What to Expect When You're Inspected

Christopher Jones
Well Inspector
Divisions 1 & 2

July 9, 2021

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Department of Natural Resources

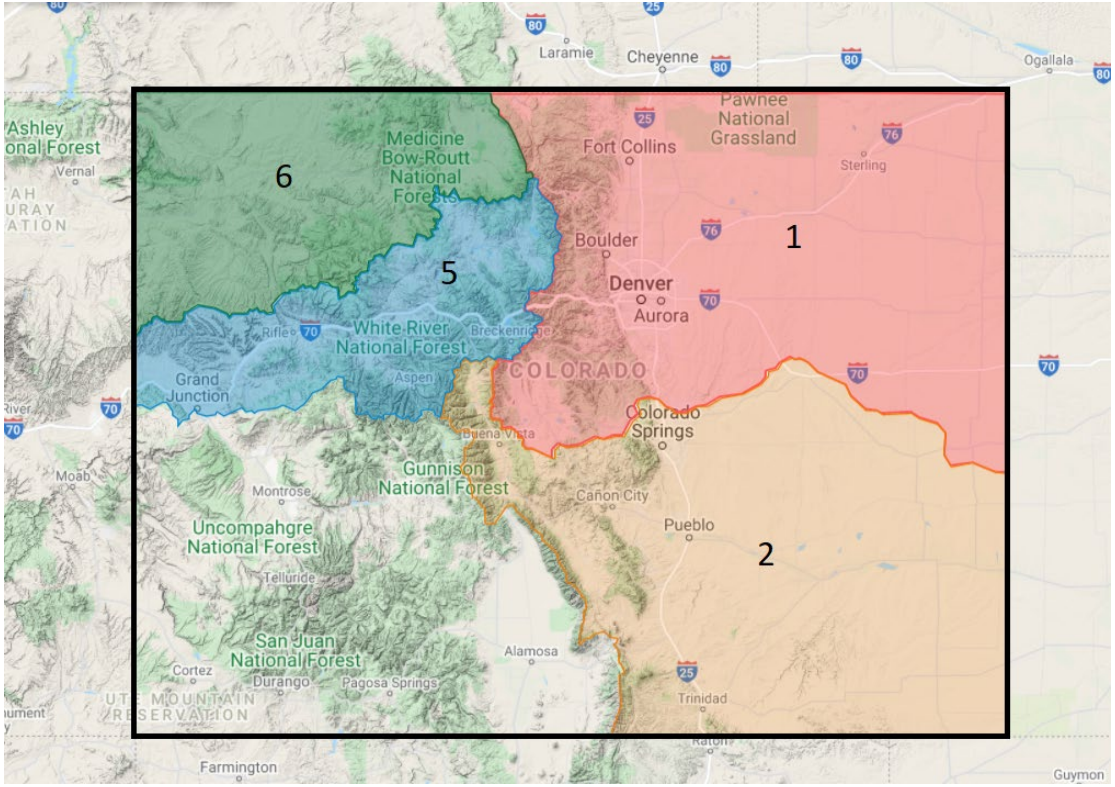
Outline

- Well Inspection Program Background
- Well Selection Process
- Pre-Inspection
- Onsite Inspection
  - General Inspection Practices
  - Well Construction
  - Pump Installation
  - Cistern Construction
- Inspection Documentation
- Question and Answer Session

Well Inspection Program Background
Well Inspection Team

- Chief of Well Inspection – Doug Stephenson
- Well Inspector, Divisions 1 & 2 – Chris Jones
- Well Inspector, Division 3 – Larry Hakes

