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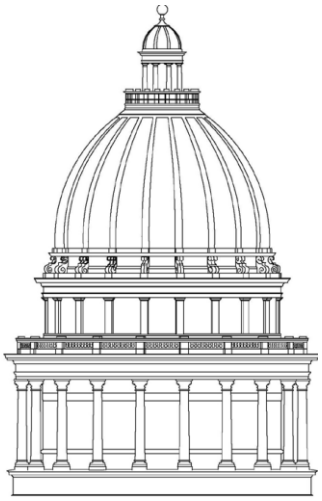
Number 2017-16



An In-depth Follow-up of The Division of Drinking Water's Minimum Source Sizing Requirements

December 2017

Office of the
LEGISLATIVE AUDITOR GENERAL
State of Utah

STATE OF UTAH

Office of the Legislative Auditor General

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JOHN M. SCHAFF, CIA
AUDITOR GENERAL

December 12, 2017

TO: THE UTAH STATE LEGISLATURE

Transmitted herewith is our report, **An In-depth Follow-up of the Division of Drinking Water's Minimum Source Sizing Requirements** (Report #2017-16). A digest is found on the blue pages located at the front of the report. The objectives and scope of the audit are explained in the Introduction.

We will be happy to meet with appropriate legislative committees, individual legislators, and other state officials to discuss any item contained in the report in order to facilitate the implementation of the recommendations.

Sincerely,

John M. Schaff, CIA
Auditor General

JMS/lm

Digest of
An In-depth Follow-up of
The Division of Drinking Water's
Minimum Source Sizing Requirements

The Division of Drinking Water has made progress towards implementing the recommendations of our December 2014 audit report. As recommended, the division has revised and clarified its rules governing the process of obtaining a reduction in the division's source sizing standards. However, the division is still in the process of implementing our recommendation to update its source sizing standards.

Our prior report concluded that the division's indoor source sizing standards appear too high and that its outdoor standards appeared too low. We recommended the division adopt new standards based on actual water demand data obtained from local water systems. For several reasons, the division has concluded that its current approach to regulation is not optimal and is now considering an entirely new approach to regulating the source sizing and storage capacity of Utah's public water systems. This report describes some of the features of the new regulatory framework being considered.

Chapter II
Division of Drinking Water Is Considering A New Approach to Regulation

The following summarizes the reasons why the division is considering a new approach to regulating the source sizing and storage capacity of Utah's public water systerms.

The Current Standards Are Outdated. The division has concluded that its current source sizing and storage standards may not be the most effective means of ensuring the reliability of Utah's public water systems. Studies prepared by Utah's four largest water conservancy districts support the conclusions of our prior audit that the division's standards do not reflect the actual demands of most local water systems. However, it is important to understand that the data submitted by the conservancy districts was the consumption at the user meter and the division's standards are on the source requirements to meet that end use. What is poorly understood is the impact that leaks and other unaccounted for use has on comparisons of local use data against the standards. Even so, it appears the standards that apply to indoor water use are too high for most water systems. The standards that apply to outdoor irrigation may be too low. The local water use data presented in our December 2014 audit report and more recently by the conservancy districts has led the division to

consider alternative strategies for regulating the source sizing of storage capacity of Utah's water systems.

The Division Is Finding It Difficult To Develop New Statewide Standards. Although the evidence suggests that there are problems with the current standards, there is insufficient evidence to identify exactly what a new set of statewide standards should be. In fact, under current conditions it may not even be possible to develop a new set of indoor and outdoor source sizing standards that would be appropriate for most water systems in Utah. For example, many systems do not monitor their peak day demand, even though they have the advanced meters that enable them to do so. As a result, it may be difficult for the division to obtain the data it needs to set a new peak day standard. In addition, the lack of reliable data and the fact that water systems have such different demands placed on them, raises questions as to whether all water systems should be subject to the same source sizing standards.

The Appeals Process Is Not an Effective Remedy for High Indoor Source Sizing Standards. In the past, the Division of Drinking Water offered water systems the opportunity to apply for a reduction in the standards if they could provide evidence that their system required a lower source capacity than was required. However, the opportunity to apply for a lower standard has not been an effective remedy when the indoor standard is too high. Even though the division has clarified its process for applying for a reduction in the standards, as we recommended in 2014, few water systems have applied for a reduction in the last two years. For several reasons, water managers and local engineers do not appear overly concerned about having a water systems with excess capacity. Rather than trying to right-size their system by appealing to the division for a more appropriate standard, some may find it easier to default to the higher state standard.

The Division Is Considering a New Approach to Regulating Source Sizing and Storage Capacity. Given the lack of data needed to develop a reliable standard, the division would like to focus on helping each public water system identify the minimum source sizing and storage capacity that best meets its local needs. Rather than allowing local water systems to default to the Division of Drinking Water's current standards, each public water system would take responsibility to identify the source capacity that best meets its own local demand for water.

New Rules and Legislation May Be Required to Enact a New Regulatory Framework. To develop its new approach to regulation, the Division of Drinking Water will need to adopt rules requiring each water system to monitor and report their peak day use, their average daily use and their unmetered water use. This is information that any well-managed water system should already be gathering. We recommend that these data elements be added to the annual water use report that each public water system is required to submit to the Division of Water Rights. To address any concerns about the division's

authority to require this information and the associated costs, we recommend the legislature consider legislation requiring each water systems to report its peak day demand, unaccounted for use, and annual demand on an annual basis. The legislature should also consider granting an exemption for small water systems that may find it difficult to comply with this requirement.

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Report No. 2017-16

An In-depth Follow-up of The Division of Drinking Water's Minimum Source Sizing Requirements

December 2017

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Chapter I
Introduction

In 2014, our office examined the source sizing standards imposed on state water systems by the Division of Drinking Water (division). Our report, *A Review of the Division of Drinking Water's Minimum Source Sizing Requirements,* concluded that the division's source sizing standards were poorly aligned with actual demands of most local water systems. Specifically, the standards for indoor water use were high, and the standards for outdoor water use were low. The division has responded to the audit by improving its internal procedures, by making adjustments to its rules, and by evaluating local water use data.

