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DIVISION OF WATER RESOURCES

WATER WELL INSPECTION PROGRAM



MAY 2019

PERFORMANCE AUDIT

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May 24, 2019

DIANNE E. RAY, CPA
—
STATE AUDITOR

Members of the Legislative Audit Committee:

This report contains the results of a performance audit of the Water Well Inspection Program within the Division of Water Resources at the Department of Natural Resources. The audit was conducted pursuant to Section 2-3-103, C.R.S., which authorizes the State Auditor to conduct audits of all departments, institutions, and agencies of state government, and Section 2-7-204(5), C.R.S., which requires the State Auditor to annually conduct performance audits of one or more specific programs or services in at least two departments for purposes of the SMART Government Act. The report presents our findings, conclusions, and recommendations, and the responses of the Division of Water Resources.

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REPORT HIGHLIGHTS



WATER WELL INSPECTION PROGRAM PERFORMANCE AUDIT, MAY 2019

DEPARTMENT OF NATURAL RESOURCES DIVISION OF WATER RESOURCES

CONCERN

The audit identified concerns about whether the Well Inspection Program (Program) is fundamentally designed and operating to accomplish its purpose of protecting Colorado's water resources and the public health and safety. The Program does not effectively use a risk based approach to target the use of its inspectors, does not focus well inspectors' time on observing key phases of well construction, does not routinely use reports on completed wells to help verify compliance with construction requirements, and does not ensure that monies in its cash fund are used only for Program operations.

- The Program does not have a strategy for getting the maximum monitoring benefits from its three inspectors and \$300,000 in annual funding. The Program inspected only 15 of the 206 wells (7 percent) it considers to have been high-risk in Fiscal Year 2018, but inspected 295 low-risk wells. We estimate the Program spent about \$320,000 inspecting low-risk wells.
- Most well inspections conducted in Fiscal Year 2018 did not inspect what the Program considers to be a key phase of well construction. Of the 310 wells inspected that year, 209 (67 percent) were never inspected for any key phase, despite some wells being inspected multiple times. One well was inspected 23 times that year without inspectors observing *any* key phase of well construction. Contractors or well owners sometimes obstruct inspections, but inspectors do not notify the Board of Examiners if they are denied access to a well.
- The Division does not monitor or enforce the submission of "work reports" contractors are required to submit when well construction is complete and does not use submitted reports to help monitor adherence to construction requirements. For example, the Division does not verify that the depth of the constructed well as noted on the work report agrees with the permitted depth.
- The Division incorrectly paid about \$75,000 from the Program's cash fund for salary expenses of staff not conducting Program work in Fiscal Year 2018. Due to the incorrect charging of salaries, there were insufficient monies in the cash fund to cover all Program expenses, so the Division used General funds to pay for 76 percent of the Program's \$40,000 in vehicle costs that year.

BACKGROUND

- Water wells provide Colorado residents access to water directly from underground aquifers, and are common where access to water through a municipal utility is not available.
- Constructing a new well requires a permit from the Division of Water Resources (Division), and construction contractors must be licensed through the Board of Water Well Examiners (Board). In Fiscal Year 2018, about 4,000 new wells were constructed.
- In 2003, the General Assembly created the Program within the Division to monitor well construction [Section 37-91-113, C.R.S.]. In Fiscal Year 2018, the Program's three inspectors conducted inspections of 310 wells constructed that year.
- The Program is funded by the Well Inspection Cash Fund, which consists of contractor licensing fees, a portion of well permit fees, and any fines issued by the Board. Program expenses are about \$300,000 per year.

KEY RECOMMENDATIONS

The Division agreed with our recommendations to:

- Require advance notice of key construction phases for all wells.
- Prioritize inspection of high-risk wells and of key phases of construction.
- Use work reports to monitor compliance with construction requirements.
- Improve financial controls over the Well Inspection Cash Fund.



CHAPTER 1

OVERVIEW

Water wells provide Colorado residents and business owners access to water directly from underground aquifers, and are common in more rural parts of the state where access to water through a municipal utility is not available. Wells can supply water for single-family domestic use, commercial businesses, domestic and livestock watering, crop irrigation, and can also be used to monitor groundwater levels and quality, among other uses. By law, every new water well in the state that diverts groundwater, which is any water not visible at the surface, must have a permit issued by the State Engineer, who is also the head of the Division of Water Resources (Division) within the Department of Natural Resources.

According to the non-profit American Ground Water Trust, which promotes public awareness of the environmental and economic importance of groundwater, proper construction of water wells is imperative to protect groundwater because drilling a well provides a direct line for bacteria and other contaminants. In 2003, the General Assembly created the Well Inspection Program to monitor well construction [Section 37-91-113, C.R.S]. In creating the program, the General Assembly stated in its legislative declaration that, “It has been established by scientific evidence that improperly constructed wells, improperly abandoned wells, and improperly installed pumping equipment can adversely affect groundwater resources and the public health, safety and welfare...[and] the periodic inspection of well construction and pump installation are essential for the protection of the public health and the preservation of groundwater resources” [Section 37-91-101(1), C.R.S.].

WELL INSPECTION PROGRAM

The Well Inspection Program, within the Division, consists of a chief well inspector who occasionally performs field inspections, and two other well inspectors whose primary responsibility is to inspect wells for adherence to minimum construction standards and any additional conditions on the well permits, such as requiring a contractor to construct the well within 200 feet of the location specified on the permit. While statute does not require that all wells be inspected, it does specify that, “Inspectors shall annually spend a majority of their time conducting field inspections and a minority of their time preparing and evaluating reports and related office work” [Section 31-91-113(3), C.R.S.]. In Fiscal Year 2018, inspectors inspected 310 out of about 4,000 wells that were constructed that year.

Inspectors’ other duties include investigating complaints, providing public education and outreach, and providing staff support to the Board of Examiners of Water Well Construction and Pump Installation Contractors (Board).

The Well Inspection Program is funded by the Well Inspection Cash Fund, which consists of well contractor licensing fees, a portion of well permit fees, and any fines issued by the Board. Program expenses are about \$300,000 per year.

BOARD OVERSIGHT OF WELL CONSTRUCTION

The Board has a responsibility to, “Assure protection of groundwater resources and the public health” [Section 37-91-104(1)(l)(I), C.R.S.]. Statute charges the Board with promulgating the rules for well construction, setting the standards for well construction contractor licensing [Section 37-91-104(1), C.R.S.], and establishing continuing education requirements for well construction contractors [Section 37-91-105(7), C.R.S.]. The Board relies on the Division to refer matters of noncompliance to it so that it can take appropriate enforcement action. The Board has authority to act on noncompliance by, among other things, issuing fines between \$50 and \$1,000 on contractors who are not compliant with licensing or well construction requirements; suspending or revoking a contractor’s license; and ordering the investigation, abandonment, repair, drilling, redrilling, casing, recasing, deepening, or excavation of a well [Sections 37-91-104 and 37-91-108, C.R.S.].

The Board consists of five members. Three members are appointed by the Governor, two of whom are required to be well construction or pump installation contractors with at least 10 years’ experience and the other an engineer or geologist with 10 years’ experience in water supply and well construction. One member is the State Engineer or a designated representative. The final member is a representative of the Colorado Department of Public Health and Environment designated by the executive director of that department. Board members serve 4-year terms.

AUDIT PURPOSE, SCOPE, AND METHODOLOGY

We conducted this performance audit pursuant to Section 2-3-103,

C.R.S., which authorizes the State Auditor to conduct audits of all departments, institutions, and agencies of the state government, and Section 2-7-204(5), C.R.S., the State Measurement for Accountable, Responsive, and Transparent (SMART) Government Act. The audit was conducted in response to a legislative request, which expressed concerns regarding the effectiveness and efficiency of the Well Inspection Program. Audit work was performed from October 2018 through May 2019. We appreciate the assistance provided by the management and staff of the Division of Water Resources during this audit.

We conducted this audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The objectives of the audit were to evaluate whether (1) the Well Inspection Program has a risk-based approach to selecting wells to inspect, times its inspections to observe key processes, uses information it receives through contractors' work reports to monitor well construction, has processes to handle complaints brought by the public, and has adequate controls over Well Inspection Program expenses; and (2) the Board has processes to ensure that deficiencies with well construction and pump installation which were identified during inspections or through public complaints, are corrected.

To accomplish our audit objectives, we performed the following audit work:

- Reviewed applicable statutes, rules, and Department policies and procedures.
- Interviewed Division and Program management and staff, and Board members. Conducted an inspection ride-along with each inspector.
- Worked with the Division to categorize high-risk and low-risk wells

and to identify the key construction phases that are important to determine that a well is properly constructed.

- Reviewed inspection reports and associated permit, advance notice, and work report data for all 310 wells inspected in Fiscal Year 2018.
- Reviewed all 28 complaint and compliance matters referred to the Board in Fiscal Year 2018 and associated Board minutes and fines.
- Analyzed Well Inspection Program vehicle expense detail and timekeeping data for Fiscal Years 2016 through 2018.

We planned our audit work to assess the effectiveness of those internal controls that were significant to our audit objectives. With respect to the Well Inspection Program's handling of public complaints and the Board's processes for ensuring that deficiencies are corrected, we did not have any findings or recommendations. Our conclusions on the effectiveness of controls related to the other objectives, as well as specific details about the audit work supporting our findings, conclusions, and recommendations, are described in the remainder of this report.

A draft of this this report was reviewed by the Division. We have incorporated the Division's comments into the report where relevant. The written responses to the recommendations and the related implementation dates are the sole responsibility of the Division.



CHAPTER 2

WELL INSPECTION PROGRAM OPERATIONS

The General Assembly created the Well Inspection Program (Program) within the Division of Water Resources (Division) to monitor construction of water wells to protect groundwater resources across the state for the public health, safety, and welfare. One of the Program's primary functions, under statute, is to conduct on-site inspections of wells. Our audit work evaluated the effectiveness of the Division's scheduling of well inspections and its use of reported information to fulfill its purpose within statutorily authorized resources. Specifically, we assessed the Division's approach to targeting those wells posing the highest

risk to public health and safety when determining which wells to inspect; its approach to timing inspections to allow inspectors to observe the most critical phases of well construction; its use of required reports submitted by well contractors when well construction is complete, to help in monitoring efforts; and its controls for ensuring that the Program's expenses are paid from the cash fund the General Assembly created for such purposes.