Well Inspection Program Background
Christopher Jones's Divisions



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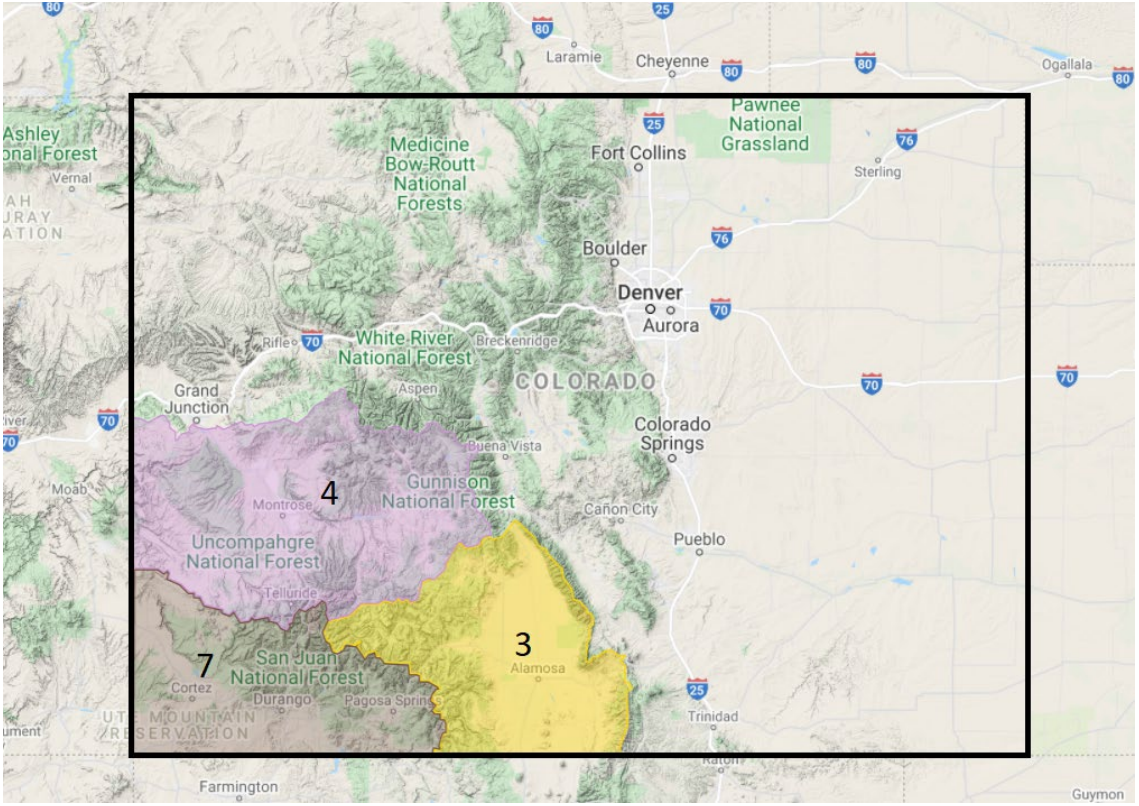
Well Inspection Program Background
Larry Hakes' Divisions



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Well Inspection Program Background

The program was created under Senate Bill 03-045 and is codified in Section 37-91-113, Colorado Revised Statutes (C.R.S.).

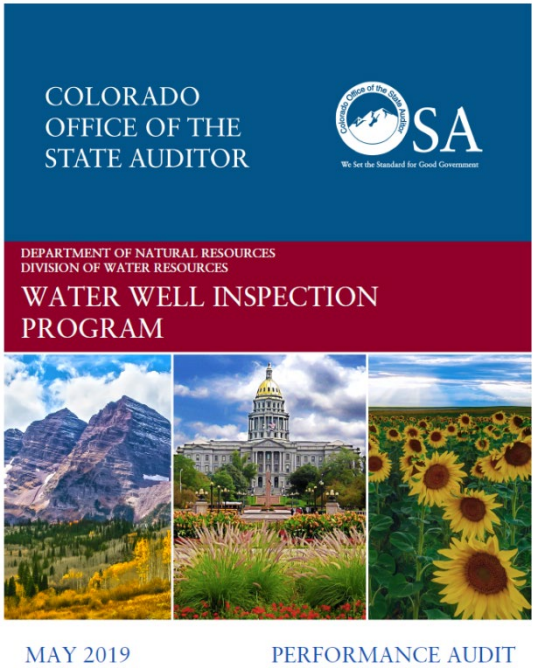
"The Well Inspection Program was instituted for the protection of public health and groundwater resources of the State of Colorado through enforcement of minimum well construction and pump installation standards."

Well Inspection Program Background

- 37-91-113: The state engineer shall monitor compliance with this article, including by inspecting water well construction and pump installation, and may employ inspectors for such purpose.

- Duties shall include the following:
- (a) Well construction and pump installation inspection and observation;
- (b) Complaint investigation;
- (c) Education and outreach;
- (d) Inspection and observation of geotechnical wells, observation and monitoring wells, dewatering wells, and test holes;
- (e) Field inspections of existing wells and pumps;
- (f) Field inspections of well and hole plugging and abandonment; and
- (g) Staff support for the state engineer and board.

Well Inspection Program Background



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.