Division of Drinking Water's Mission Is to Protect the Public Health and Safety

If not adequately sized, a public water system could run dry and pose a serious threat to public health.

The Division of Drinking Water has a responsibility to ensure that Utah's culinary water systems are safe and reliable. With this objective in mind, the division has issued administrative rules governing (1) the size of a water system's water source and (2) the capacity of a water system's storage facilities. If systems are not adequately sized, public water systems could run dry and pose a serious threat to public health. For example, all water systems have leaks. If a water system were to run dry and the water pressure drop to zero, contaminants could enter the public water supply through those leaks.

To make sure water systems are safe and reliable, the division has developed regulations governing the source of supply. The source flow needs to be adequate to meet the peak day demand, or the demand on the day of highest water consumption. As shown in Figures 1.1 and 1.2, separate standards have been developed for indoor uses and outdoor uses of a culinary water system. Both standards include a source standard that is sufficient to cover peak day demand and a storage requirement that is intended to cover average yearly demand.

Figure 1.1 State Rules Impose Separate Source Demand Standards for Indoor Water Use. Administrative Rule R309-510-7 requires that water systems be designed to provide a sufficient source flow to meet an indoor demand of: (1) a peak day demand of 800 gpd/conn (2) the average yearly demand for water of 146,000 gal/conn.

Each public water system must have a source capacity that can meet a peak day demand of 800 gpd/conn.

Table 510-1 Source Demand for Indoor Use		
Type of Connection	**Peak Day Demand**	**Average Yearly Demand**
Year-Round Use		
Residential	800 gpd/conn	146,000 gal./conn
ERC	800 gpd/ERC	146,000 gal./ERC

Source: Utah Administrative Code R309-510-7. Source Sizing

Figure 1.1 shows the source demand standards for that portion of a water system that is devoted to providing water for indoor use. In other words, if a culinary water system is only used for indoor water use, not for outdoor irrigation, then only the above standards would apply. The standards require that water systems be designed to meet a peak day demand of 800 gallons per connection (gpd/conn) served. Each culinary water system must also have sufficient water to meet an annual indoor demand of 146,000 gallons of water per connection. In practice, the average yearly demand is often converted to a daily value of 400 gallons per day (146,000 gallons divided by 365). Similar standards are applied to water use by commercial, institutional and industrial users that are measured in equivalent residential connections (ERCs).

If a water system can demonstrate that its actual peak day use and average yearly demand are lower than the standards, the system can file an appeal for a reduction in the standard. However, it must supply data demonstrating how a smaller system design can meet the needs of its users. The appeals process existed when our prior audit was performed. However, few water systems have sought a reduction in the standard. Thus, most municipalities design their water systems according to the division's peak day standard of 800 gpd/conn and daily demand of 400 gpd/conn.

Additional Standards Apply for Outdoor Water Use. If a culinary water system is also used for outdoor irrigation, the Division of Drinking Water requires that additional source capacity be added to

the system design. The standards for this additional capacity are described in Figure 1.2.

Figure 1.2 Source Sizing for Outdoor Use Focuses on Flow Rates Per Irrigated Acre. Based on the region of the state, different flow rates are required to address secondary water needs. Most communities along the Wasatch Front fall within map zone 4.

Table 510-3 Source Demand for Irrigation (Outdoor Use)		
Map Zone	**Peak Day Demand (gpm/irrigated acre)**	**Average Yearly Demand (AF/irrigated acre)**
1	2.26	1.17
2	2.8	1.23
3	3.39	1.66
4	3.96	1.87
5	4.52	2.69
6	4.9	3.26

Source: Utah Administrative Code R309-510-7

Water systems must create enough source capacity to meet the peak day demand and average yearly demand required for their region.

Figure 1.2 shows the minimum flow rates required to satisfy the peak day demand or outdoor irrigation water. It imposes a different standard for each of the six different geographic zones in the state. For most communities, the peak day demand will occur during July or August when the demand for outdoor irrigation water is greatest. Therefore, a municipality that relies on its culinary system for both indoor and outdoor use must supplement its indoor use requirement with additional source flow to meet peak outdoor demand.

As discussed in our prior report, the outdoor requirement for zone 4 results in about 800 gallons per day for outdoor use, which is the same as the indoor use standard. Therefore, total source capacity for culinary systems that are used for both indoor water use and outdoor irrigation will be 1,600 gallons per day per connection. The adequacy and reasonableness of the indoor standard and the outdoor standard were the scope of our prior audit. Based on our findings, we recommended several action items that the Division of Drinking Water should take to more effectively regulate the source and storage capacities of culinary water systems.

Audit Scope and Objectives

The Legislative Audit Subcommittee asked for a follow-up review to determine whether the Division of Drinking Water had implemented each recommendation in our 2014 audit report. The recommendations in our prior report focused on two action items: 1) clarifying the appeals process for obtaining reduced source sizing requirements, and 2) adjusting the indoor and outdoor source sizing standards to reflect actual use.

In Chapter II, we report our findings related to these two action items. Our observations were based on interviews with representatives of local water systems, conservancy districts, and the Division of Drinking Water. Recently, the Division of Drinking Water has hosted several work groups to review local water use data which could be used to evaluate the division's source sizing and storage capacity standards. The collaboration with the key stakeholders is ensuring that a better regulatory environment will be created going forward.

Chapter II
Division of Drinking Water Is Considering A New Approach to Regulation

The Division of Drinking Water (DDW or division) recognizes the merits of the findings of our prior report and recognizes that its source sizing standards do not match the needs of most water systems. However, rather than revise the current standards, the division is considering a different approach to regulating both the source sizing and the storage capacity of local water systems. In the future, the division plans to rely less on a set of statewide standards and instead rely on water systems to provide evidence that they have designed a safe and reliable water system.