We found problems with the Program's underlying approach to protecting water resources and the public. As described in this chapter, the Division does not have a strategy for getting the maximum monitoring benefit from the Program's three inspectors and about \$300,000 in annual funding. The Division does not effectively use a risk-based approach to target the use of the Program's inspectors on inspecting wells deemed to be high-risk, it does not focus inspectors' time on observing key phases of well construction, it does not routinely use reports on completed wells to help verify adherence with construction requirements, and it does not ensure that the monies in its cash fund are used only for Program operations.

We have made recommendations for the Division to manage its resources more strategically, with an overarching goal of improving the Program's effectiveness. However, our findings raise concerns about whether the Program is fundamentally designed and operating to accomplish its purpose of protecting Colorado's water resources and the public health and safety, which is a policy issue that the General Assembly may wish to consider.

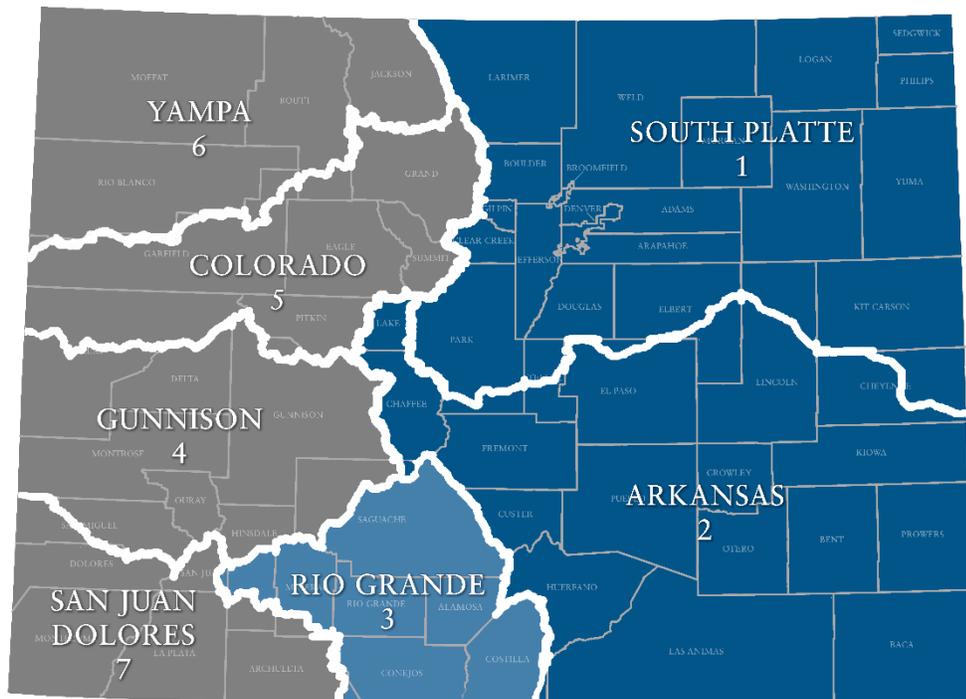
RISK-BASED APPROACH TO INSPECTIONS

Statute charges the State Engineer with issuing permits to allow the construction of a water well and the State Engineer can include conditions on a permit such as a requirement that a well contractor provide advance notice of construction. According to statute, a permit to construct a well will expire 1 or 2 years after it is issued, depending on the permit type. This means that a well can be constructed any time during the 1- or 2-year permit validity. To provide inspectors with more specific information about when some wells will be constructed, the Board of Examiners of Water Well Construction and Pump Installation Contractors (Board) requires that well construction “comply with the conditions of approval of the valid well permit, including any applicable condition that the well construction and/or pump installation contractor provide advance notification to the State Engineer prior to well construction...” [2 CCR 402-2, Rule 6.2.2.1].

The State Engineer adds a requirement to some well permits for contractors to provide at least 24 hours of advance notice from the date that construction of the well will begin. Contractors can access an online form where they input the permit information and expected date that construction will commence. This form automatically creates an advance notice list. Notice of when construction will begin is important because inspections need to occur while the well is being constructed; once a well is completed, an inspector can no longer see key aspects of construction, such as the well’s grout because it is obscured by other components of the well.

The Division employs three well inspectors—two field inspectors whose primary job is to conduct well inspections and a Chief Well Inspector, who oversees the Program and occasionally conducts inspections. The Division has assigned each of the field inspectors to specific water divisions, as shown in the map below:

EXHIBIT 2.1. MAP OF WATER DIVISIONS BY INSPECTOR



SOURCE: Office of the State Auditor compilation of map and water division information provided by the Division of Water Resources.

Water divisions 1 and 2 (*dark blue*) are assigned to Inspector A; water division 3 (*light blue*) is assigned to Inspector B; and the remaining four water divisions (*gray*) are not assigned to any inspector. We discuss problems with how the unassigned divisions are covered later in the finding.

Inspecting a well is intended to help ensure that the well is constructed according to construction standards. It is important that wells are constructed properly to protect public health and groundwater resources. When inspectors identify a violation of construction rules during an inspection, they might discuss the violation with the contractor, conduct additional inspections to ensure that the contractor corrected the violation, or refer the violation to the Board for disciplinary action or a fine against the contractor.

Once construction is complete, contractors or property owners, as applicable, are required to submit a completion report (referred to as a

work report) to the Division. The Division received 4,462 work reports in Fiscal Year 2018 for wells constructed across each of the Division's seven water districts.

WHAT AUDIT WORK WAS PERFORMED AND WHAT WAS THE PURPOSE?

We reviewed permit, inspection, and advance notification data for all wells for which the Division received completion reports for wells constructed in Fiscal Year 2018 and information provided by the Division about wells that fall into high-risk categories. We interviewed Division management, staff, and the Board chair. We also spent a day in the field with each inspector. The purpose of our audit work was to determine whether the Division uses a risk-based approach to inspect wells to gain reasonable assurance that wells are constructed in compliance with standards.

HOW WERE THE RESULTS OF THE AUDIT WORK MEASURED?

A WELL INSPECTION PROGRAM SHOULD BE DESIGNED AND CARRIED OUT TO PROVIDE PUBLIC PROTECTION. According to Section 37-91-101, C.R.S., "It has been established by scientific evidence that improperly constructed wells, improperly abandoned wells, and improperly installed pumping equipment can adversely affect groundwater resources and the public health, safety, and welfare.... Therefore, the proper...construction...and abandonment of wells, the proper installation...of pumping equipment...and the periodic inspection of well construction and pump installation are essential for the protection of the public health and the preservation of groundwater resources."

THE WELL INSPECTION PROGRAM IS REQUIRED TO OPERATE WITHIN ESTABLISHED RESOURCES. Specifically, Section 37-91-113(1), C.R.S., states that inspections of well construction and pump installations are to be conducted within the resources provided through the Well Inspection Cash Fund. The cash fund is funded by permit, license, and application

fees, as well as by fines imposed by the Board of Examiners, and had an annual average of about \$275,000 in revenue over the last 3 fiscal years. Given that the Division issues about 5,000 permits annually and is expected to carry out the well inspection function within the resources of the Well Inspection Cash Fund, the Division should have a process to target its well inspections so that wells that pose the highest risk to public health and safety in the event of improper construction or abandonment are inspected in greater proportion than wells that pose lower risks.

WITH LIMITED RESOURCES, WELLS SHOULD BE PRIORITIZED FOR INSPECTION. The Division has no written policy outlining which wells are considered to be at highest risk and therefore should be prioritized for inspection. However, when we asked management and the Board which wells posed the highest risk, they were able to identify for us the following types of wells:

- **WELLS CONSTRUCTED IN THE LARAMIE-FOX HILLS AQUIFER.** The Laramie-Fox Hills aquifer is the deepest aquifer in the Denver Basin, covering a large area stretching from Weld County into El Paso County. It is also present north of the Denver Basin in the Cheyenne Basin of Weld and Morgan counties. Wells drilled in the Laramie-Fox Hills aquifer have special construction requirements due to naturally occurring coal seams above the aquifer. The specific requirements are intended to ensure that the well is constructed to prevent poor-quality water in the coal seams from contaminating the aquifer.
- **WELLS CONSTRUCTED WITH VARIANCES FROM CONSTRUCTION RULES.** When wells require a waiver of the construction rules based on unique circumstances of the well, a Division hydrogeologist must approve these variances prior to construction. For example, if due to the size of the land parcel where the well will be constructed, the well must be placed closer to a septic leach field than rule allows, the contractor must request a variance from the construction rules. The construction rules are intended to ensure the safety of the well, so when a contractor must deviate from these rules, there is a higher risk of problems

occurring that could ultimately affect the safety of the water.

- **WELLS CONSTRUCTED THROUGH MULTIPLE CONFINING LAYERS.** These wells penetrate more than one water source and have more construction requirements to prevent commingling of multiple aquifers. Each water source must stay confined through proper construction techniques.
- **WELLS CONSTRUCTED BY PROPERTY OWNERS.** Because property owners may lack familiarity with the construction rules, which are meant to protect the groundwater and the public, there is an increased risk that they will not fully adhere to all the rules.
- **WELLS CONSTRUCTED IN KNOWN CONTAMINATION AREAS.** Water supply wells constructed in areas of known water contamination have additional construction requirements to ensure that the well is drilled to an uncontaminated aquifer and to prevent cross-contamination among aquifers. For example, Rocky Mountain Arsenal, the former site of a chemical weapons manufacturing facility, is known to have contaminated water. The Division considers only those wells in known contamination areas to be high risk when they will serve as a water supply for drinking or irrigation, as opposed to wells used exclusively to monitor water quality. Wells used for water quality monitoring most often are completed in the shallowest aquifers, carry less risk of cross-contamination to deeper aquifers, and are therefore not categorized by the Division as high risk.

