COLORADO
Division of Water Resources
Department of Natural Resources

Board of Examiners of Water Well Construction
and Pump Installation Contractors

February 3, 2020

BOE Policy 2020-1

DEFINING HIGH RISK WELLS AND KEY PHASES OF WELL CONSTRUCTION

Background

The Well Inspection Program was instituted for the protection of the groundwater resources of the State of Colorado and public health through enforcement of minimum well construction and pump installation standards. The program was created under Senate Bill 03-045.

This policy is derived from the recommendations of an audit by the Office of the State Auditor, found in the report *Water Well Inspection Program, Performance Audit, May 2019*. This policy addresses Recommendations 1A, 1B, 1C, and 2C of that report and seeks to create a more efficient and effective Well Inspection Program.

Objective

To create a risk-based Well Inspection Program, it is necessary to identify the various well construction factors that increase the potential for groundwater contamination or mixing of groundwater from different aquifer sources and then to prioritize those factors for the purpose of well inspections. Board of Examiners Staff (Board Staff) has developed a matrix providing guidance to the Well Inspection Program on which types of well construction and pump installations pose the highest potential risk to Colorado's groundwater and to consumers if not constructed properly. As directed by Audit Recommendation 1A, high-risk wells will be inspected at a higher rate than other wells. Key phases of well construction are also identified to help inspectors prioritize when to visit higher risk wells. Each January, the Chief Well Inspector will establish and communicate a quantitative rate for high risk inspections over the year and include that information on the Division of Water Resources website.

The risk matrix considers the **likelihood** of impacts to the public health and groundwater resources of Colorado and the **consequences** of such impacts. Much of the data needed to determine the likelihood and consequences will be provided on the well permit application. However, some information will not be available until the advance notification is given. Therefore, the actionable risk can not be determined until the well contractor provides advance notice of well construction to the Division of Water Resources (DWR). Board Staff and the Well Inspectors will assign a numeric value for each risk factor based on their hydrogeological knowledge and experience. The risk factor values will consider both high-risk wells, but also high-risk construction situations, like those in areas that have not been inspected frequently or by contractors who have not been inspected recently. The values will be selected from within the ranges of values outlined below. These examples are meant to guide Board Staff and the Well Inspectors in their final numeric assignments as delineated in the **Policy** section.

Risk Factor Weight Ranges: Low (L) = 1-3, Medium (M) = 4-6, High (H) = 7-9

Application Risk Factors (based on Information Provided on the Permit Application)

Geography: (Likelihood)	Geothermal = H Denver Basin = M Division 3 = M Cheyenne Basin = M Karst = M Designated Basin = L Rest of State = L	**Well Status:** (Consequences)	Exempt/small capacity = L Nonexempt/large capacity = M
		Well Use: (Consequences)	Industrial = L Dewatering = L Monitoring = L Irrigation = M Commercial = M Residential/Domestic = M Municipal = H
Proposed Driller: (Likelihood)	Licensed Contractor = L Authorized Individual = L Self/Private Driller = H	**Aquifer:** (Likelihood & Consequences)	Alluvial = L Fractured granite = L Other bedrock aquifers = L-M Dakota aquifer = M Laramie-Fox Hills = M Unconfined San Luis Valley = M Confined San Luis Valley = H

Notification Risk Factors (based on Information Provided during Advanced Notification)

Aquifer Type: (Likelihood & Consequences)	Type III = L Type II = L Type I (single) = M Type I (multiple) = H Laramie Fox Hills = H	**Time Since Contractor Last Inspected:** (Likelihood)	< 6 months = L 6-12 months = M > 12 months = H
Variance: (Likelihood)	No Variance = L Variance = H	**Time Since Inspection in Division** (Likelihood)	< 6 months = L 6-12 months = M > 12 months = H

The Overall Risk Value will be determined by adding the sum of the Application Risk Factors to the sum of the Notification Risk Factors.

Overall Risk Value = Sum of Application Risk Factors + Sum of Notification Risk Factors

The Overall Risk Value will be considered by well inspectors daily before performing field inspections.

Key Phases of Well Construction and Completion

Well inspections during key phases ensure the well meets minimum construction, installation, or abandonment standards and therefore protects groundwater resources and public health and safety. Table 1 outlines the key phases for all aquifer types. Well Inspectors must prioritize the inspection of key phases by communicating and coordinating with well drillers and pump installers on proposed construction or installation schedules.

Table 1
Key Phases for Well, Pump, and Cistern Inspection (All Aquifer Types)

Abandonment	Installation of Perforated Casing
Annular Space	Minimum Required Grout Interval(s)
Disinfection	Total Depth
Initial Pump/Initial Cistern Installation	Well/Cistern Location

Policy

The Well Inspection Program will prioritize inspections of wells that pose a higher risk of adversely affecting groundwater resources and the public health, safety, and welfare. To assist with this practice, Board Staff will develop and maintain a business process that calculates the Overall Risk Value (ORV) of proposed wells. Specific numeric assignments for Application and Notification Risk Factors are stored and displayed in a worksheet maintained on the Division of Water Resources website. The Well Inspection Program will use the ORV to identify higher risk wells and plan an inspectors' daily work schedule. A variety of wells ranked higher in risk and other lower risk well constructions, pump installations, and abandonments will be inspected as directed by the Chief Well Inspector.

The Well Inspectors will coordinate with the driller or pump installer on the anticipated dates of key phases of well construction or pump installation and will prioritize visits to high-risk category wells during key phases of well construction, pump installation, or well abandonment. Well Inspectors will record which phases were observed during the inspection. These records will be maintained in a database to track well inspections. Staff will regularly report the numbers of inspections, the quantitative rate of high-risk category inspections, and the key phases inspected to the Board. After each year of implementation of this policy, Board Staff will review the number of high-risk wells that were constructed and update the required quantitative rate of high-risk category wells to be inspected by the program in the following year.

Well Inspectors may prioritize the inspection of any well or key phase based on their own professional knowledge and discretion as well as consideration of safety-related factors.

Approval

This policy may only be modified or revoked in writing by the Board of Examiners of Water Well Construction and Pump Installation Contractors.

Approved 2-3-2020

Keith Branstetter, Chairperson
Board of Examiners of Water Well Construction
and Pump Installation Contractors