Because the division is pursuing a new approach to regulation, the recommendations from our last report may take on less significance. For example, we recommended that the division develop new standards based on actual data provided by water systems. Under the regulatory framework now being considered, local systems would be asked to monitor and report their peak day demand, unaccounted for water use, and annual demand. They would then design their water systems to meet their own needs, rather than a state standard which may or may not address local conditions.

Water systems should be designed to meet their own needs, not a state standard that may not match local conditions.

Figure 2.1 summarizes the division's response to our 2014 audit recommendations.

Figure 2.1 DDW Clarified Its Appeals Process and Is Considering a New Regulatory Approach. In the prior audit report, we recommended that the Division of Drinking Water reevaluate its source sizing standards. These standards may lose their significance under a new regulatory framework.

Chapter II Recommendation	Status
1. We recommend that the Division of Drinking Water reevaluate its indoor source sizing regulations and issue a set of revised standards that are based on actual indoor use data provided by Utah water systems.	In Process
Chapter III Recommendation	**Status**
1. We recommend that the Division of Drinking Water review its outdoor source sizing requirements and establish new requirements, based on current research, that are consistent with actual outdoor water use data.	In Process
Chapter IV Recommendations	**Status**
1. We recommend that DDW revise R309-510-5 Reduction of Requirements in a manner that clarifies the process of obtaining a reduction when one is justified.	Implemented
2. We recommend that DDW establish a written protocol to provide guidance for those interested in pursuing a reduction to the source sizing requirements.	Implemented
3. We recommend that DDW consider creating a process for receiving a reduction to the source sizing requirements prior to building low water use developments.	Implemented
4. We recommend that the DDW work to clarify in rule the following: a. The intent behind the language "in the absence of firm water use data" b. How the requirements address unaccounted water c. How the requirements address redundancy	Implemented

Source: Office of the Utah Legislative Auditor General

Because the division is pursuing a new approach to regulation, the recommendations from Chapters II and III may take on less significance.

Although the rule and procedural changes recommended in Chapter IV have been implemented, the division has not yet succeeded in revising its standards as recommended in Chapters I and II. Instead, the division is considering a different regulatory framework. Their reasons for this move include the following:

1. **The Current Standards are Outdated.** The standards were developed decades ago and are no longer appropriate for the demands placed on most water systems today. In some circumstances, the standards lead water systems to build more capacity than is necessary. In other instances, they may lead to undersized systems.

2. **Developing a New Set of Statewide Standards May Not Be Possible at This Time.** Currently, there is insufficient, reliable data with which to develop a new set of statewide standards.

3. **The Division's Appeal Process Has Not Been an Effective Remedy.** The ability to apply to the division for a reduced source sizing requirement was once viewed as a remedy for a set of standards that may not be well suited to all water systems. However, few water systems have applied for a reduction in the standard.

After summarizing these challenges, this chapter describes several steps that the division should take as it develops its new regulations.

The Current Standards Are Outdated

The division is considering new strategies for regulating the source sizing of storage capacity of Utah's water systems.

The division has concluded that its source sizing and storage standards may not be the most effective means of ensuring the reliability of Utah's public water systems. Studies prepared by Utah's four largest water conservancy districts support the conclusions of our prior audit. That is, the standards that apply to indoor water use appear to be too high for most water systems. The data show that the average end use at the residential meter is lower than the state standard but most comparisons do not include unaccounted for water. The data also show the standards that apply to outdoor irrigation may be too low. These studies, as well as other investigations, have led the division to consider alternative strategies for regulating the source sizing of storage capacity of Utah's water systems.

Indoor Use Standards Appear Too High

As mentioned in Chapter I, the state's source sizing regulations require that each water system has an adequate source capacity to meet the peak day demand. The peak day standard for indoor water use is 800 gallons per day per connection. Water systems are also required to have the capability of supplying an annual indoor demand of 146,000 gallons per connection, which equals 400 gallons per day.

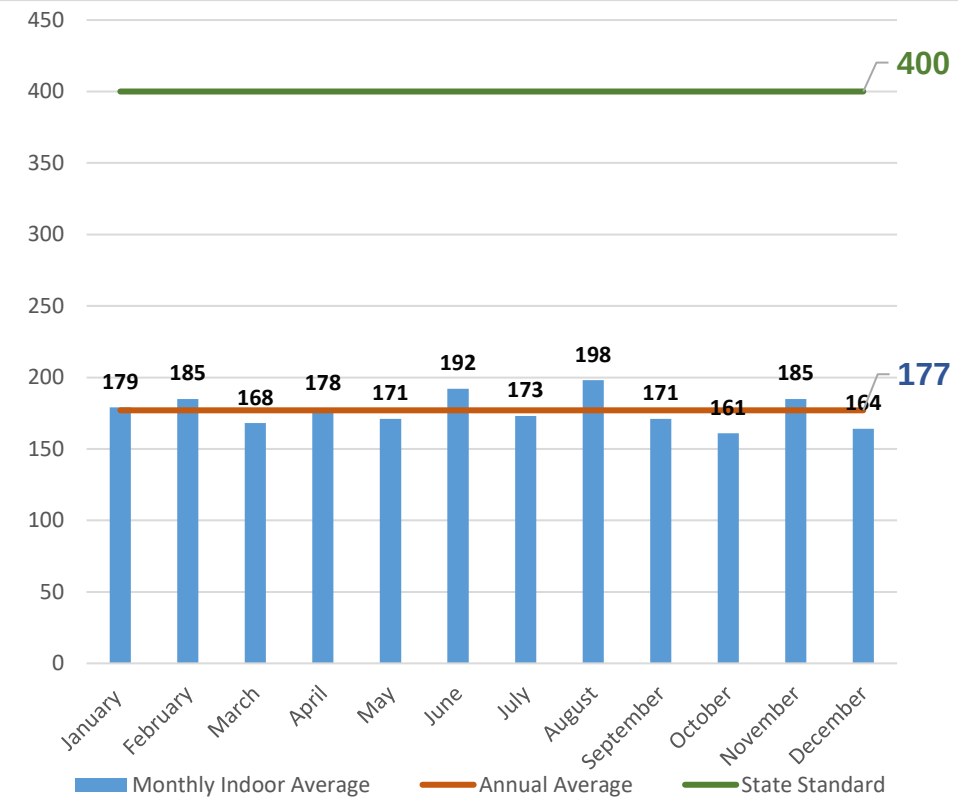
In Chapters II and III of our prior audit report (see Figure 2.1), we recommended that the division establish new requirements that are consistent with actual water use data. In response the division asked

Utah's four largest water conservancy districts to provide any data that might identify the actual demand for water experienced by local water systems. These districts provided information that seems to support the findings of our prior audit report that the standards that apply to indoor water use are too high.