Division management reported that inspectors should prioritize inspections of high-risk wells but should not disregard low-risk wells. We evaluated the extent to which inspections of these high-risk well types were prioritized in Fiscal Year 2018.

WHAT PROBLEM DID THE AUDIT WORK IDENTIFY?

THE PROGRAM DOES NOT PRIORITIZE INSPECTIONS OF WELLS AT HIGHEST RISK OF ADVERSELY AFFECTING GROUNDWATER RESOURCES AND THE

PUBLIC HEALTH, SAFETY, AND WELFARE. Division records indicate that 206 of the 4,462 wells constructed during Fiscal Year 2018 were high risk, according to the categories described above. We found that the Program inspected only 15 of these high-risk wells (7 percent). Furthermore, none of the five high-risk wells that fit into more than one risk category (e.g., were both constructed through confining layers and had variances) were inspected. EXHIBIT 2.2 summarizes the number of wells constructed and the number inspected in Fiscal Year 2018, with information about high-risk wells highlighted in the dark gray row.

EXHIBIT 2.2. HIGH-RISK WELLS VERSUS LOW-RISK WELLS CONSTRUCTED AND INSPECTED FISCAL YEAR 2018			
TYPE OF WELL	NUMBER OF WELLS CONSTRUCTED	NUMBER OF WELLS INSPECTED	PERCENT INSPECTED
TOTAL—ALL WELLS	4,462	310	7%
Low Risk Total	4,256	295	7%
High Risk Total	206	15	7%
Laramie-Fox Hills	83	6	7%
Variances	45	2	4%
Multiple Confining Layers	68	7	10%
Property Owner Constructed	15	0	0%
Known Contamination Area	0	0	0%

SOURCE: Office of the State Auditor analysis of the Division of Water Resources' inspection and construction databases and information provided by the Division of Water Resources for high-risk wells constructed in Fiscal Year 2018.

WHY DID THIS PROBLEM OCCUR?

MANAGEMENT HAS NOT DEFINED HIGH-RISK WELLS IN POLICY. Although the Board and management were able to describe to us the types of wells they consider to be high risk and that should be prioritized for inspection, neither management nor the Board has defined in writing which types of wells are high risk. In addition, the inspectors identified another category of wells they consider to be high risk—those constructed by contractors who frequently violate construction rules. The inspectors told us that they prioritize such wells for inspection. Even though management agrees that contractors with more frequent violations are a concern, they are reluctant to include this as a risk category because they believe it could have a negative impact on a contractor's reputation and business.

However, the Division would not need to publicly name these contractors. Rather, the Division could establish a threshold number of violations over a given period of time, beyond which it would consider the contractor to be high risk. For example, the Division could define a contractor as high risk if the contractor had more than four violations of construction standards over 2 years.

MANAGEMENT HAS NOT ADEQUATELY DIRECTED INSPECTORS TO TARGET HIGH-RISK WELLS. Management told us that it has given general verbal guidance to inspectors to focus on (1) their assigned divisions; and (2) the advance notice system for wells within those divisions when planning their inspection schedules, but allows inspectors to determine what they are going to do in any given day, including where and how far they drive. Based on interviews with inspectors and observations when auditors spent a day with each inspector, they often determine which wells they will visit based in part on where they choose to drive that day. For example, when auditors accompanied an inspector for a day, he drove a total of 6 hours and observed only one well that was under construction. This haphazard approach to conducting on-site inspection of wells does not appear to be an efficient use of the Program's limited resources.

Furthermore, management has not established any written policies to direct inspectors to prioritize inspections of high-risk wells. As a result, although both inspectors appear to focus on inspections within their assigned divisions, our analysis shows they do not deliberately target inspections of wells in the high-risk categories or those for which they receive advance notice. Specifically:

- One inspector told us that he focuses on coverage of contractors (i.e., trying to inspect wells constructed by a number of different contractors rather than only inspecting wells built by one or two contractors) within his two assigned water divisions. He conducted inspections of only 17 of the 193 high-risk wells in his assigned water divisions (9 percent) in Fiscal Year 2018.

- The other inspector told us that he focuses on coverage of all wells in his one assigned water division. He inspected three of the seven high-risk wells in his water division (43 percent), but also inspected 171 low-risk wells constructed in Fiscal Year 2018.
- Within the four water divisions for which no inspector is assigned, the inspectors collectively inspected only one of the 11 high-risk wells constructed in Fiscal Year 2018 (9 percent) and two of the 740 low-risk wells constructed. Neither of the two field inspectors has been instructed to routinely inspect high-risk wells in the other four water divisions where there is no assigned inspector. Inspections in these divisions occur only when directed by the Chief Well Inspector.
- The inspectors collectively inspected only 8 percent of the 88 high-risk wells for which they had received advance notice in Fiscal Year 2018, as discussed below.

MANAGEMENT DOES NOT MONITOR INSPECTORS' COVERAGE OF HIGH-RISK WELLS. Management does not track the number or percentage of high-risk wells inspected, although it does review quarterly reports on the total number of inspections completed by each of the two inspectors and reports that information to the Board.

THE DIVISION DOES NOT ALWAYS OBTAIN ADVANCE NOTICE OF WELL CONSTRUCTION. We found that the Division did not have advance notice for 4,093 of the 4,462 wells constructed in Fiscal Year 2018 (92 percent) and therefore lacked information it needed to target inspections. Specifically, the Division did not have advance notice for 118 of the 206 high-risk wells (57 percent) and for 3,975 of the 4,256 low-risk wells constructed (93 percent). To date, the Division does not mandate advance notice of construction for most types of wells, as follows:

- The Division has notified permit staff to include advance notice conditions on the permits of wells in two of the high-risk categories—those in the Laramie-Fox Hills aquifer and those with variances approved at the time of permitting, but it has not done the same for the other three high-risk categories—multiple confining layers,

property owner constructed, or constructed in a contamination area.

- The Division does not require advance notice when a well is determined to be high risk after the permit is issued, which most commonly occurs related to variances or drilling through multiple confining layers. The Division reports that it often does not know at the time it issues a well permit that a variance will be needed or that a well will be constructed through multiple confining layers, so the advance notice requirement is not included on the permit in these cases.
- The Division does not require advance notice for *all* types of low-risk wells, but does include it for some wells that are considered low risk.

Requiring advance notice for all wells is important to both ensure that all high-risk wells can be prioritized for inspection, as well as to allow inspectors to time inspections for key phases of the construction process, even for those low-risk wells the Program intends to inspect. Discussion of the timing of inspections is included in the next finding.

THE DIVISION DOES NOT TRACK OR ENFORCE COMPLIANCE WITH THE ADVANCE NOTICE REQUIREMENT. At the time of our audit, the Division did not have processes in place to comprehensively track non-compliance with the advance notice requirements. Although inspectors occasionally noted in inspection reports when contractors failed to provide the notice (we found this in two of the Fiscal Year 2018 inspection reports), the Division had no systematic method to verify compliance, such as by reconciling completion reports submitted by contractors to its list of permits requiring advance notice. As of February 2019, the Division created a report that performs this reconciliation and found that contractors failed to provide required advance notice about 29 percent of the time in Calendar Year 2018. However, the report does not specify whether certain contractors consistently fail to submit notice. We analyzed the Division's data and identified 31 contractors who failed to submit advance notice in Calendar Year 2018, 10 of whom failed to properly provide any of the advance notice required, and five of whom failed to submit notice at least eight times that year.

Furthermore, we found that the Division was not notifying the Board of noncompliance with the advance notice requirement (such as the two instances noted in inspection reports) until it instituted its reconciliation reporting in February 2019. Providing advance notice is a condition of the permit, and if a contractor fails to submit advance notice they have violated the permit. Reporting violations to the Board gives it the opportunity to consider enforcement action, such as issuing fines or taking action on the contractor's license.

WHY DOES THIS PROBLEM MATTER?

Without a risk-based inspection process to ensure inspection of the majority of high-risk wells, the Program may not be as effective as it could be at identifying or mitigating risks associated with these wells. The purpose of conducting inspections is to assess the well construction and materials, identify violations of construction rules and permit requirements, notify the contractor of such violations for correction, and notify the Board if further action is needed. Wells within the five high-risk categories identified by management and the Board have an increased likelihood that any improper construction or installation of pump equipment will lead to water contamination. For example, wells improperly constructed in the Laramie-Fox Hills aquifer may allow contamination from the nearby coal seam to reach other aquifers in the Denver and Cheyenne Basins, thereby contaminating the groundwater supplied by those aquifers.

Further, inspections are the primary means by which the Board can be made aware of violations that may affect groundwater resources or public health, allowing them to compel correction and issue sanctions. A risk-based inspection process would focus limited inspection resources to discover and correct construction flaws on those wells posing the highest risk to public health and groundwater thereby providing the greatest amount of protection for public health and safety.

The lack of process to define and target inspections of high-risk wells results in the Program diverting resources to inspections of wells it considers to be lower risk. In Fiscal Year 2018, we estimate that the Program had about \$320,000 in inspection costs and completed 760 inspections (some of the 310 wells inspected in Fiscal Year 2018 were inspected multiple times), for an average cost per inspection of \$429. Of the 760 inspections, 97 percent (739 inspections) were of low-risk wells while only about 3 percent (21 inspections) were of high-risk wells. This means the Program spent \$320,000 inspecting low-risk wells, which could have been targeted to inspections of high-risk wells.

RECOMMENDATION 1

The Division of Water Resources should implement a risk-based water well inspection program by:

- A Defining in a written policy the types of wells considered to be at highest risk of affecting groundwater resources or the public health, safety, and welfare in the event of improper construction or pump installation, and that should be prioritized for inspections. The policy should clarify whether wells constructed by contractors who routinely violate construction rules are considered high risk for the purposes of prioritizing inspections.
- B Implementing a written policy that prioritizes high-risk well inspection, including any wells that fall outside of the water divisions assigned to the field inspectors.
- C Implementing a process of monitoring inspectors' coverage of high-risk wells.
- D Requiring advance notice of all wells through the Division's online notification system and communicating this requirement to all licensed contractors and property owners who construct their own wells.
- E Expanding processes to monitor contractor compliance with advance notice requirements so that the monitoring identifies contractors who repeatedly fail to provide notice and notify the Board of Examiners of Water Well Construction and Pump Installation Contractors of the results for potential enforcement action.

