001-3300 _____ mgd
e) Systems with populations 3301-10,000 _____ mgd
f) Systems with populations 10,001-50,000 _____ mgd
g) Systems with populations 50,001-100,000 _____ mgd
h) Systems with populations 100,001-1,000,000 _____ mgd
i) Systems with populations > 1,000,000 _____ mgd

**Background Information about Treatment Technologies**

The following treatment trains – pre-treatment, treatment and waste disposal – were determined by the EPA to effectively remove arsenic and bring a water system into compliance. Some treatment technologies were more relevant for smaller systems while others would primarily be used by larger systems (and would not be installed exclusively for arsenic removal).

1. Add pre-oxidation [if not in-place] and modify in-place Lime Softening (pH > 10.5) and modify corrosion control.
2. Add pre-oxidation [if not in-place] and modify in-place coagulation/Filtration and modify corrosion control.
3. Add pre-oxidation [if not in-place] and add Anion Exchange and add POTW waste disposal. Sulfate level ≤ 20 mg/L.
4. Add pre-oxidation [if not in-place] and add Anion Exchange and add POTW waste disposal. Sulfate level: 20 mg/L ≤ sulfate ≤ 50 mg/l.
5. Add pre-oxidation [if not in-place] and add Coagulation Assisted Microfiltration with corrosion control and add mechanical dewatering/non-hazardous landfill waste disposal.
6. Add pre-oxidation [if not in-place] and add Coagulation Assisted Microfiltration with corrosion control and add non-mechanical dewatering/non-hazardous landfill waste disposal.
7. Add Oxidation/Filtration (Greensand)(20:1 iron: arsenic) and add POTW for backwash stream.
8. Add pre-oxidation [if not in-place] and add Activated Alumina and add non-hazardous landfill (for spent media) waste disposal. pH 7 ≤ pH ≤ pH 8.

9. Add pre-oxidation [if not in-place] and add Activated Alumina and add non-hazardous landfill (for spent media) waste disposal. pH 8 ≤ pH ≤ pH 8.3.
10. Add pre-oxidation [if not in-place] and add Activated Alumina with pH adjustment (to pH 6) and corrosion control and add non-hazardous landfill (for spent media) waste disposal. Run length = 23,100 BV.
11. Add pre-oxidation [if not in-place] and add Activated Alumina with pH adjustment (to pH 6) and corrosion control and add non-hazardous landfill (for spent media) waste disposal. Run length = 15,400 BV.
12. Add pre-oxidation [if not in-place] and add POU Reverse Osmosis.
13. Add pre-oxidation [if not in-place] and add POU Activated Alumina. (Finished water pH ≤ pH 8.0)
14. Other, please describe

*Treatment Capital Costs (TCC)*

Treatment Capital Costs (TCC) include any expenditures on installation or retrofit of structures or equipment associated with the implementation of an operational decision to comply with the Arsenic Rule, otherwise known as upfront costs or one-time costs. These costs generally are incurred in the year in which the operational decision takes place (though often financed over a longer period). Capital costs include equipment and material costs, construction costs, engineering costs, and any other up-front costs associated with the operational decision.

Treatment capital costs are likely the sum of a number of different costs that were incurred as a result of the operational decision on a treatment train. For each specific cost category listed, please enter the costs incurred for each treatment train so that the sum totals Total Treatment Capital Costs (TTCC). If a particular category does not apply, please enter a zero.

*Treatment Operation and Maintenance Costs (TOM)*

Treatment Operation and Maintenance Costs (TOM**)** include costs associated with the materials, labor, chemicals, electricity, and other costs necessary to operate and maintain the operational decision to comply with the Arsenic Rule. Unlike capital costs, operation and maintenance costs are incurred each year that the operational decision is in effect.

Operation and maintenance costs are likely the sum of a number of different costs that were incurred as a result of an operational decision. For each specific cost category listed, please enter the total costs incurred for each treatment train so that the sum totals Total Treatment Operation and Maintenance (TTOM) Costs. If a particular category does not apply, please enter a zero.

**Questions about Treatment Technologies**

9. Please enter the Total Treatment Capital Costs (TTCC) and Total Treatment Operation and Maintenance Costs (TTOM) and their respective parts for each treatment train and system size in Tables 1-8.

**Table 1. Size Category < 100**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 1. Size Category < 100**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 2. Size Category 101 - 500**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 2. Size Category 101- 500**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 3. Size Category 501- 1000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 3. Size Category 501 - 1000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 4. Size Category 1001 – 3,300**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 4. Size Category 1001 – 3,300**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 5. Size Category 3,301 – 10,000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 5. Size Category 3,301 – 10,000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 6. Size Category 10,001 – 50,000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 6. Size Category 10,001 – 50,000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 7. Size Category 50,001 – 100,000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 7. Size Category 50,001 – 100,000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 8. Size Category 100,001 – 1,000,000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 8. Size Category 100,000 – 1,000,000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 9. Size Category > 1,000,000**