The Weber Basin Water Conservancy District was one of the four entities that prepared a report. Figure 2.2 compares the indoor water use by a sample of Weber Basin customers to the state standards.

A study of Weber Basin customers suggest actual use is well below the state's source sizing standard.

Figure 2.2 At 177 Gallons, Average Daily Demand Is Less Than Half What the Standards Require. The data for a sample of Weber Basin customers show they use only 177 gallons per day per connection (gpd/conn) at the end of the system which is well below the state standard of 400 gpd/conn at the source of the system. However, it does not include unaccounted for water which does not explain the entire difference between the standard and the use.



Source: Weber Basin Water Conservancy District Memo on Secondary Water Use & Culinary Use Data for Peak Demand Source Sizing (March 16, 2017). Study of Potable Water Use by Customers with Secondary Water Connections (2013-2016 Average).

As Figure 2.2 shows, the average daily demand for indoor water for the entire year was 177 gallons per day per connection. However,

it is important to recognize that the data in Figure 2.2 is water consumption as measured by the curbside meter. To identify total systemwide water demand at the source, some allowance must be made for unaccounted for water use due to leaks and unmetered use. Unaccounted for water can vary significantly from one water system to the next. Local consulting engineers estimate that unaccounted for water equals about 16 percent of a water system's total demand. Thus, when considering the total demand placed on a water system, the data in Figure 2.2 suggests the state standard is nearly double the typical local demand for water. This data illustrates why there is broad concern that the indoor source sizing standard is too high.

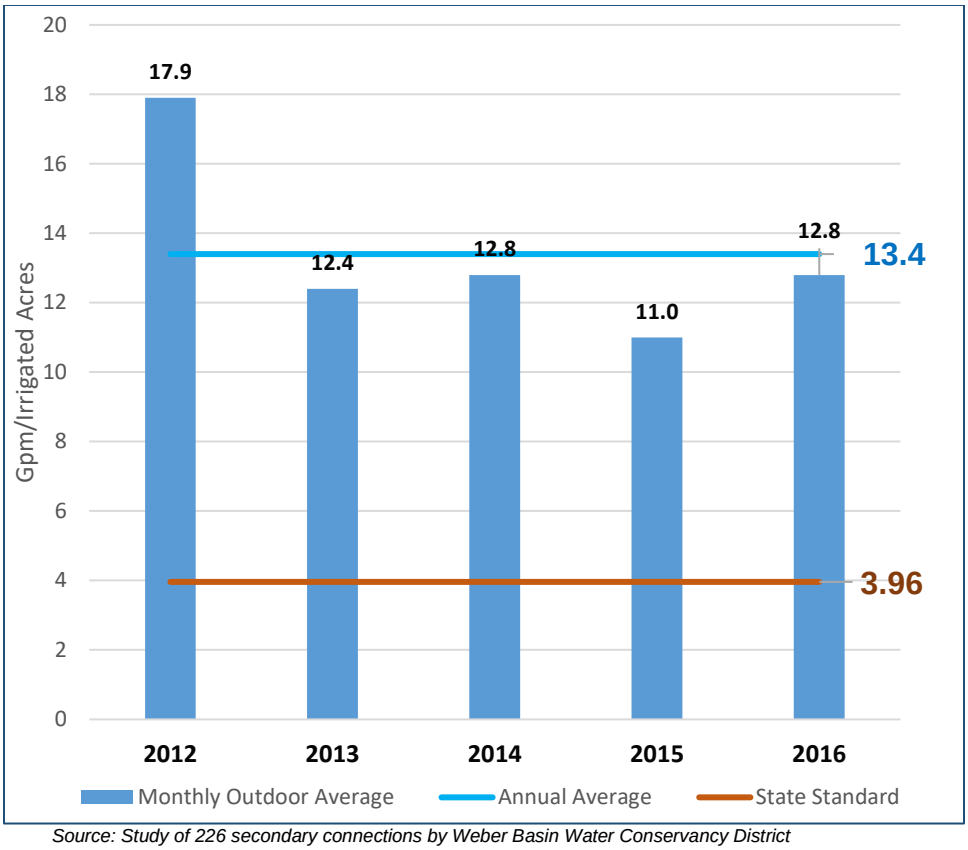
Actual peak use at some water systems in the Weber River Basin appears to be roughly half of the state standard.

Peak Day Indoor Standard Also Appears High. The data in Figure 2.2 also raises questions about the division's peak day standard of 800 gpd/conn. The peak day demand for indoor use is related to the indoor average use. Industry experts suggest, as a general rule of thumb, that the peak day demand for indoor water use is double the average indoor daily demand. Therefore, if the average indoor use averages 177 gallons then engineers would estimate the indoor peak use to be double that amount at 354 gpd/conn. Even when assuming another 16 percent for unaccounted for water, the actual use by these Weber Basin water systems would still be about half of the division's indoor peak day standard at 800 gpd/conn.

Standards for Outdoor Water Use Appear Too Low

The reports by the four largest water districts also cast doubt on the division's source sizing standards for outdoor water use. For example, another study by the Weber Basin Water Conservancy District (summarized in Figure 2.3) shows that the state's peak day standard is about one third of actual peak day demand by customers in its service area.

Figure 2.3 A Weber Basin Study Shows Actual Peak Day Demand for Outdoor Water Use Is Much Higher Than the State Standard. During the past five years, the average peak day demand equaled a flow of 13.4 gpm/irrigated acre. The state standards requires water flow of only 3.96 gpm/irrigated acre.*



Source: Study of 226 secondary connections by Weber Basin Water Conservancy District
** Data does not include unaccounted for water.*

A study of outdoor irrigation water in Weber River Basin suggests actual use is well above the state standard.