RESPONSE

DIVISION OF WATER RESOURCES

A AGREE. IMPLEMENTATION DATE: FEBRUARY 2020.

The Division of Water Resources (DWR) will develop and adopt a written policy that addresses RECOMMENDATIONS 1A, 1B, and 1C, with concurrence of the Board of Examiners. The policy will identify the types of wells considered to be at highest risk of affecting groundwater resources or the public health, safety, and welfare (“high-risk wells”), and the basis for them being identified as such.

The policy will set the standard that high-risk wells should be inspected at a higher rate than other types of wells and set a quantitative rate for those inspections. In doing so, the policy will recognize that the total number of wells constructed each year and the number of high-risk wells constructed each year will vary. The policy will set out a process for the Chief Well Inspector to set the priorities of the Well Inspectors regarding the number of high-risk wells to inspect during a given time period. The policy will require monitoring of well inspectors’ activities through inspection data capture to ensure that the quantitative rate identified in the policy is met. The policy will clarify the basis on which wells constructed by contractors who routinely violate construction rules are considered high risk.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

B AGREE. IMPLEMENTATION DATE: FEBRUARY 2020.

The Division of Water Resources (DWR) will develop and adopt a written policy that addresses RECOMMENDATIONS 1A, 1B, and 1C,

with concurrence of the Board of Examiners. The policy will identify the types of wells considered to be at highest risk of affecting groundwater resources or the public health, safety, and welfare (“high-risk wells”), and the basis for them being identified as such.

The policy will set the standard that high-risk wells should be inspected at a higher rate than other types of wells and set a quantitative rate for those inspections. In doing so, the policy will recognize that the total number of wells constructed each year and the number of high-risk wells constructed each year will vary. The policy will set out a process for the Chief Well Inspector to set the priorities of the Well Inspectors regarding the number of high-risk wells to inspect during a given time period. The policy will require monitoring of well inspectors’ activities through inspection data capture to ensure that the quantitative rate identified in the policy is met. The policy will address the dispatching of well inspectors to high-risk wells that are being constructed outside of the inspectors’ assigned water divisions.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

C AGREE. IMPLEMENTATION DATE: FEBRUARY 2020.

The Division of Water Resources (DWR) will develop and adopt a written policy that addresses RECOMMENDATIONS 1A, 1B, and 1C, with concurrence of the Board of Examiners. The policy will identify the types of wells considered to be at highest risk of affecting groundwater resources or the public health, safety, and welfare (“high-risk wells”), and the basis for them being identified as such.

The policy will set the standard that high-risk wells should be inspected at a higher rate than other types of wells and set a quantitative rate for those inspections. In doing so, the policy will recognize that the total

number of wells constructed each year and the number of high-risk wells constructed each year will vary. The policy will set out a process for the Chief Well Inspector to set the priorities of the Well Inspectors regarding the number of high-risk wells to inspect during a given time period. The policy will require monitoring of well inspectors' activities through inspection data capture to ensure that the quantitative rate identified in the policy is met.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

D AGREE. IMPLEMENTATION DATE: AUGUST 2020.

The Division of Water Resources will develop and adopt a written policy that addresses RECOMMENDATIONS 1D, 2A, and 2B, with concurrence of the Board of Examiners. The policy will add specificity to existing rules to allow adding requirements to well permits to facilitate the implementation of RECOMMENDATIONS 1D, 2A, and 2B. To facilitate the implementation of RECOMMENDATION 1D, the policy will require that contractors or well owners notify the Division of Water Resources through the online notification system of the upcoming construction of all new wells. The policy will identify the method(s) to communicate the new advance notice requirement to licensed contractors and private constructors. To facilitate RECOMMENDATION 2B, the policy will also direct that the notification include estimated dates for each key phase of a well's construction. To facilitate RECOMMENDATION 2A, the policy will require Division staff to include the aquifer type on the well permit and further, will direct the contractor or private constructor to notify the Division of Water Resources if the "aquifer type" of the well's source will differ from that identified on the well permit.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and

comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

E AGREE. IMPLEMENTATION DATE: JULY 2019.

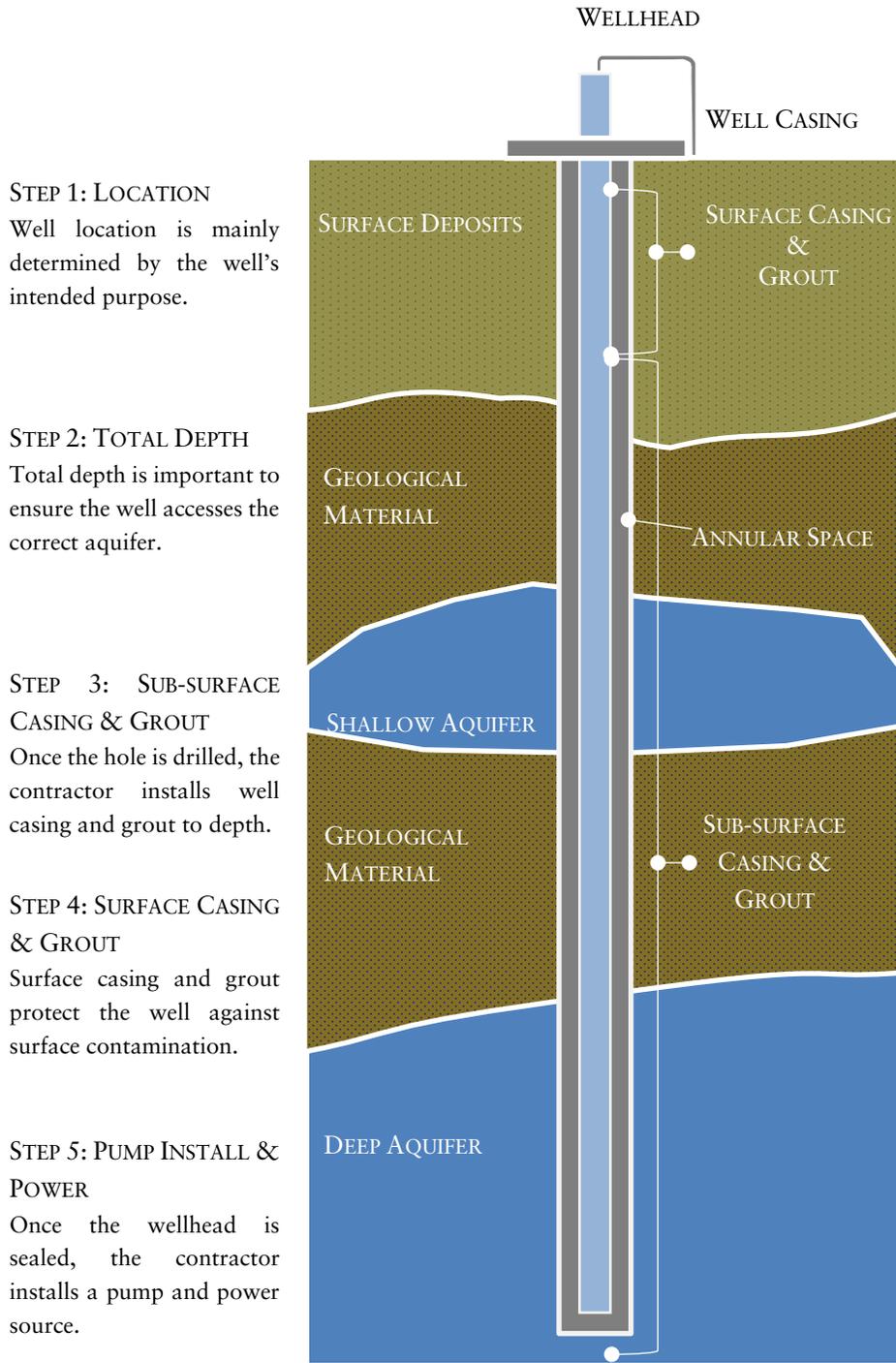
The Division of Water Resources will develop and adopt a written policy with concurrence from the Board of Examiners. The policy will identify a process for monitoring compliance with the advance notice requirements according to the rule change and the enforcement actions that the Board of Examiners will take for contractors that fail to comply.

In the near term, the Division of Water Resources will periodically conduct a manual data-query comparison process of separate datasets to comply with this recommendation. The results will be given to the Chief Well Inspector to process for the Board of Examiners consideration. This manual process will be instituted starting in July 2019. The Division of Water Resources will also begin work to create a new automated process to monitor compliance with the advance notice requirement, but this will involve detailed computer application development through the Division's Water Information Team and the Colorado Office of Information Technology. The estimated implementation date for the automated process is August 2020. Therefore, the Division of Water Resources will have achieved compliance with this recommendation by July 2019 but will refine its process over time to achieve greater efficiency.

INSPECTION TIMING

Proper construction of a well is important for ensuring the safety of groundwater resources and the public. Proper construction generally entails drilling the well in the correct location and to the appropriate depth to access the intended water source while protecting the well from surface and subsurface contaminants through the application of casing and grout. EXHIBIT 2.3 outlines the key steps of well construction.

EXHIBIT 2.3. WATER WELL CONSTRUCTION DIAGRAM



SOURCE: Office of the State Auditor analysis of information provided in *A Guide for Private Domestic Well Owners*, compiled by The California State Water Resources Control Board, March 2015.

Board rules outline specific construction requirements based on the type of aquifer the well will access [2 CCR 402-2, Rule 10], and also classify

Colorado aquifers into four types [2 CCR 402-2, Rule 5] as follows:

- **CONFINED.** An aquifer with a confining layer of relatively impermeable material above it, such as clay or shale.
- **CONSOLIDATED.** An aquifer within consolidated geologic material, such as bedrock, that does not have a confining layer above it.
- **UNCONSOLIDATED.** An aquifer within unconsolidated geologic material, such as alluvial sand.
- **LARAMIE-FOX HILLS.** The specific aquifer found below the shales of the Laramie Formation and above the Pierre Shale. It is found in Colorado's Denver and Cheyenne Basins along the Front Range.