February 3, 2020

Policy 2020-2

ADVANCE NOTICE OF WELL CONSTRUCTION, PUMP INSTALLATION, CISTERN INSTALLATION, AND WELL ABANDONMENT

Background

The Well Inspection Program was instituted for the protection of public health and groundwater resources of the State of Colorado through enforcement of minimum well construction and pump installation standards. The program was created under Senate Bill 03-045 and is codified in Section 37-91-113, Colorado Revised Statutes (C.R.S.).

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 1D, 2A, and 2B of that report and seeks to create a more efficient and effective well inspection program.

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Well Selection Process

- How do Inspectors Become Aware of a Contractor's Activities:
  - Advance Notification System
  - Conversations with Contractors
  - Complaints
  - Permit Tracking via DWR programs such as HydroBase Data Management Console (HBDMC)
  - Observing/Finding Contractor while in Transit
  - Submitted Reports

- Priority to Wells Representing **Higher Risk**

Well Selection Process

Policy 2020-1 DEFINING HIGH RISK WELLS AND KEY PHASES OF WELL CONSTRUCTION

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.

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

The Well Inspection Program will use the ORV to identify higher risk wells and plan an inspectors' daily work schedule.

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

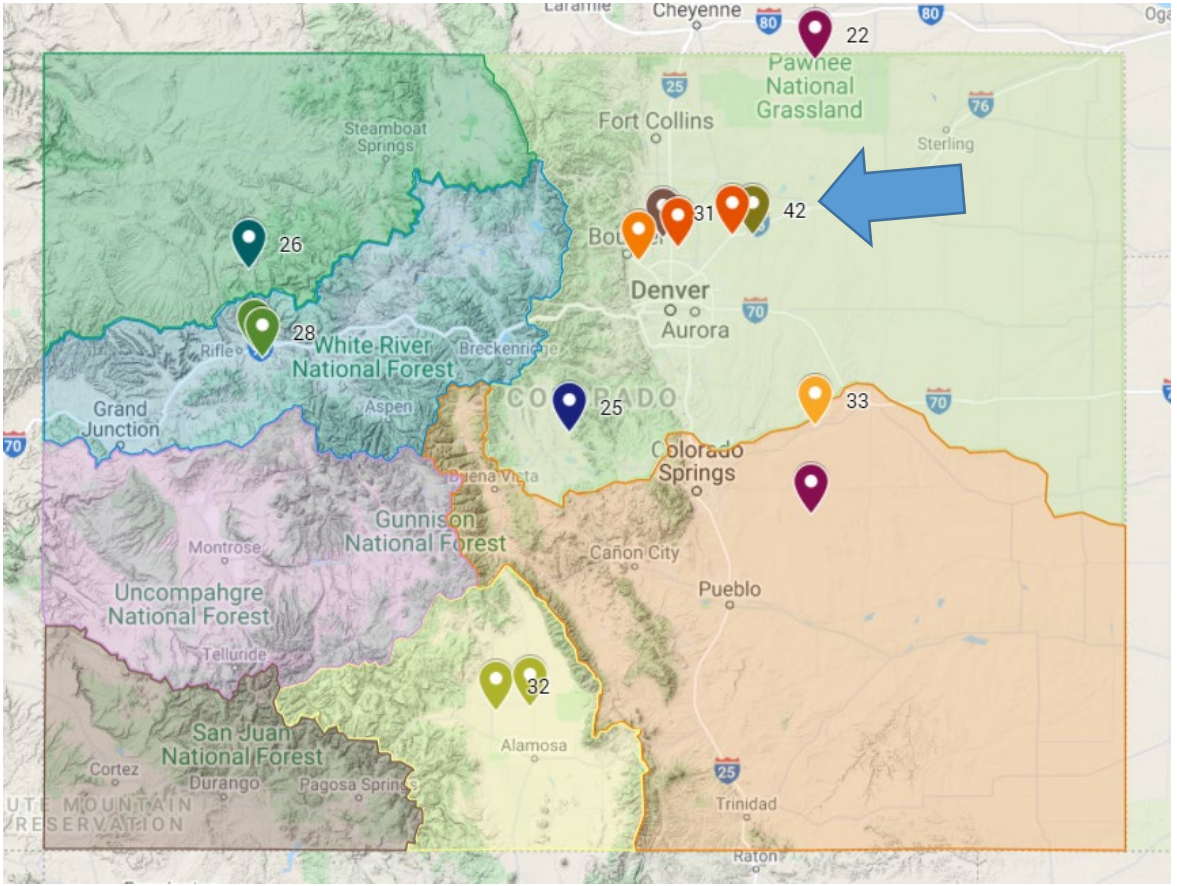
Well Inspectors may prioritize the inspection of any well or key phase based on their own professional knowledge and discretion as well as consideration of safety-related factors.