Figure 2.3 compares the state's sizing standard of 3.96 gpm/acre (for map zone 4 in Figure 1.2) to the actual draw from a secondary system devoted solely to outdoor irrigation. The actual use is over three times the state standard. However, as with Figure 2.2, Figure 2.3 only shows consumptive use measured at the curbside meter and does not include unaccounted use due to leaks and other unmetered use. As a result, the actual demand on the system is likely higher than the reported 13.4 gpm/acre.

Other water conservancy districts (Central Utah, Jordan Valley, and Washington County) obtained comparable results to those shown above for the Weber Basin Water Conservancy District. Even though they also did not include unaccounted for water, each reported their peak day and average daily demand for indoor water use were much lower than the state standards. Similarly, their outdoor use and peak

day use were much higher than the state standards. Although this information raises concern about the current source sizing standards, it does not show what level a new set of statewide standards should be. The obstacles to setting a new statewide standard are discussed in the follow section.

The water use data that is currently available is not adequate to establish a new set of statewide source sizing standards.

The Division Is Finding It Difficult To Develop New Statewide Standards

Although the evidence suggests that there are problems with the current standards, there is insufficient evidence to identify exactly what a new set of statewide standards should be. In fact, under current conditions it may not be possible to develop a new set of indoor and outdoor source sizing and storage capacity standards that would be appropriate for most water systems in Utah. For example, many systems do not collect peak day readings so it may be difficult to obtain the data needed to set a new peak day standard. In addition, the lack of reliable data and the fact that water systems have such different demands placed on them, raises questions as to whether all water systems should be subject to the same source sizing standards.

Information Regarding Peak Day Demand And Average Demand Is Difficult to Obtain

During both our 2014 audit and this follow-up review, we found it challenging to find water systems that gather the basic data needed to measure the source demands placed on a system. Although most have automated meters that can be used to collect this data, few water systems regularly do so.

Most Public Water Systems Do Not Monitor Peak Day Demand. Because meeting the peak day demand is so important to designing and maintaining a reliable water system, several water managers and consulting engineers have suggested that every water system in Utah should regularly monitor its peak day demand. Unfortunately, most water systems do not monitor their peak day demand. Although many are equipped with the advanced metering technologies that enable them to automatically measure peak day demand, few choose to do so. One reason may be that most water systems have plenty of surplus capacity and meeting the peak day demand is rarely an issue.

Due to System Losses and Unmetered Use, Water Demand Data Is Incomplete. We found that local water use figures are often understated because few water systems are tracking their unaccounted water use. Most every water system suffers some loss due to leakage and unmetered water use for public facilities such as parks and cemeteries. Water used for construction projects and system maintenance may also remain unaccounted. Estimates of unaccounted for water use range from 5 percent to 60 percent of a water system's total demand. The concern is that because the water lost to leaks and unmetered uses is often unknown, it can be difficult to identify a system's total demand for water. Furthermore, if the total demand is not known, it can be difficult to properly size a water system.

Local water use statistics may be understated due to leaks and unmetered water use.

Data Accuracy Remains a Concern

Before the Division of Drinking Water can set standards and evaluate the reliability of a water systems design, it will need to have confidence in the accuracy of the data it receives. In the past, the division has been forced to rely on annual water demand and peak day demand figures which in our view were not reliable. For example, the division surveyed local water systems and asked if they measured their peak day and average daily demand. Many systems reported that they did collect the data but were unwilling to share it because they were not confident in its accuracy. Thus, many systems were casting doubt on the reliability of their own data. Furthermore, the division did receive data from 28 systems. However, when we invited an outside consulting engineer to review the data, he found so many irregularities that he concluded that it also was unreliable.

In a separate audit report, we raise concerns about the accuracy of local water use data in general. In addition to this report, the Legislative Auditor General is issuing a companion report titled *A Follow-up audit of the Division of Water Resources' Projections of Utah's Water Needs*. That report provides an update on the efforts by the Division of Water Rights to gather accurate and reliable water use data from local water system. While that report describes the improvements in the reliability of Utah's local water use data, it still raises several concerns regarding the accuracy of much of the data.

As further improvements are made to the local water use data, we believe state agencies will be able to have greater confidence in the data they use to do the planning, forecasting and regulating they have

been asked to do. Presently, however, DDW does not appear to have access to sufficient, reliable data on which to develop a new set of source sizing standards.

Large Variation in Demand Observed Among Water Systems

Variation in demand among water systems is another obstacle to creating new source sizing standards. The data provided by Utah's four largest water districts show large variations in the rates of use among similar water systems. Their reports show that both indoor and outdoor water use varies according to the unique demographics and watering practices within each community. To demonstrate the variability in water use, Figure 2.4 shows the different levels of indoor water use among various communities in Utah.

Variations in the rate of water use makes it difficult to create a statewide source sizing standard.

Figure 2.4 Reported Indoor Water Use Varies Significantly from One Community to Another. The local water use data provided by four large water districts show communities have wide variation in the level of indoor water use. This could make it difficult to set a statewide standard.*

Water System	Reported Indoor Water Use gpd/conn.
Jordan Valley Water Retail Customers	164
Draper	167
Riverton	169
Weber Basin Water Conservancy District	177
Spanish Fork	185
Provo	188
Sandy	188
Washington	189
La Verkin	198
Kearns Improvement District	205
Orem	211
Toquerville	220
St. George	226
Taylorsville-Bennion Improvement District	243
Hurricane	268
Ivins	295

Source: Reports by Weber Basin Water Conservancy District, Jordan Valley Water Conservancy District, Central Utah Water Conservancy District, and Washington County District. Spanish Fork Water Use Reports.
** Does not include unaccounted water.*

The data in Figure 2.4 shows the extent to which indoor water use can vary among communities. For example, Hurricane and Ivins report using far more water than nearby Washington City. Draper and

Jordan Valley's retail customers reportedly use much less water than the nearby Taylorsville-Bennion district.