WHAT AUDIT WORK WAS PERFORMED AND WHAT WAS THE PURPOSE?

We worked with the Division to identify the key construction phases that are important to determine that a well is properly constructed. We then reviewed the 760 reports associated with the 310 wells inspected in Fiscal Year 2018 to determine which key phases the inspector was able to observe. The purpose of our work was to determine whether the program timed its inspections to give it assurance that wells were properly constructed.

HOW WERE THE RESULTS OF THE AUDIT WORK MEASURED?

A WELL INSPECTION PROGRAM SHOULD BE DESIGNED AND CARRIED OUT TO PROVIDE PUBLIC PROTECTION. According to Division management, well inspections at key stages provide assurance that the well meets the minimum construction standards and therefore protects groundwater resources and the public health and safety. EXHIBIT 2.4 outlines these key phases.

EXHIBIT 2.4. KEY PHASES OF WELL CONSTRUCTION			
KEY PHASE	WHERE APPLICABLE	INSPECTION TIMING	INSPECTION PURPOSE
Well Depth—total depth drilled for the well	All aquifers when well permit includes a maximum depth.	Must be measured after total depth has been drilled but before pumping equipment is installed in the well.	Ensures the correct aquifer is accessed.
Casing—the material that lines the hole below and above the surface	Laramie-Fox Hills and Confined	Casing below the surface must be inspected while it is being placed AND surface casing must be inspected after placement.	Ensures the casing is properly placed to protect the well from contaminants.
	Consolidated	Surface casing ONLY must be inspected after placement.	
Grout—cement like material used to secure the casing to the surrounding geological surface	Laramie-Fox Hills and Confined	Subsurface grout must be inspected while it is being placed AND surface grout must be inspected after placement.	Ensures the casing is properly secured to protect the well from contaminants.
	Consolidated	Surface grout ONLY must be inspected after placement.	
Annular Space—the space between the geological material surrounding the well and the casing	All aquifers	Must occur during drilling or immediately afterwards.	Ensures that, given the correct casing, there is sufficient space between the wall of the well hole and the casing for the grout to properly stabilize the casing and seal the well from contaminants.
Disinfection—the application of chlorine after the well construction has been completed	All aquifers	Determined by an evident odor of chlorine.	Ensures the well has been disinfected to prevent contamination prior to use.
Location	All aquifers	Determined by comparing GPS information while inspector is on site to the location on the permit.	Ensures that the well is on the correct property.

SOURCE: Office of the State Auditor analysis of well construction rules [2 CCR 402-2], information provided by Division of Water Resources' staff, and water well publications.

THE WELL INSPECTION PROGRAM IS REQUIRED TO OPERATE WITHIN ESTABLISHED RESOURCES. Specifically, Section 37-91-113(1), C.R.S., states that inspections of well construction and pump installations are to be conducted within the resources provided through the Well Inspection Cash Fund, which is funded by permit, license, and application fees, as well as fines by the Board. The Division should have a process to time their well inspections to observe key phases of well construction, using the resources that can be funded through the Well Inspection Cash Fund, to give assurance that wells were properly constructed to protect the public health and environment.

WHAT PROBLEM DID THE AUDIT WORK IDENTIFY?

Overall, we found that most well inspections conducted in Fiscal Year 2018 did not inspect a key phase. Specifically, 209 of the 310 wells inspected (67 percent) were never inspected for any key phase. In addition, conducting multiple inspections of the same well did not ensure inspection of a key phase. For the 140 wells that were inspected multiple times, 74 wells (53 percent) were never inspected during a key phase. This includes one well that was inspected 23 times in Fiscal Year 2018 without inspectors observing any key phase of construction. In EXHIBIT 2.5, we provide the number of wells that were inspected by key phase. Because a key phase might be applicable to some wells but not others, the number of wells for which a key phase was relevant is sometimes less than 310.

EXHIBIT 2.5. WELLS CONSTRUCTED AND INSPECTED BY KEY PHASE FISCAL YEAR 2018			
KEY PHASE	NUMBER OF THE 310 TOTAL WELLS INSPECTED FOR WHICH THE KEY PHASE WAS APPLICABLE	NUMBER OF WELLS INSPECTED FOR KEY PHASE	PERCENT INSPECTED
Total Depth	175	14	8%
Casing			
Confined and Laramie-Fox Hills	43 ¹	0	0%
Consolidated	74 ¹	22	30%
Grout			
Confined and Laramie-Fox Hills	43 ¹	0	0%
Consolidated	74 ¹	22	30%
Annular Space	310	94	30%
Disinfection	310	40	13%
Location Confirmation	310	19	6%

SOURCE: Office of the State Auditor analysis of Division of Water Resources well permit and construction data and inspection reports for Fiscal Year 2018.
¹Number reflects minimum based on work reports available for review. Actual number may be higher.

As noted in the table, the number of wells for which casing and grout were key phases are minimum estimates based on the number of work reports that were available for audit staff to review. As described in the WORK REPORTS section of this report, the Division did not receive work reports for all wells that it inspected in Fiscal Year 2018. Contractors note on the work reports the aquifer type, which determines these two key phases, once construction is completed. Therefore, it is possible that the number of wells for which casing and grout were key phases is higher than the numbers reported in EXHIBIT 2.5.

WHY DID THIS PROBLEM OCCUR?

NO INSTRUCTION TO INSPECTORS TO INSPECT KEY PHASES. The Division has not provided guidance to inspectors on what it considers to be key phases for each type of well or instruction to inspectors that they should focus their inspection efforts on key phases. As a result, inspectors do not try to time their inspections to a key phase and will inspect whatever aspect of the well is under construction or visible at the time they are on site. For example, the inspectors assessed total depth for 23 wells, but it was only a key phase for 14 of these wells. Similarly, there were 43 wells for which subsurface and surface casing and grout inspections

were required but not conducted; instead, inspectors inspected casing for 21 wells and grout for 14 wells when it was not required.

LACK OF DATA ABOUT AQUIFER TYPE TO PROPERLY TIME KEY PHASE INSPECTIONS. The well construction permit issued by the Division does not identify the aquifer type. The Division does not document aquifer type until construction is complete because it is possible that the anticipated aquifer type may be different than expected due to the natural variation of subsurface geological conditions. For example, a property owner or construction contractor is often not able to tell if a well will penetrate an aquifer with a confining layer or consolidated geologic material until construction has begun. The Division reported that inspectors use their experience and knowledge to anticipate the aquifer type for inspection purposes of a permitted well, but it does not require contractors to notify the Division of the aquifer type once known. As a result, the Division does not have information it needs to identify and target inspections of key phases for some wells. For example, since the Division is not notified that a well is being constructed through a confining layer, the inspectors do not know to schedule inspections when the casing or grout is being installed, even though these are key phases of the construction of such a well. In Fiscal Year 2018, the Division did not inspect both the subsurface and surface casing or grout for any of the 43 wells in confined aquifers in part because the inspectors were not notified of the aquifer type.

NO REQUIRED NOTIFICATION OF WHEN KEY CONSTRUCTION PHASES WILL OCCUR. Some permits require advance notice of the estimated construction start date, but this notice does not provide information about when key phases are scheduled or expected to occur. Inspectors use informal methods to determine timing of key phases, such as outreach to contractors, to inform their inspection schedule, but report that this method is not often successful. Wells could be constructed anytime during the 1 or 2 years allowed by the permit. In addition, there is no standard timeframe for constructing a well or completing each key phase and no way to predict how weather and other conditions may affect the construction schedule. Therefore, the only way the Division can reliably

know when a key phase will occur is for there to be specific notice at each key phase. Contractors could provide such notice by using the advance notification system, which contractors can access through the Division's website at any time. According to the Division, it has not implemented a requirement for notice of each key phase because the Program was never intended to inspect all key phases for all wells, but to conduct as many inspections as possible given their resources. However, without such notice, the Division is not targeting resources to conduct inspections when most needed.

CONTRACTOR OR OWNER IMPEDIMENTS TO INSPECTIONS. We found indications that contractors or owners sometimes obstruct inspections. For example, inspection reports we reviewed documented 11 instances when the inspectors were locked out of the drill site by the contractors or well owners. While the State Engineer has the authority, "To go upon all lands, both public and private, for the purpose of inspecting wells..." [Section 37-90-110(1)(c), C.R.S.], inspectors told us they consider crossing a locked gate a risk to their personal safety. In addition, one inspector reported that contractors will stop work and leave the well site when he arrives, preventing him from inspecting the work in progress, which is required for some key phase inspections. Inspectors reported that they do not submit complaints to the Board when they are denied access.

WHY DO THESE PROBLEMS MATTER?

If inspections are not conducted during key phases, the Division risks improperly constructed wells going undetected and uncorrected, which could lead to:

- **AQUIFER CONTAMINATION.** Without proper inspection of the well's grout, casing, annular space, and disinfection, or capping on abandonment, there is increased risk of contamination to the aquifer, which can have significant economic, environmental, and public health impacts to other users of the same aquifer. For example, other wells in the same aquifer might have to treat their water to address contamination or abandon and re-drill wells into a new aquifer. If

aquifer quality is negatively affected due to contamination from a well, the well owner could be subject to legal liability for the water loss or health consequences of other users and the environment and economic costs to the community of users.

- **UNAUTHORIZED USE OF AN AQUIFER.** When depth or location is not inspected, there is a risk that the well has been drilled into the incorrect aquifer. The well could potentially draw from an aquifer that contains low quality or hazardous water due to contamination by natural gas, coal, or other natural contaminants, or from an aquifer that is over allocated, thus limiting the water available to rightful users and reducing the life of the aquifer. Use of water from an unauthorized aquifer can also subject the well owner to legal liability for use of water beyond their permitted allowance.
- **WELL CONTAMINATION AND FAILURE.** Without proper inspection of the well’s grout, casing, annular space, and disinfection, the lifespan and usability of the well could be jeopardized. Improper construction might allow contaminants to enter the well or lead to well failure, both of which can result in a large expense for a well owner to either remove the contaminants or abandon and redrill the well.