Well Selection Process

Overall Risk Value - Risk Based Rating System

- Uses information provided by the Contractor from the Advance Notice, Permit information gathered from HBDMC and other information known by the Inspectors.
- Overall Risk Value = Sum of Numerical Values of Risk Factors
  - Geography (Denver Basin, Division 3, etc.)
  - Proposed Driller (Authorized Individual, Licensed Driller, Private Driller)
  - Well Use (Stock, Domestic, Irrigation, etc.)
  - Aquifer Name (Alluvium, Fractured Granite, Laramie-Fox Hills, etc.)
  - Aquifer Type (Type I, II, III, etc.)
  - Time Since Driller Last Inspected
  - Variance
  - Time Since Division Last Inspected
- What is a Low Vs High ORV?

Well Selection Process



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Well Selection Process

Further Consideration Given to Key Phases (Policy 2020-1)

- Location
- Annular Space
- Total Depth
- Minimum Required Grout Interval
- Installation of Perforated Casing
- Installation of Initial Pump
- Installation of Cistern
- Disinfectant
- Abandonment

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Board of Examiners of Water Well Construction and Pump Installation Contractors

February 3, 2020

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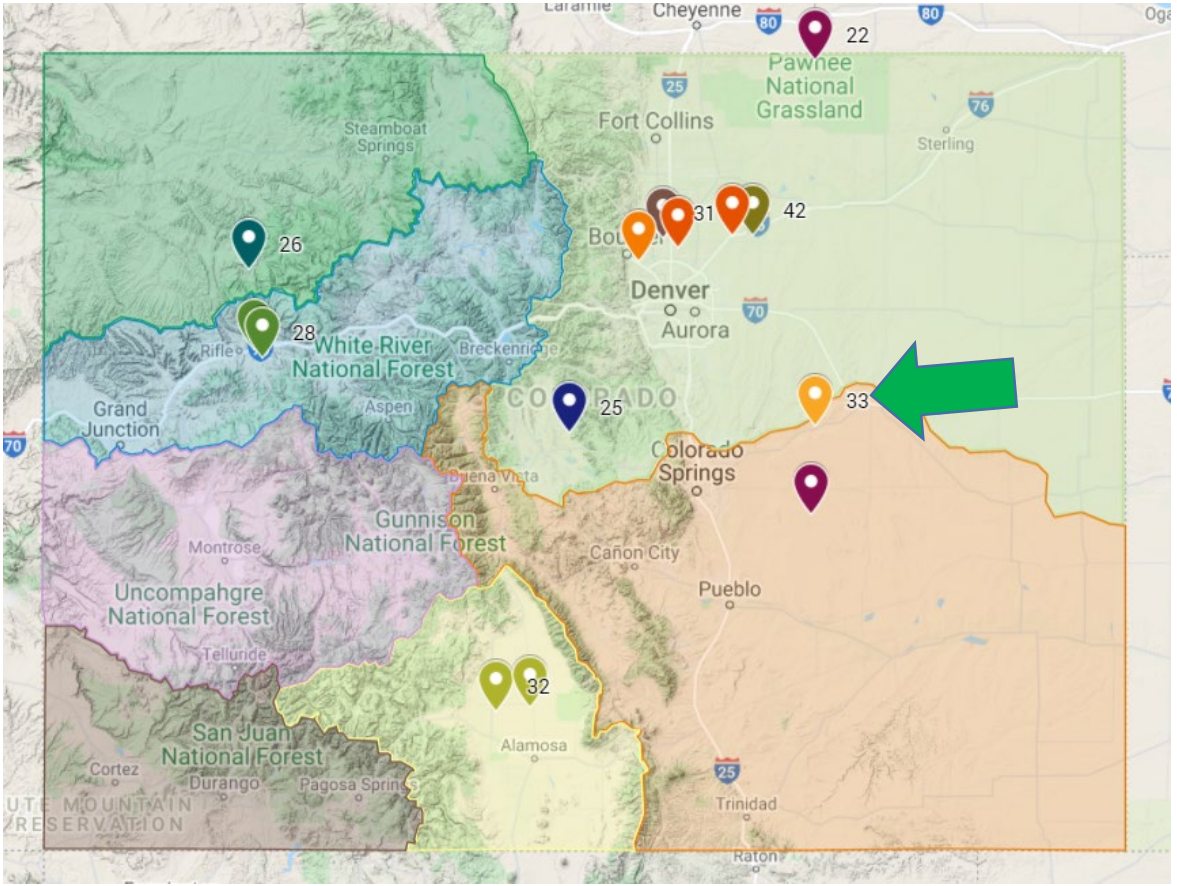
Well Selection Process