Local experts have identified several explanations for the differences in indoor water use among Utah communities. They include (1) differences in the age of the homes, with newer homes having more efficient appliances than older homes in established neighborhoods, (2) the different income levels among communities where residents can afford more water using appliances and where rate incentives are less effective, and (3) the differences in the community's commitment to water conservation. Due to these differences, it may be difficult for the division to develop statewide standards that would be appropriate for all water systems in Utah.

The Appeals Process Is Not an Effective Remedy For High Indoor Source Sizing Standards

In the past, the Division of Drinking Water suggested that even if its indoor use standards were too high, water systems had an opportunity to apply for a reduction in the requirement. However, the option of applying for a lower standard has not been an effective remedy for the indoor standard being too high. Even though the division clarified its process for applying for a reduction in the standards, as we recommended in 2014, few water systems have applied for a reduction in the last two years.

Few water systems are taking advantage of the opportunity to apply for a reduced source sizing standard.

The lack of appeals raises concern as to why municipalities are not appealing a standard that is too high. Our concern is that some water managers and city engineers have shown a tendency to prefer the higher standard even if it is well above the capacity their water systems require. Some prefer the excess capacity as a protection against unforeseen events. Furthermore, applying for a reduced standard requires collecting data a water system may not have. In the past, the division has required as much as three years of peak demand data to support a reduction in the standard. Consequently, to reduce their risk and save time, some water managers may default to the division's standard rather than appropriately sizing their systems.

The Division Clarified Its Process, But Few Appeals Were Filed

Our prior audit report suggested that the division's process for applying for a reduction may have been confusing and difficult. For this reason, we recommended four improvements to the Division of Drinking Water's appeals process. These are described in Figure 2.1 on page 6. Each of the recommendations relating to the appeals process have been addressed. However, in spite of the changes to the rules, few water systems have applied for a reduction in the standard.

Division Clarified Its Rules for Seeking a Reduction in the Source Sizing and Storage Capacity Standards. In March 2015, the division filed a rule change for its minimum sizing requirements, which became effective in July. Supplementing its rule change, the division provided written protocols and updated rule guidance on its website. These steps provided the additional guidance Recommendation 2 intended. Based on the content of the change, the division has effectively addressed the Chapter IV recommendations in Figure 2.1.

Water Systems Are Not Seeking Reductions in the Standard. Even after clarifying its process, the division reports that only two water systems have obtained a reduction in the standard since our 2014 audit was released. One was Lindon City that submitted three years of data to justify receiving a reduction in the peak day standard from 800 to 712 gpd. Another reduction was granted to Manorlands Water District which obtained a reduction to the indoor source sizing and storage standards for the summer cabins it serves during the summer months.

Most communities appear willing to abide by the division's relatively high indoor source sizing standards.

Instead of using the division's appeal process to right-size their water systems, most communities choose to abide by the division's relatively high indoor source and storage standards. To understand the underlying cause for this preference, we asked local water managers, consulting engineers, and state regulators why local decision makers would be willing to accept standards that require them to build a water system larger than their communities need. The following information summarizes our findings.

Local Water Systems Enjoy the Protection a State Standard Provides

Instead of applying for a reduction in the requirements, most municipalities have chosen to abide by the division's indoor source and storage standards. During our discussions with local consulting engineers, regulators and water managers, we learned of several reasons why no appeals have been made.

Local water managers and their design engineers can reduce their risk by defaulting to the state's high indoor source sizing standards.

- **Dire Consequences Occur If a System Runs Dry.** Several managers have expressed concern for the public outcry that often follows any interruption in water service. Consequently, some water managers feel a need to reduce the risk of system interruptions by building a larger system with more redundancy than necessary. Rather than trying to right-size their system by appealing to the division for a more appropriate standard, they find it easier to default to the higher state standard.

- **Oversized Systems Provide a Buffer During High Growth Periods.** Many communities are dealing with problems associated with local population growth. Some public officials and water managers believe keeping up with growing needs is a greater risk to their water system than avoiding excess capacity. Hence, they willingly build to larger standards than they would otherwise.

- **Systems Lack Sufficient, Accurate Water Use Data Necessary to File an Appeal.** Inadequate data raises the level of uncertainty regarding the system's true needs and its ability to perform. To avoid the risks presented by that uncertainty, some water system managers simply default to the state standard.

- **The Division of Water Rights Specifies Minimum Water Right Thresholds for Domestic Dwellings.** When developers supply water to homes in unincorporated areas, the Division of Water Rights requires them to supply 0.45 acre feet of water per year per domestic dwelling which equals 400 gallons per connection per day. That standard was selected, in part, to be consistent with the DDW's source sizing standards. Both agencies have expressed a willingness to reduce the requirement when presented with adequate data. However, it appears some

engineers and water managers have come to consider 400 gpd as the state's preferred standard.

While the division has implemented each recommendation from Chapter IV of our prior audit report, utilization of its appeals process has not increased. The dire consequences that water managers face if systems go dry as well as the lack of sufficient, accurate data are two obstacles not easily overcome within the division's current regulatory framework.

The Division Is Considering a New Approach to Regulating Source Sizing and Storage Capacity

The division understands that it would face significant challenges if it tried to revise its current standards. This has led division staff to consider the strategies used by other states to regulate the source capacity and storage of local water system. Their conclusion is that Utah would be better served if the division adopted a regulatory approach that includes some of the features found in the regulations used by other states. For example, several states, including Arizona, Colorado, and Washington do not rely on a set of statewide source sizing standards to insure water systems are reliable. Instead, these states rely on each water system to provide the state with data and analysis demonstrating that their system design will meet the needs of their community.

Rather than proscribing a minimum source capacity, several other states rely on the water systems to prove that they have a reliable system design.

To develop its new approach to regulation, the Division of Drinking Water will need to adopt new rules requiring each water system to monitor and report their peak day use, their average daily use, and their unmetered water use. We anticipate the cost of reporting this information should be minimal. Even so, we recommend the Legislature consider requiring water systems to annually report this new information while granting an exemption for small water systems.