Due to limited resources, the Division reports that it relies on the “sentinel effect” of its inspection program to promote adherence to well construction requirements. The sentinel effect relies on contractors’ belief that an inspection could happen at any time, and would identify violations of rule, potentially leading to sanctions, and would therefore discourage intentional violations or careless construction practices. According to an annual compilation of criminal justice research published in 2013, *Deterrence in the Twenty-First Century*, the sentinel effect requires frequent presence by an enforcement authority when the unallowable behavior might occur for it to be an effective deterrent. Because the Program inspected about 7 percent of wells constructed in Fiscal Year 2018, and most of the inspections did not inspect a key phase, the Program does not provide a frequent enforcement presence and thus is unlikely to serve as a reliable deterrent.

INEFFICIENT USE OF RESOURCES. When the Division conducts inspections without reviewing any key phases of a well, it does not use its staff resources efficiently to protect well owners or the public. In Fiscal Year 2018, we estimate the Program spent about \$326,000, putting the average cost of its 760 inspections at \$429 per inspection. However, the majority of the Program’s resources were not spent on conducting inspections at key phases in construction; instead, the 615 inspections that did not inspect a key phase cost the Division about \$264,000, or about 81 percent of the total Program cost in Fiscal Year 2018.

RECOMMENDATION 2

The Division of Water Resources (Division) should improve the Well Inspection Program's timing of inspections by:

- A Implementing a written policy requiring Division staff to include the aquifer type on the permit, and requiring contractors, or property owners as appropriate, to notify the Division during construction if the aquifer type differs from that indicated on the permit.
- B Requiring contractors and property owners, as applicable, to provide advance notice when each key phase will occur on all wells, as part of the advance notice changes in RECOMMENDATION 1.
- C Implementing a written policy that defines the key phases of well construction for each well type and instructs inspectors to focus their efforts on conducting inspections during the key phases, using the advance notice reporting recommended in PART B.
- D Implementing a written policy that instructs staff to submit a complaint with the Board of Examiners of Examiners of Water Well Construction and Pump Installation Contractors when contractors or well owners deliberately obstruct the inspection process.

RESPONSE

DIVISION OF WATER RESOURCES

A AGREE. IMPLEMENTATION DATE: AUGUST 2020.

The Division of Water Resources will develop and adopt a written policy that addresses RECOMMENDATIONS 1D, 2A, and 2B, with concurrence of the Board of Examiners. The policy will add specificity to existing rules to allow adding requirements to well permits to facilitate the implementation of RECOMMENDATIONS 1D, 2A, and 2B. To facilitate the implementation of RECOMMENDATION 1D, the policy will require that contractors or well owners notify the Division of Water Resources through the online notification system of the upcoming construction of all new wells. The policy will identify the method(s) to communicate the new advance notice requirement to licensed contractors and private constructors. To facilitate RECOMMENDATION 2B, the policy will also direct that the notification include estimated dates for each key phase of a well's construction. To facilitate RECOMMENDATION 2A, the policy will require Division staff to include the aquifer type on the well permit and further, will direct the contractor or private constructor to notify the Division of Water Resources if the "aquifer type" of the well's source will differ from that identified on the well permit.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

B AGREE. IMPLEMENTATION DATE: AUGUST 2020.

The Division of Water Resources will develop and adopt a written policy that addresses RECOMMENDATIONS 1D, 2A, and 2B, with concurrence of the Board of Examiners. The policy will add specificity to existing rules to allow adding requirements to well

permits to facilitate the implementation of RECOMMENDATIONS 1D, 2A, and 2B. To facilitate the implementation of RECOMMENDATION 1D, the policy will require that contractors or well owners notify the Division of Water Resources through the online notification system of the upcoming construction of all new wells. The policy will identify the method(s) to communicate the new advance notice requirement to licensed contractors and private constructors. To facilitate RECOMMENDATION 2B, the policy will also direct that the notification include estimated dates for each key phase of a well's construction. To facilitate RECOMMENDATION 2A, the policy will require Division staff to include the aquifer type on the well permit and further, will direct the contractor or private constructor to notify the Division of Water Resources if the "aquifer type" of the well's source will differ from that identified on the well permit.

The recommendation will be implemented by February 2020. This timeline allows for the required Board of Examiners review and comment over an eight-month timeframe, including three quarterly meetings, to let the necessary review process reach consensus.

C AGREE. IMPLEMENTATION DATE: FEBRUARY 2020.

The Division of Water Resources will develop and adopt a policy, as identified in the response to RECOMMENDATIONS 1A, 1B, and 1C, to identify the key phases of well construction for each well type and instruct inspectors to focus their efforts on conducting inspections during the key phases, using the advance notice system. Implementation of this recommendation is dependent on the implementation of RECOMMENDATION 2B since, until the dates of key phases of construction are available, the inspectors have no basis for planning to conduct inspections of those phases.

The recommendation will be fully implemented by February 2020. This timeline is needed because the following steps are necessary:

- Board of Examiners members and Division of Water Resources

staff (including well inspectors) will need to draft the policy in concert with the Division of Water Resources management.

- To ensure a policy that has the approval of the regulatory bodies involved with well construction, namely the Division of Water Resources and the Board of Examiners, a draft policy must be reviewed and commented on by the Board of Examiners at its quarterly meetings during the development process. The Board meets in February, May, August, and November each year.

- Division of Water Resources Staff will need a timeframe of eight months including three Board of Examiners quarterly meetings to allow the necessary policy review, comment, and revision process to reach consensus.

D AGREE. IMPLEMENTATION DATE: AUGUST 2019.

The Division of Water Resources will develop and adopt a written policy that instructs staff to submit a complaint with the Board of Examiners when contractors or well owners deliberately obstruct the inspection process.

The recommendation will be fully implemented in August 2019.

WORK REPORTS

In addition to on-site inspections, another key aspect of monitoring compliance is through the collection and review of reports submitted by the contractor or property owner when well construction, pump installation or well abandonment is complete. According to Board rule, the purpose of these work reports is to document the location of wells, gather information about hydrogeological conditions of Colorado, and ensure compliance with permit and water rights requirements [2 CCR 402-2, Rule 17]. These reports demonstrate things such as:

- Who drilled the well, installed the pump, or installed the cap on an abandoned well, which can be used for verifying that the person has a current license.
- The depth and diameter of the well and the type of casing and grout installed, which can be used for ensuring that the well was constructed in line with construction requirements and any depth conditions put on the permit.
- The type of pump installed and the pumping rate, which can be used to verify the approved maximum pumping rate specified on the permit is not exceeded.
- The method used to cap an abandoned well, which can be used to verify that a well was adequately abandoned so as to protect the aquifer from surface contamination.
- The aquifer type, as noted in the previous finding.

Board rule generally requires reports to be submitted within 60 days after the completion of the work [2 CCR 402-2, Rule 17.3]. The report templates are available on the Division's website, and the contractor submits the report to the Division via email or mail. Once submitted, Division staff input some information from the work report into the Division's well database.

Because of the important information that these reports provide to the Division, the Board considers their submission to be an enforcement priority. The Board fines contractors between \$50 and \$250 for each instance of submitting a report late and \$500 to \$1,000 for not submitting reports at all, depending on how long ago the work was completed and whether the permit for the work is still valid or not. In Fiscal Year 2018, the Board fined five contractors a total of \$4,875 for either failing to submit reports or submitting them late.

WHAT AUDIT WORK WAS PERFORMED AND WHAT WAS THE PURPOSE?

We reviewed the Division's processes for ensuring that it receives required work reports and for reviewing the information provided on work reports. We reviewed the Division's database to determine whether work reports were submitted for wells that were inspected and noted by inspectors to be under construction in Fiscal Year 2018. We also reviewed referrals the Division made to the Board in Fiscal Year 2018 for contractors' noncompliance with work report submissions. The purpose of our work was to determine whether the Division leverages work reports as a monitoring tool.

HOW WERE THE RESULTS OF THE AUDIT WORK MEASURED?

THE DIVISION SHOULD USE WORK REPORTS AS PART OF THE PROGRAM'S MONITORING OF WELL CONSTRUCTION. Statute charges the Board with adopting "rules and regulations reasonably necessary to insure the proper construction or proper abandonment of wells and the proper installation of pumping equipment" and provides it with the "authority to require the filing of information and reports relating to the construction or abandonment of wells and the installation of pumping equipment whenever it may deem such action to be necessary" [Section 37-91-110(2), C.R.S.]. Board rule [2 CCR 402-2, Rule 17], requires contractors to certify the following through the submission of work reports:

- “Where, how, and when” a well was drilled.
- A description of “the pump, date of installation, its depth setting... and the results from the production equipment test,” such as the pumping rate.
- “A detailed description of how [an abandoned] well...was plugged, including types and amounts of materials used, and the placement method and intervals of those materials.”

Statute requires the State Engineer to “monitor compliance with [requirements for water well and pump installation contractors]...and may employ inspectors for such purpose” [Section 37-91-113(1), C.R.S.]. While statute specifies that, “Inspectors shall annually spend a majority of their time conducting field inspections and a minority of their time preparing and evaluating reports...”[Section 37-91-113(3), C.R.S.], conducting some type of review of work reports that help establish that work was done in line with requirements can serve as a component of the Division’s overall monitoring. Incorporating the review of work reports as part of the system of monitoring is especially important given that the Program inspects only a small proportion of the wells constructed (including pump installation) each year. In addition, with respect to abandoned wells, the Division reports that its primary way of monitoring is through review of abandonment work reports. Once an abandoned well is capped, it is difficult to inspect whether the work was done correctly, so the Division relies on review of abandonment work reports to verify that the description of the work completed is in line with requirements in Board rules for abandonment.