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Well Selection Process

- Well Inspection Program Guidance 2020-1

The Chief Well Inspector will assess inspectors' work related to their focus on high-risk well inspections:

a) Each well inspector will be monitored on the percentage of their own well inspections done in low and high categories;

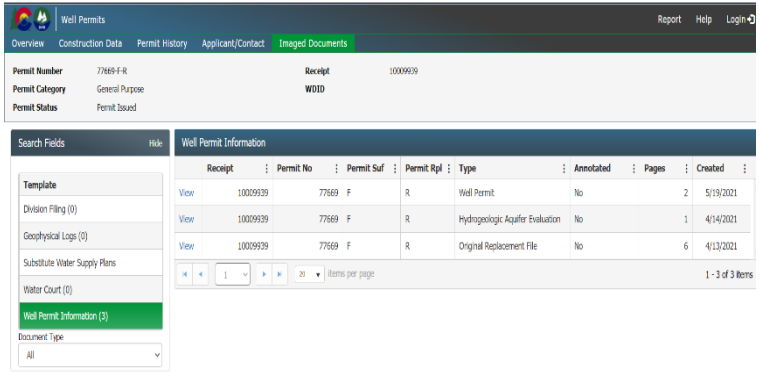
b) The percentages identified in a) will be compared to the overall percentages for all wells for which advance notice is received;

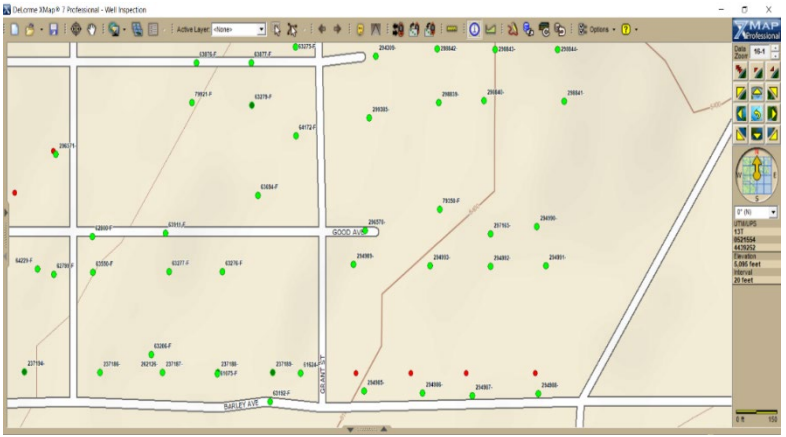
c) The number of wells that provided advanced notice but were not inspected and their average **Overall Risk Value (ORV)**;

d) The percentage of inspections performed on wells for which advance notice is not received (and an ORV is not available) will be calculated and taken into account in assessing whether inspectors are appropriately focusing on high-risk wells.

Pre-Inspection

- **Review Permit, Variance and other Pertinent DWR Documents**
- Review Logs for Existing well or Nearby Wells
- Review Geologic maps
- Conferring with Hydrogeos
- Call Driller/Onsite Contact for:
  - Clarification on aquifer
  - Further information regarding when phases of work might be performed





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Onsite Inspection

- No Set Procedure
- Each Inspector will have his own inspection style, preferences, and methods.
- Assess Construction for Conformance with the Rules, Permit Condition and Variance.
- Document and Photograph Well Site and Aspects of the Work Performed by the Contractor.

Onsite Inspection – General Inspection Practices

- Upon Arrival, Assess Site and Activities:
  - Current activities
  - General Location of Well
  - Existing site structures and potential sources of contaminants
  - Method of drilling
  - Phase of construction

- Greet/Acknowledge Contractor

- If Contractor is available, Make inquiries to the Contractor to further assess:
  - Is Permit onsite
  - Current activities
  - Phase of construction
  - Pertinent construction details

Onsite Inspection – Well Construction

- Inspection of Drilling and Construction Methods

  - <u>Any aspect of well construction that is covered by the rules.</u>
  - Location (Permit Conditions)
    - Does it satisfy permit conditions?
    - <200’ from UTM coordinates
    - On correct property?
    - >600’ from other wells not owned.
  - Location (Rule 10.2)
    - Sanitary Site?
    - Distance from sources of contaminants
    - Distance from vessels containing contaminants.