Other States Require Municipalities to Demonstrate They Have Adequate Source Capacity

Our prior audit report describes several different approaches that other states have taken to regulate source sizing requirements of their water systems. Specifically, some states hold communities to a fixed set of design standards, as Utah currently does. Others place responsibility

on the municipality to work with engineers to develop specifications for their system.

Given the lack of data needed to develop a reliable standard, we support the division's proposal to require water systems to demonstrate that they have designed a water system that can meet the community's peak day and annual water demand. This is the approach taken by Arizona, Colorado and Washington.

- **Arizona:** For source flows, state regulations require the design engineer to show that the "safe yield" will be achieved by considering "…the full range of hydrologic conditions that might reasonably be expected to occur during the life of the project."

- **Colorado:** No specific requirements exist, other than that a professional engineer must design all water systems. The plans are submitted to the Water Quality Division's section for approval.

- **Washington:** Engineers must design water systems based on actual use records, water use from an analogous water system, or the water source sizing criteria, which advises multiplying the average day demand by a peaking factor of 2.0 to get a peak day demand.

Each water system should identify the minimum source sizing and storage capacity that best meets its local needs.

Each of these states focuses on requiring professional engineers to develop specifications for a system using the system's own peak day demand and annual demand data.

Proposed Regulations Would Shift the Focus from State Standards to Each Water System's Actual Needs

Incorporating some of the features of other state regulations, the Division of Drinking Water is contemplating a shift in focus away from a set of statewide standards. Instead, the focus would be on helping each public water system identify the minimum source sizing and storage capacity that best meets its local needs. The division would also no longer have separate standards for indoor and outdoor water system.

Division Would No Longer Consider Indoor and Outdoor Demand Separately. Instead, each water system would need to

identify their total demand for water, including both metered use at the connection and unaccounted for use. Figure 2.5 compares the features of their newly proposed regulations to the current regulations.

Figure 2.5 New Regulations Would Focus on Identifying Each Water System's Peak Day Demand and Annual Average Demand. Rather than defaulting to a state standard, the division wants each public water system to identify a system specific standard that meets its own source and storage capacity needs.

	Current Minimum Sizing Requirements (UAC R309-510)			Conceptual Future Regulatory Framework (Alternative to Current Standards)		
Source Capacity	Peak Day Demand	Indoor Use	800 gpd/ connection	**Peak Day Demand**	Combined Indoor & Outdoor Use	**System Specific** (use state or regional average if no system specific data)
		Outdoor Use	Varies by Zone			
	Average Yearly Demand	Indoor Use	400 gpd/ connection	**Yearly Demand**	Combined Indoor & Outdoor Use	
		Outdoor Use	Varies by Zone			
Storage Capacity	Average Day Demand	Indoor Use	400 gallons/ connection	*Options:* (1) Average Day Demand OR (2) Avg. Day during Peak Month	Combined Indoor & Outdoor Use	**System Specific** (use state or regional average if no system specific data)
		Outdoor Use	Varies by Zone			
	Fire Suppression	Determined by Fire Authority		Same		
	Emergency Storage	Determined by Water System		Same		

Source: The Division of Drinking Water

Whether all water systems should be subject to the new regulations is a question that remains unanswered. Very small water systems may lack meters or staff necessary to track their peak day demand. The division may need to provide special guidance on how to design water systems with fewer than a certain number of connections.

Local Water Systems Should Monitor their Own Demand For Water and Design their Systems Accordingly

Each water system in Utah should report its peak day demand, average daily demand and unaccounted for water use.

Rather than allowing local water systems to default to the Division of Drinking Water's current standards, we support the divisions proposal that each water system should take responsibility for right-sizing its public water system based on its own demand for water. To accomplish this goal, each water system will need to monitor and

report peak day demand, average daily demand and unaccounted water use. This is information that any well-managed water system should already be gathering. It should not be difficult for most larger public water systems to include this information in their annual water use report to the Division of Water Rights.

It appears the Division of Drinking Water has authority to require each public water system to monitor their peak day demand, their unmetered use, and total demand on an annual basis. In fact, at the request of the Division of Drinking Water, the Division of Water Rights already plans to add the peak day demand to its 2017 annual survey.

Because most water systems already have electronic meters, there should be little added cost to gathering peak demand, annual demand, and unaccounted for use.

There remains a concern for the fiscal impact that a new reporting requirement might have on water systems. However, we have been informed that most large water systems already have the technical capability to gather the required information. The cost of gathering the information from existing electronic metering systems should be incidental. Furthermore, if the data is used correctly, many water systems may be able to avoid building a larger system that they would otherwise. In that case, gathering the information and reporting it to the state could reduce the cost of Utah's water systems. Finally, because the division has not yet finalized its new approach to regulation and because this follow-up audit was limited in scope, we did not evaluate the financial impact that a new regulatory framework might have on the Division of Drinking Water or the Division of Water Rights.

To address any concerns about the division's authority to require the information and the associated costs, we recommend the Legislature consider requiring water systems to annually report peak day demand, unaccounted for use, and annual demand. The Legislature should also consider granting an exemption for small water systems that may find it difficult to compile this information.

Recommendations

1. We recommend that the Division of Drinking Water consider alternatives to a statewide source sizing requirement and implement a process placing greater responsibility on municipalities to determine appropriate source sizing specifications.

2. We recommend that the Division of Drinking Water require that public water systems monitor and report their peak day source demand, average annual demand, and unaccounted for use on an annual basis.

3. We recommend that the Legislature consider adopting legislation requiring that the peak day source demand, total annual demand, and unaccounted for demand be added to the annual water use reports submitted by public water systems to the Division of Water Rights.