THE DIVISION SHOULD CONSISTENTLY REFER NONCOMPLIANT CONTRACTORS TO THE BOARD. The Board relies on the Division to refer matters of noncompliance to it so that it can take appropriate enforcement action. The Board has authority to act on noncompliance by, among other things, issuing fines; suspending or revoking a contractor’s license; and ordering the investigation, abandonment, repair, drilling, redrilling, casing, recasing, deepening, or excavation of a well [Sections 37-91-104 and 37-91-108, C.R.S.].

WHAT PROBLEMS DID THE AUDIT WORK IDENTIFY AND WHY DID THEY OCCUR?

THE DIVISION DOES NOT MONITOR FOR COMPLIANCE WITH THE REQUIREMENT TO SUBMIT WORK REPORTS. The Division could use information from a variety of activities to track compliance with the reporting requirement, but does not.

From the permitting process, the Division knows the “where” that a property owner has been approved to construct a well and the “when” within the general timeframe of the permit, typically 1 to 2 years after issuance based on the type of permit. More specific information about when construction is planned could be derived from:

- The advance notice requirement, which provides the Division when construction is planned to begin for wells subject to the advanced notice requirement.
- On-site inspections, which provide the Division specifically when inspected wells are under construction.

By matching the information from these activities, the Division could track compliance with the requirement to submit work reports and improve its oversight of well construction.

We compared information from inspections conducted in Fiscal Year 2018 with the work reports the Division had on file as of March 2019. We found indicators that contractors may be frequently failing to submit work reports. Specifically, of the 259 wells inspectors observed to be under construction in Fiscal Year 2018, no work reports had been submitted for 45 wells (17 percent). According to the Division, once started, well construction is typically completed within 45 days, meaning that the wells that were under construction in Fiscal Year 2018 (July 1, 2017, through June 30, 2018) should all have been completed by late summer 2018. Furthermore, since rules require work reports be

submitted within 60 days of completion of construction, the Division should have received work reports for all these wells by March 2019.

THE DIVISION DOES NOT REVIEW WORK REPORTS AS PART OF ITS MONITORING SYSTEM. According to the Division, staff review construction reports to ensure the well was constructed in the correct general location allowed by the permit and when they receive a complaint about a particular well, but the Division does not use the reports to monitor compliance with construction requirements. For example, the Division does not verify that the depth of the constructed well as reported on the work report agrees with the permitted depth, that the installed pump does not exceed the maximum pumping rate permitted, that the types of grout and casing materials used or the method of capping an abandoned well meet construction standards.

We have noted elsewhere in this report that the Program only has three inspectors and the operations of the Program are required to be self-funded from the Program's cash fund. As such, we recognize that the Program has limited resources to expand its monitoring of well construction beyond on-site inspections. However, the information included in work reports provides the Program with the opportunity to perform data analytics to assist in its monitoring efforts in a more efficient way than relying exclusively on driving to physical well sites.

Matching some data between permits and work reports could be done electronically to identify exceptions or potential problems that should receive further review. For example, Division staff enter some information from work reports into the well database, such as total depth, type of disinfection, and well yield estimate. However, the Division does not run reports of this data to analyze whether the work reports indicate adherence to construction standards and permit conditions, such as comparing any depth conditions on the permit to total depth reported on the work report.

Electronic matching could be done on additional data points if the Division expanded the information it enters into the well database. For

example, Division staff do not enter some information from work reports into the well database, such as hole diameter, plain casing, and grouting record. By adding this information to the well database, the data could be matched to the permit data to analyze whether the work reports indicate adherence to construction standards and permit conditions, such as evaluating casing and grout based on the aquifer type. There may be other opportunities for electronic matching of inspection observations with information on permits and work reports to flag work reports and wells that require further review by the Program.

THE DIVISION DOES NOT CONSISTENTLY REFER CONTRACTORS TO THE BOARD FOR FAILING TO FILE WORK REPORTS. Inspectors noted the lack of a work report for three wells inspected in Fiscal Year 2018. In these cases, inspectors noted that construction was completed, but that there was no work report on file. In one instance, the inspector contacted the well owner, who provided copies of the reports, but never referred the contractor responsible for the work to the Board for failing to file work reports. In the other two instances, inspectors did not follow up on the submission of work reports, such as by checking after the 60-day deadline to submit reports to see if the report had been submitted, and they did not refer the matter to the Board. The Division told us that for these two cases, the inspector did not know who the contractor was since the permit did not list the contractor (permits are usually issued to the property owner rather than the contractor) and the Division had not received any advance notice of construction for that well from the contractor; the Division was therefore not positioned to make a referral to the Board.

THE DIVISION DOES NOT HAVE WRITTEN POLICY GUIDANCE FOR STAFF ON HANDLING WORK REPORT NONCOMPLIANCE MATTERS. For example, there is no written policy or procedure on what actions staff should take when they determine that a work report has been submitted late, has not been submitted, or contains information to indicate that construction standards or permit requirements were not followed. Policies and procedures could establish which violations should be referred to the Board when identified and which violations, if any, should be resolved by staff contacting the contractor to remind them of the construction requirements.

WHY DO THESE PROBLEMS MATTER?

WHEN THE DIVISION DOES NOT MONITOR AND ENFORCE COMPLIANCE WITH THE REQUIREMENT THAT CONTRACTORS SUBMIT WORK REPORTS, IT MISSES AN OPPORTUNITY TO EFFICIENTLY IMPROVE ITS OVERSIGHT OF WELL CONSTRUCTION. As discussed throughout this section, work reports contain information that the Division could use to verify that well construction was completed to standards. Reviews could provide an added layer of protection of the groundwater and public health and safety on top of well inspections. By not using the work reports as part of the monitoring process, the value of the work reports is diminished. In addition, one Board member we spoke to reported that one reason the work reports are important is because they provide a signed statement from the contractor that work was done in accordance with the Board's rules. As such, they view the submission of work reports as an important mechanism for holding contractors accountable for following construction requirements.

In addition, the Division reports that staff *do* review work reports for compliance with key construction requirements when investigating an allegation that a well was improperly constructed. In Fiscal Year 2018, 17 completion reports reviewed by the Division were forwarded to the Program to investigate noncompliance. When the Division does not obtain work reports, it is hindered in such investigations.

WHEN THE DIVISION DOES NOT REPORT NONCOMPLIANCE WITH THE WORK REPORT REQUIREMENTS TO THE BOARD, THE BOARD CANNOT TAKE ENFORCEMENT ACTION. Inconsistent referral of noncompliant contractors to the Board results in inconsistent enforcement. Whereas five contractors paid fines for failing to submit timely work reports, at least another 13 contractors, but likely more, were not referred to the Board for enforcement. This creates an uneven playing field for contractors in which some contractors are held accountable for submitting timely work reports and others are not.

RECOMMENDATION 3

The Division of Water Resources (Division) should improve its use of work reports for the Well Inspection Program's monitoring of compliance with water well construction requirements by:

- A Modifying the Division's well database to capture information collected through advance notifications about construction starts and contractors responsible for the work, and evaluating opportunities to maintain electronic records of other key data to allow data matching.
- B Implementing a process to run periodic data match reports to identify contractors who began work on a well but did not submit a work report and wells for which construction may not have aligned with permit conditions and construction standards.
- C Implementing a written policy for Division staff to refer wells flagged through data analytics implemented in PART B to Well Inspection Program staff for further review.
- D Implementing a written policy to guide staff about work report noncompliance matters, including the types of actions staff should take themselves and which matters should be referred to the Board of Examiners of Water Well Construction and Pump Installation Contractors.

RESPONSE

DIVISION OF WATER RESOURCES

A AGREE. IMPLEMENTATION DATE: AUGUST 2020.

The Division of Water Resources will document the functional requirements to guide the modification of the well database to accommodate the collection of data regarding well construction starts and estimated dates for the key construction phases. This effort will also consider and document other key data fields that can be captured to enhance the use of work reports as an additional source of information from outside the Well Inspection Program. This functional requirements documentation effort will be completed by March 2020. After the document is completed, the Division of Water Resources will work with the Office of Information Technology to pursue the modifications to the well database.

The recommendation will be implemented by August 2020. This timeline is needed because the Division of Water Resources cannot engage in development of a programmatic solution until the requirements of that solution are documented. Once completed, then development can begin.

B AGREE. IMPLEMENTATION DATE: AUGUST 2020.

As part of the "functional requirements documentation effort" identified in the Response to RECOMMENDATION 3A, the Division of Water Resources will document the functional requirements to guide the development of data matching analysis to identify contractors that have not submitted work reports and to identify occurrences where the well construction may not have aligned with well permit conditions of approval or construction standards. This "functional requirements documentation effort" will be completed by March 2020. After the document is completed, the Division of

Water Resources will work with the Office of Information Technology to pursue the modifications to the well database.

The recommendation will be implemented by August 2020. This timeline is needed because the Division of Water Resources cannot engage in development of a programmatic solution until the requirements of that solution are documented. Once completed, then development can begin.

C AGREE. IMPLEMENTATION DATE: AUGUST 2020.

The Division of Water Resources will develop and adopt a written policy that guides the staff in the process of identifying wells flagged through data analytics for further review. This policy can be developed but the recommendation cannot be fully implemented until enhancements to the well database by the Office of Information Technology are completed, as outlined in 3B.

D AGREE. IMPLEMENTATION DATE: FEBRUARY 2020.

The Division of Water Resources will develop and adopt a written policy with concurrence of the Board of Examiners, to guide staff about work report noncompliance matters, including the types of actions staff should take themselves and which matters should be referred to the Board.

The recommendation will be fully implemented by February 2020. This timeline is needed because the following steps are necessary:

- Board of Examiners members and Division of Water Resources staff (including well inspectors) will need to draft the policy in concert with the Division of Water Resources management.

- To ensure a policy that has the approval of the regulatory bodies involved with well construction, namely the Division of Water Resources and the Board of Examiners, a draft policy must be reviewed and commented on by the Board of Examiners at its

quarterly meetings during the development process. The Board meets in February, May, August, and November each year.

- Division of Water Resources Staff will need a timeframe of eight months including three Board of Examiners quarterly meetings to allow the necessary review, comment, and policy revision process to reach consensus.