Onsite Inspection – Well Construction

- Drilling Water (Rule 6.9)
- Discharge of drilling fluids (Rule 6.8 and Policy 2020-3)
- Use of Drilling fluid additives (Rule 6.10)
- **Construction Methodology suitable for the Aquifer Type and Geology** (Rule 10.1, Rule 10.4, Permit Conditions)
  - Borehole size ->Annular Space (Rule 10.4.4 or 10.5.3.3)
  - Total Depth (Permit Condition, Rule 10.1)
  - Grout Interval (Rule 10.4)
  - Handling of Coal zones (Policy 2000-1, Policy 2021-1, Rule 10.1.1, 10.1.2 and 10.5)

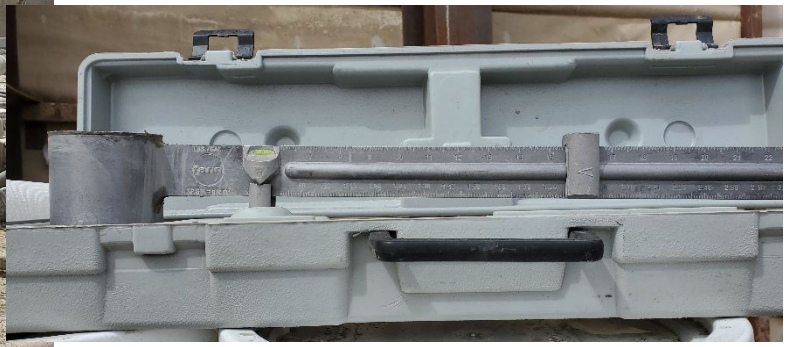
Onsite Inspection – Well Construction

- Casing
  - Conductor vs Surface vs Production
  - Size and thickness (Rule 10.3.2, 10.3.3)
  - Used vs New (Rule 10.3.1)
  - Perforated Casing
    - Interval (Permit Conditions, Rule 10.1, Rule 10.4)
    - Presences of Inclusions (Rule 10.3.4)
  - Centralized in Grout zones (Rule 10.4.1)

- Filter Pack Interval (Rule 10.4.10)

Onsite Inspection – Well Construction

- Grout
  - Mix Type (Rule 10.5.1, Table 2)
  - Volumetric or Weight measurement (Rule 10.5.1)
  - Interval or Intervals (Rule 10.4 and 10.5.2)
  - Method of Placement (Rule 10.5.3)



Onsite Inspection – Well Construction

- Well Development (Rule 10.6)
- Disinfection (Rule 10.7, Rule 15)
- Well/Borehole Covered and Secured (Rule 10.1.3, 11.5.1)

Onsite Inspection – Well Construction

- Post Construction Inspection
  - Follow up to Observations made during Construction
  - No Inspections performed During Construction

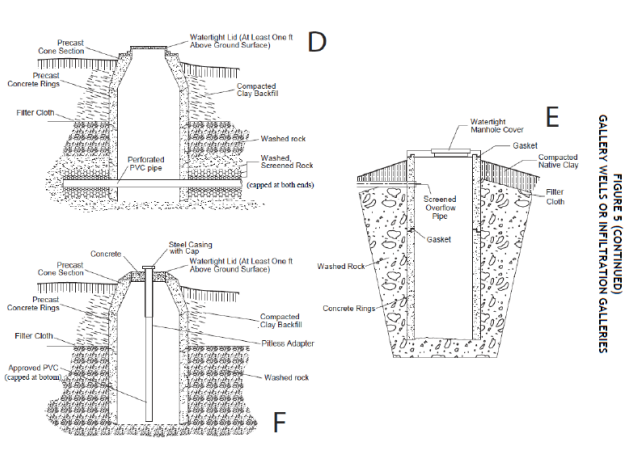
Onsite Inspection – Well Construction

- Gallery Wells
  - Conformance with Variance (Rule 10.4.11, Variance)

Well Permit Information

	Receipt	Permit No	Permit Suf	Permit Rpl	Type	Annotated	Pages	Created
View	10007462	319746		A	Well Construction	No	1	4/27/2021
View	10007462	319746		A	Original Replacement File	No	5	12/16/2020
View	10007462	319746		A	Well Permit	No	1	12/16/2020
View	10007462	319746		A	Well Construction Variance	No	6	12/14/2020