| **Treatment Train** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

**Table 9. Size Category > 1,000,000**

| **Treatment Train** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
|---|---|---|---|---|---|---|---|
| Number of Systems using Treatment Train | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **before** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Average Arsenic Level of finished water going into distribution **after** treatment (mg/L) | | | | | | | |
| | | | | | | | |
| Total Treatment Capital Costs (TTCC) | | | | | | | |
| Treatment Equipment and Materials | | | | | | | |
| Waste Disposal Equipment and Materials | | | | | | | |
| Construction | | | | | | | |
| Engineering | | | | | | | |
| Land | | | | | | | |
| Bench and Pilot Testing | | | | | | | |
| Permitting | | | | | | | |
| Other, please describe: | | | | | | | |
| Total Treatment O&M Costs (TTOM) | | | | | | | |
| Materials | | | | | | | |
| Labor | | | | | | | |
| Chemicals | | | | | | | |
| Electricity | | | | | | | |
| Monitoring and Reporting | | | | | | | |
| Waste Disposal | | | | | | | |
| Other, please describe: | | | | | | | |
| % of **TTCC** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |
| % of **TTOM** used to meet arsenic standard compared to meeting the standard of other co-contaminants or indicators | | | | | | | |

10. Which treatment trains were installed or changed to address additional pollutant standards? How were they modified or changed? Which pollutants? Can you provide this information by system size?

The following alternative to treatments could be used to bring a water system into compliance:

1. Regionalization
2. Alternate source
3. Increasing treatment time (for treatments already in place)
4. Blending water
5. Purchasing water
6. Being acquired by a larger utility

11. If applicable, please enter the Total Capital Costs and Total Operation and Maintenance Costs for each alternative treatment and system size in Table 9.

**Table 9. Non-treatment Options**

| Size Category | Alternative Treatment | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| <100 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 101-500 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 501-1000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 1,001-3,300 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 3,301 – 10,000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |

Sample Questionnaire: EPA National Drinking Water Regulations – Arsenic

| **Size Category** | **Alternative Treatment** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|---|
| 10,001 – 50,000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 50,000 – 100,000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| 100,001 – 1,000,000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |
| | | | | | | | |
| > 1,000,000 | Number of Systems Using Alternative | | | | | | |
| | Total Capital Costs | | | | | | |
| | Total O&M Costs | | | | | | |
| | Waste Disposal Capital Costs | | | | | | |
| | Waste Disposal O&M Costs | | | | | | |

**Questions about Non-transient Non-community Water System Treatment Costs**

12. Is it possible to provide non-transient non-community water system (NTNC) characteristics for each system service category? If so, please complete Tables 10 and 11. If not, please answer the following questions:

a. How many NTNC systems were impacted by the Arsenic Rule?

b. What is the average size of the population served by a NTNC system?

c. What is average design flow (mgd) for a NTNC system?

d. What is the average daily flow (mgd) for a NTNC system?

e. Please list the treatment technologies used by NTNC systems?

f. What are the average annual system costs for each treatment technology?

**Table 10**. Non-Transient Non-Community Water Systems

| Service Area Type | Number of Systems | # of Systems Above the MCL | Avg. Population Served per System |
|---|---|---|---|
| Daycare Centers | | | |
| Highway Rest Areas | | | |
| Hotels/Motels | | | |
| Interstate Carriers | | | |
| Medical Facilities | | | |
| Mobile Home Parks | | | |
| Restaurants | | | |
| Schools | | | |
| Service Stations | | | |
| Summer Camps | | | |
| Water Wholesalers | | | |
| Agricultural Products/Services | | | |
| Airparks | | | |
| Construction | | | |
| Churches | | | |
| Campgrounds/RV Parks | | | |
| Fire Departments | | | |
| Federal Parks | | | |
| Forest Service | | | |
| Golf and Country Clubs | | | |
| Landfills | | | |
| Mining | | | |
| Amusement Parks | | | |
| Military Bases | | | |
| Migrant Labor Camps | | | |
| Misc. Recreation Services | | | |
| Nursing Homes | | | |
| Office Parks | | | |
| Prisons | | | |
| Retailers (Non-food related) | | | |
| Retailers (Food related) | | | |
| State Parks | | | |
| Non-Water Utilities | | | |
| Manufacturing: Food | | | |
| Manufacturing: Non-Food | | | |

**Table 11. Non-Transient Non-Community Water System Characteristics**

| Service Area Type | Design Flow (mgd) | Avg. Daily Flow (mgd) | Treatment Technology Used | Avg. Annual System Costs |
|---|---|---|---|---|
| Daycare Centers | | | | |
| Highway Rest Areas | | | | |
| Hotels/Motels | | | | |
| Interstate Carriers | | | | |
| Medical Facilities | | | | |
| Mobile Home Parks | | | | |
| Restaurants | | | | |
| Schools | | | | |
| Service Stations | | | | |
| Summer Camps | | | | |
| Water Wholesalers | | | | |
| Agricultural Products/Services | | | | |
| Airparks | | | | |
| Construction | | | | |
| Churches | | | | |
| Campgrounds/RV Parks | | | | |
| Fire Departments | | | | |
| Federal Parks | | | | |
| Forest Service | | | | |
| Golf and Country Clubs | | | | |
| Landfills | | | | |
| Mining | | | | |
| Amusement Parks | | | | |
| Military Bases | | | | |
| Migrant Labor Camps | | | | |
| Misc. Recreation Services | | | | |
| Nursing Homes | | | | |
| Office Parks | | | | |
| Prisons | | | | |
| Retailers (Non-food related) | | | | |
| Retailers (Food related) | | | | |
| State Parks | | | | |
| Non-Water Utilities | | | | |
| Manufacturing: Food | | | | |
| Manufacturing: Non-Food | | | | |