WELL INSPECTION CASH FUND

Statute [Section 37-80-111.5(1)(d), C.R.S.] creates the Well Inspection Cash Fund (Cash Fund) to pay the costs of the Program through permit, license, and application fees as well as any fines levied by the Board. Specifically, the Division collects a fee for every well permit application. The fees are set by statute, ranging from \$60 to \$100 and from these fees, statute requires \$40 per well be deposited into the Cash Fund [Section 37-80-111.5(1)(d), C.R.S.]. In addition, statute requires the Board to collect and deposit into the Cash Fund contractor license and license application fees of \$70 to \$450 depending on whether or not they are residents of Colorado, annual license renewal fees of \$50 from well construction and pump installation contractors, and any fines levied by the Board [Sections 37-91-107 and 37-91-108(5), C.R.S.].

The average annual Cash Fund revenue for the last 3 fiscal years was approximately \$275,000 with reported expenses growing from about \$275,000 in Fiscal Year 2016 to \$370,000 in Fiscal Year 2018. Any money in the Cash Fund unexpended at the end of the fiscal year remains in the fund and does not revert to the General Fund [Section 37-80-111.5(1)(d), C.R.S.]. The increase in expenses in Fiscal Year 2018 meant that the Cash Fund used most of its reserve that year, as shown in EXHIBIT 2.6 below.

EXHIBIT 2.6 WELL INSPECTION CASH FUND REPORTED REVENUES AND EXPENSES FISCAL YEARS 2016 THROUGH 2018			
	2016	2017	2018
Beginning Year Balance	\$ 98,700	\$ 79,500	\$ 67,100
Revenue	255,200	264,300	305,600
Expenses	274,400	276,700	370,000
Year End Balance	\$ 79,500	\$ 67,100	\$ 2,700

SOURCE: Office of the State Auditor analysis of fund data in the Colorado Operations Resource Engine.

The money in the Cash Fund is the only appropriation given to the

Program for its expenses, which primarily includes salary and benefits for two field inspectors and a supervisor, and the costs of the two vehicles assigned to inspectors for conducting their field inspections.

WHAT AUDIT WORK WAS PERFORMED AND WHAT WAS THE PURPOSE?

We reviewed salary expense detail and timekeeping data from the Department's timekeeping system to analyze which staff charged time to the Program in Fiscal Years 2016 through 2018. We also reviewed vehicle expenses including lease, mileage, and vehicle equipment expenses, for the two vehicles assigned to inspectors for Fiscal Years 2016 to 2018. The purpose of our work was to evaluate the Division's controls for ensuring Program expenses are paid from the Cash Fund.

HOW WERE THE RESULTS OF THE AUDIT WORK MEASURED?

Section 37-80-111.5(1)(d), C.R.S., creates the Cash Fund and specifies that, "Moneys in the well inspection cash fund shall be appropriated to and expended by the state engineer for the purposes established in section 37-91-113," which is the statute creating the Program. Statute also specifies that Program costs be paid from the Cash Fund. Specifically, Section 37-91-113(1), C.R.S., states, "The costs of [the Program] shall be paid from the well inspection cash fund created by section 37-80-111.5." Therefore, we expected that the Cash Fund be used only for Program costs and Program costs be paid by the Cash Fund and not other sources.

WHAT PROBLEMS DID THE AUDIT WORK IDENTIFY?

THE DIVISION USED CASH FUND MONEY TO PAY SALARY EXPENSES FOR STAFF NOT CONDUCTING PROGRAM WORK. Specifically, in Fiscal Year 2018 the Division paid approximately \$74,800 from the Cash Fund for 2,990 hours of work performed by 12 Division staff, none of which related to well inspections. These staff were conducting well

measurement and permitting work, which are functions not related to well construction or the Program.

THE DIVISION USED GENERAL FUNDS TO PAY FOR SOME PROGRAM VEHICLE EXPENSES. In 2 of the last 3 fiscal years (2016 and 2018) the Division used General Funds to pay for substantial portions of the Program’s vehicle expenses. EXHIBIT 2.7 shows vehicle expenses charged to both the Cash Fund and the General Fund in Fiscal Years 2016 through 2018.

EXHIBIT 2.7. WATER WELLS INSPECTION PROGRAM VEHICLE EXPENSES BY FUND FISCAL YEARS 2016 THROUGH 2018			
	2016	2017	2018
Cash Fund	\$ 26,000	\$ 28,000	\$ 9,800
General Fund	\$ 15,000	\$ -	\$ 31,000
Total Vehicle Expense	\$ 41,000	\$ 28,000	\$ 40,800
Percentage of Vehicle Expenses Paid from General Fund	37%	0%	76%
SOURCE: Office of the State Auditor analysis of fund data in the Colorado Operations Resource Engine.			

Expenses charged to the General Fund included vehicle mileage, leases, and other related vehicle modification expenses.

WHY DID THESE PROBLEMS OCCUR?

IMPROPER USE OF WELL INSPECTION TIME CODE. The Division did not have adequate controls to ensure that only staff working on Program activities charged time to codes associated with the Cash Fund. In Fiscal Year 2018, the time code WELL in the Division’s timekeeping system was used to identify which salary expenses should be attributed to the Program and therefore paid from the Cash Fund. However, use of the WELL time code was not restricted to only Program staff, and the Division had no description explaining that the time code should only be used by Program staff. All employees who used the WELL time code, including non-inspection staff, were paid for that time from the Cash Fund. In addition, the supervisors who reviewed time entries of the non-Program staff did not know that the code was solely for the Program, so did not correct the mistake.

INADEQUATE REVIEW OF VEHICLE EXPENSES. Although Division accounting staff review program expenses at the end of each fiscal year, the reviews did not consistently identify incorrect billing of Program vehicle costs for the years we reviewed. For example, in June 2018 the mileage and lease for one inspector's vehicle (totaling \$868) was charged to the General Fund, while the other inspector's mileage and lease were correctly charged to the Cash Fund. The reviews by Division staff did not find the erroneous charges to the General Fund, so they were not corrected. However, in December 2015 one vehicle's mileage was incorrectly charged to the General Fund, then later adjusted to charge the Cash Fund, indicating that in this instance the error was identified somehow. In addition, because of the incorrect charging of salaries to the Cash Fund in Fiscal Year 2018, Division accounting staff report that there were insufficient monies in the Cash Fund to cover all the Program vehicle expenses, so they were charged instead to the General Fund.

WHY DO THESE PROBLEMS MATTER?

When the Division lacks adequate controls to ensure that only Program activities are paid for with the Cash Fund money, it results in the Program having less money available for key program activities, such as conducting inspections. Adjusting for the vehicle expenses, the Program could have used the \$43,800 spent incorrectly on non-Program salaries in Fiscal Year 2018 to inspect more wells. Each inspection costs approximately \$429 which means the Inspection Program could have afforded about 100 more inspections in Fiscal Year 2018 with the \$43,800 paid for non-Program activities. The State Engineer has statutory authority to contract out for work [Section 37-80-109, C.R.S.], so the Program may have been able to use contract staff to conduct additional inspections in Fiscal Year 2018.

Additionally, as of the end of Fiscal Year 2018, the Cash Fund had a balance of only \$2,700. Therefore, the incorrectly paid non-Program salaries have virtually eliminated any surplus in the Cash Fund, although Program management indicated that it prefers to maintain enough

surplus to provide a safety net for years when revenues to the Cash Fund are low.

Additionally, when some Program costs are paid from sources other than the Cash Fund, the Division and the Board lack a complete understanding of the costs associated with the Program's daily operations. Based on the problems identified with salaries and vehicle expenses, we estimate the true program costs in Fiscal Year 2018 were at least \$326,000. As a Program that is designed to be self-funded, it is important for management to have a clear understanding of the Program's costs.

RECOMMENDATION 4

The Division of Water Resources (Division) should improve financial controls over the Well Inspection Cash Fund by:

- A Implementing controls for use of the time code used to charge Well Inspection Program staff time to the Well Inspection Cash Fund. This may include restricting use of the well inspection time code, providing written guidance to Division staff on the time code's use, and ensuring that timesheet reviewers review for proper use of the code.
- B Improving the annual process of reviewing Well Inspection Program vehicle costs to ensure that they are charged to the Well Inspection Cash Fund, and to correct any vehicle costs incorrectly charged to the General Fund.

RESPONSE

DIVISION OF WATER RESOURCES

- A AGREE. IMPLEMENTATION DATE: DECEMBER 2019.

The Division of Water Resources will implement this recommendation. The Division of Water Resources has already started working with Human Resources on restricting access to the Well Inspection time code (WELL) for all employees, except for the three members of the Well Inspection program. We anticipate this issue to be resolved in December 2019 as the process will require coordination with Human Resources and the technical team at the Office of Information Technology as there may need to be technical and programmatic modifications to the State's timekeeping system. While this issue gets resolved, staff will review bi-weekly and monthly payroll reports to identify any improper use of the Well Inspection program code and correct it. We will also notify

employees and supervisors who are using and approving the improper use of the code and provide written guidance to avoid additional usage.

More comprehensively, starting in July 2019, the Division will do an agency-wide audit of all employee time codes to make sure that each Division employee only has access to time codes and programs that they are allowed to charge time to. Currently, Division of Water Resources employees have access to all codes for their Division and these codes have not been reviewed in some years. This "clean-up" will ensure that in the future, no employee has access to charge time to programs or codes they are restricted from. We will update this list annually.

B AGREE. IMPLEMENTATION DATE: JULY 2019.

The Division of Water Resources will implement this recommendation. The Division has already started ad-hoc reviews of all of the Division's Fleet charges to ensure that State Fleet Management accurately charges vehicle lease payments and mileage to the appropriate programs and/or appropriations. When incorrect charges are found, they are corrected by Division staff. Starting in July of 2019, the Division will implement quarterly accounting reviews (in addition to ad-hoc reviews) of all Division vehicle costs to ensure that all charges are allocated accurately.

In addition, for FY19, DWR will restore reserve funding in the Well Inspection Cash Fund to ensure that the program has the needed flexibility to continue operations should a revenue shortfall occur in the future.