1 20 items per page 1 - 4 of 4 items



Onsite Inspection – Pump Installation

- Assess Depth of Grout in Annulus (Rule 10.5.2)
- Depth of Pitless Connection Relative to Grout (Rule 10.5.2.1)
- Assess Pump Installation Relative to Minimum Standards (Rule 11.2)
- Assess if the Pumping system pumping rate exceeds the Permitted Rate (Rule 11.1.4)
- Assess Electrical Connections (Rule 11.8.1)
- Assess plumbing materials and fittings between pump and point of discharge (Rule 11.8.2)
- Disinfection (Rule 11.11, Rule 15)

Onsite Inspection – Cistern Installation

- Assess Cistern Installation Relative to Minimum Standards (Rule 11.3)
  - Location Accessible for Servicing
  - Bedding/Backfilling
  - Grading
- Assess Electrical Connections (Rule 11.8.1)
- Assess plumbing materials and fittings between pump and point of discharge (Rule 11.8.2)
- Disinfection (Rule 11.11, Rule 15)

Inspection Documentation

- Documentation of Inspection:
  - Well Inspection Tracking form for notes regarding observations of Key Phases or other aspects of the work.
  - Add Inspection to HBDMC as an Action
    - Routine Inspection
    - Key Phase Inspection
  - Add Well Inspection Report to HBDMC.
  - Photos Uploaded to Google Drive or Stored Elsewhere.

Inspection Documentation

- Suspected Violation(s) of the BOE Construction Rules or BOE Administration Rules
  - Discuss aspect of construction that Inspector believes is in violation of the Rules with the onsite personnel.
  - If concern cannot be addressed by onsite personnel, reach out to Licensed Contractor.
  - Notify Chief Well Inspector with documentation of suspected violation of the Rules and supporting facts.

Inspection Documentation

Well Inspection Reports

Well Permits

Report Help Login

Overview | Construction Data | Permit History | Applicant/Contact | Imaged Documents

Permit Number	317852-	**Receipt**	10003972
Permit Category	Residential	**WDID**	
Permit Status	Well Constructed		

THIS PAGE IS NOT THE ACTUAL PERMIT

The information contained on this page is a summary of the permit file and may not reflect all details of the well permit. To view the actual permit, click here, or navigate to Imaged Documents to view all documents related to this permit.

Application/Permit History

Action History

CSV

Action	Action Date	Date Received	Comment
Permit Expiration Date	7/1/2022		
Well Inspected, Key Phase	10/9/2020		Key Phase: Follow up, Minimum Grout appears to be corrected.
Pump Installed	10/7/2020	10/27/2020	
Well Inspected, Key Phase	10/7/2020		Key Phase: Location >200' from Permitted Location. Minimum Grout not in conformance with Rule 10.5.2.1.b. See Inspection report
Well Constructed	10/5/2020	10/27/2020	
Permit Issued	7/1/2020		
Application Received	6/10/2020		

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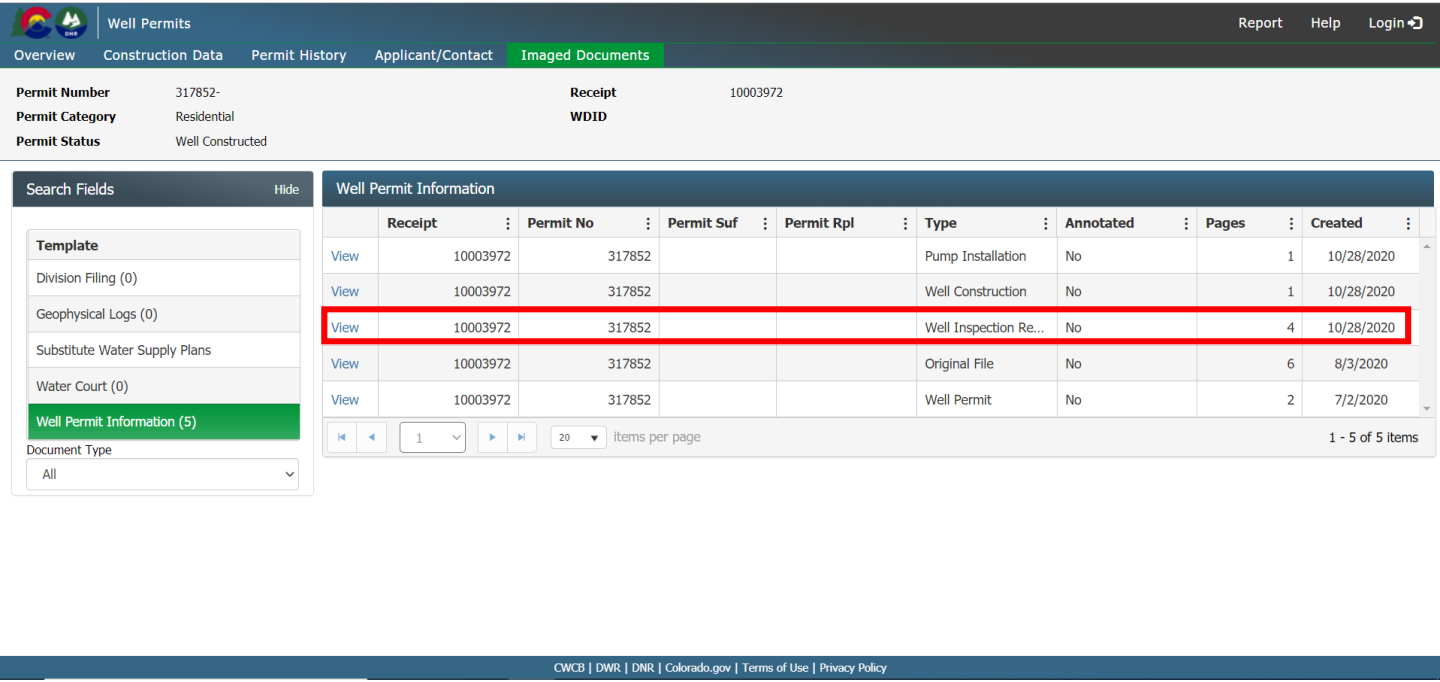
Inspection Documentation