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Agency Response

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State of Utah

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Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF DRINKING WATER
Marie E. Owens, P.E.
Director

December 7, 2017

John M. Schaff, CIA Auditor General
315 House Building, Capital Complex
PO Box 145315
Salt Lake City, Utah 84114-5315

Dear Mr. Schaff:

The Division of Drinking Water would like to express our deep appreciation for the extensive work the Legislative Auditors have put into this follow-up report. They have spent countless hours talking with the Division, reaching out to various public water systems, reviewing data, and participating in stakeholder groups as we have all worked to correctly characterize the current situation and find a suitable path going forward. We have found the auditors to be highly competent and professional. We generally agree that the findings presented in this report are accurate. In this letter we would like to provide additional information, the Division's perspective, and anticipated steps for the future.

The Division of Drinking Water's mission is to protect public health by ensuring the safe quality and the adequate supply of drinking water to the citizens of Utah. This is done, in part, by establishing construction standards for safe and reliable drinking water infrastructure. While our purpose naturally supports other state water objectives such as growth, sustainability, prosperity, and water conservation, we are uniquely obligated to protect public health. We understand other state water agencies have aligned their standards for water quantity to the Division's sizing requirements. However, our concern remains primarily on the impact these requirements have on the continuous supply of drinking water.

The December 2014 audit report recommended that the Division update its sizing standards to reflect actual use. After extensive effort by both the Division and the Auditors, it has become apparent that the actual data does not support merely resetting the numbers. What was found from the available data is the following:

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No Consistent Peaking Factor
The data received from select large systems showed there is not a consistent peaking factor that can be applied to average daily use to account for the peak day demand in lieu of actually collecting the data. The Division is uncomfortable continuing to use the two-fold peaking factor for the entire state and recommends an individual system strategy instead.

Insufficient Data on Unaccounted for Water
There is very little, if any, actual data on unaccounted for water. This is a significant component in the overall amount of water needed at the source to have enough to meet the actual use by the consumer. This audit report recognizes there is a large range (5% to 60%) of water that may be lost (due to leaks) or unmetered (such as fire hydrants or park irrigation). The Division supports assisting water systems to better quantify this consumption and requiring water systems to report on it yearly.

Inconsistent Average Daily Use Number
While the report used Weber Basin Water Conservancy District data as an example, the complete dataset from the large systems showed a spread from 158 gallons per day per connection (gpd/conn) to 243 gpd/conn for strictly indoor use. The Division staff also investigated the indoor use numbers reported in the 2016 statewide Water Use Survey (narrowed to 20 applicable systems) which showed a spread from 132 gpd/conn to 938 gpd/conn. This discrepancy expands when outdoor water use is included. As a result, the Division recommends a system specific strategy over the selection of a new statewide number.

The report recognized that the recommendations may be overly difficult and costly for small water systems to comply with when it states “the legislature should also consider granting an exemption for small systems…” (pg. ii). The Division regulates over 1,000 public water systems. Of those, only 110 systems serve communities over 3,300 residents. Systems serving less than 500 residents are considered very small or non-community. This represents approximately 75% of the state’s public water systems. The Division would like to make it clear that implementing these suggestions will only apply to 10 to 25% of the water systems even though they all need sizing requirements to protect public health. It is our hope that once the larger systems are required to submit actual data we will be able to use that information to provide guidance to the remaining small water systems.

The report also concluded that cost of the requirements to the applicable water systems would be “incidental” (pg. 19). The Division expects the relative cost to comply for the system to increase as the system size decreases. However, we are not confident the cost to even the large and medium size systems will be incidental.

Finally, the report also indicated that it “did not evaluate the financial impact that [the] new regulatory framework might have on the Division of Drinking Water” (pg.19). This was due, in part, to the fact that the framework is not yet finalized. However, it is important to note that this

cost will not be negligible. In order to implement this strategy, the Division will need to develop space in its database to track system specific numbers, provide training and oversight for the program, conduct engineering reviews of the data submitted, and maintain implementation procedures. The personnel resources alone will be significant. The Division requests the legislature appropriate funds to cover these costs if they approve the report recommendations.

Below are the Division's specific responses to the recommendations presented in the report.

Recommendation #1 Response

The Division provided the information presented in the report on the proposed new regulatory framework and is comfortable accepting this recommendation. The Division intends to continue stakeholder collaboration as we finalize some of the details of this new strategy. We would also like to check the statewide 2018 water use data submitted by the public water systems against the new strategy before we finalize a rule change proposal. This data will be available by July of 2019.

Recommendation #2 Response

The Division agrees that public water systems will need to be required to collect, validate, and report the necessary water use data to the state in order to successfully implement the first recommendation and other state water policies. This could be done through drinking water rules or a variety of other mechanisms. We anticipate guidance is needed for water systems to accurately determine peak day numbers and characterize the unaccounted component of their usage. The Division will continue working with the Divisions of Water Resources and Water Rights to provide this assistance. We request clarification from the legislature on which state water agency they would like to create and enforce this requirement.

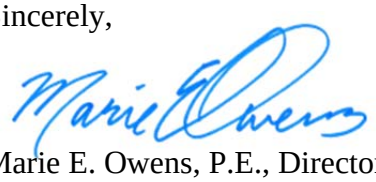
Recommendation #3 Response

Through the stakeholder work the Division has done, we expect pushback from many public water systems on a rule change implementing a data reporting requirement including the criticism that the cost to them would be an unfunded mandate. The Division supports this recommendation that the legislature provide a clear directive through legislation requiring public water systems to collect, validate, and report accurate water use information as cited. We further request that this legislation identify which state water division they prefer to implement and enforce this requirement and appropriate funding to that division to develop and maintain this new state regulation.

The Division of Drinking Water recognizes the importance of these issues to the continued growth and prosperity of Utah. We are available to meet with any legislative committees, individual legislators, and other state officials to discuss any of the items presented in this audit follow-up report and this response letter. Please contact me directly at mowens@utah.gov or (801) 536-4207.

We are committed to ongoing collaboration with all stakeholders in facilitating a timely implementation of the recommendations presented and to the continued protection of the health and wellbeing of the citizens of Utah and their drinking water.

Sincerely,



Marie E. Owens, P.E., Director
Division of Drinking Water
Utah Department of Environmental Quality