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Inspection Documentation

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Board of Examiners of Water Well Construction and Pump Installation Contractors

WELL INSPECTION REPORT

Permit Receipt Number: 10003972 Permit Number: 317852

Inspector: CAJ

Date of inspection: 10/07/2020 Time Arrive: 18:00 Time Depart: 18:55

Division: 1 County: Arapahoe UTM Zone: ZONE 13 UTM X: 550912 UTM Y: 4397074

Company:

Driller/Installer Personnel Onsite: no one onsite

Reason for Visit: Saw Rig Notice Required: NO Notice Received: NO

Key Phases Observed:		Comments:
X	Well Location	>200' from permitted location
	Annular Space	
	Total Depth	
X	Minimum Grout	>3' below pitless Rule 10.5.2.1.b
	Perforated Casing	
	Pump Install	
	Cistern Install	
	Disinfection	
	Abandonment	

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Additional Comments:

Address appears to be 49652 CR 6. Borehole had been drilled and the contractor had installed the pitless adapter, electrical wiring, and plumbing between well and home. Open trench and excavation present at the wellhead. Contractor had used a piece of wood siding to cover the top of the well casing. The well casing is not secure per Rule 10.1.3. Depth to the pitless is about 63"; I was able to push a metal probe down the annulus between the borehole and casing about 69" (5.75') below the pitless adapter. Borehole annulus grout minimum depth exceeds the 3' required by Rule 10.5.2.1.b.

The information contained in this report reflects only what was observed during the inspection and does not endorse the well construction, pump installation, cistern installation, and/or abandonment. The responsible individual who certifies the work report pursuant to Rule 17.4 (2 CCR 402-2) is solely responsible for the work performed by them or under their direction or supervision.

Inspection Documentation

Well Inspection Report
Receipt No. 10003972
page 3 of 4

Photo 1: Insecure top of well.

Photo 2: Metal probe fully inserted into the annulus. Note measurement to vice gripe.

Well Inspection Report
Receipt No. 10003972
page 4 of 4

Photo 3: Metal probe extracted and measured to vice gripe.

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Questions?

Job Title	Full Name	E-Mail Address	Business Phone
Chief of Hydrogeology	Matt Sares	Matt.Sares@state.co.us	(303) 866-3581 Ext. 8290
Hydrogeologist, Senior	Kevin Donegan	Kevin.Donegan@state.co.us	(303) 866-3581 Ext. 8221
Hydrogeologist	Andrew Flor	Andrew.Flor@state.co.us	(303) 866-3581 Ext. 8218
Hydrogeologist	Ashley Lennon	Ashley.Lennon@state.co.us	(303) 866-3581 Ext. 8283

Job Title	Full Name	E-Mail Address	Business Phone
Chief of Well Inspection	Doug Stephenson	Douglas.Stephenson@state.co.us	(303) 866-3581 Ext. 8270
Well Inspector, Divisions 1 & 2	Chris Jones	Chris.Jones@state.co.us	(720) 618-9982
Well Inspector, Division 3	Larry Hakes	Larry.Hakes@state.co.us	(719) 588-8142

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