

# Field Inspection Unit

## Well Inspection Prioritization

Finalized 5/12/2016



### Introduction

Senate Bill 13-202 mandated the Colorado Oil and Gas Conservation Commission (COGCC) use a “risk-based strategy for inspecting oil and gas locations that targets the operational phases that are most likely to experience spills, excess emissions, and other types of violations and that prioritizes more in-depth inspections.” To accomplish this, the COGCC created a “Risk-Based Inspections” report in February 2014. The report had four main recommendations as summarized below:

1. Review integrity test results and inspect production facilities more frequently.
2. Increase inspections during production facility closures.
3. Conduct more time-specific inspections of construction, reclamation, and drilling activities using improved notice from operators.
4. Increase inspection frequency of hydraulic fracturing operations.

The first part of recommendation #1 will be implemented by a newly created Engineering Integrity team and all of recommendation #2 will be implemented by the COGCC Environmental group. Therefore, these recommendations are not included in this plan.

The latter half of recommendation #1 and all of recommendations # 3 and 4 will be carried out by the COGCC’s Field Inspection Unit (FIU) and are addressed in this plan.

### FIU Inspection Priorities

#### Overview

To improve the ongoing process and address the risks identified in the February 2014 report, inspectors within the FIU will concurrently perform the following:

1. Inspect the higher risk existing production wells and facilities as identified in the risk based model described below. This model addresses the second part of recommendation #1.
2. Inspect certain activities within the different operational phases of oil and gas development along with performing required follow-up inspections and responding to complaints. This addresses recommendations #3 and #4.

FIU inspectors will split their time between the two goals identified above and explained in further detail below.

#1 -- Risk Based Model for Existing Wells and Facilities

The COGCC has developed a geographic information system (GIS) model that calculates a total risk factor (RF) score for every well, including associated facilities. This risk factor would then be used to prioritize which existing wells and facilities should be given a higher priority for inspection.

The GIS risk model is a systematic, automated, and statistically-based method that includes several different factors and includes real-time data derived from the COGCC’s database, the Colorado Department of Water Resources (DWR), Colorado Parks and Wildlife (CPW), Colorado Department of Local Affairs (DOLA), and federal census data.

The risk-based model has six separate individual risk factors as listed in the below table. Each of the six individual risk factors has a scale from 1 (low risk) to 5 (high risk), an associated criteria for determining how a well is rated, and the weight factors for the risk factor.

	<b>Risk Factor</b>	<b>Higher (5)</b>	<b>(4)</b>	<b>(3)</b>	<b>(2)</b>	<b>Lower (1)</b>	<b>RF Weight</b>
1	<i>Population Density &amp; Urbanization</i>	>25 ppl/mi2	6-25 ppl/mi2 -or- within municipality AND <6 ppl/mi2	1-6 ppl/ mi2	0.5-1 ppl/mi2	<0.5 ppl/mi2	10%
2	<i>Environmental Risk</i>	See below					20%
3	<i>Time Since Last Inspection</i>	>5 yrs	3-5	2-3	1-2	<1	15%
4	<i>Years In Service</i>	>20 yrs	10-20	3-10	0-3	0	30%
5	<i>Reported Spills (Location)</i>	>4	3-4	2	1	0	10%
6	<i>Corrective Actions (Location)</i>	>3		1-3		0	15%

After applying the six individual risk factors with the associated weights, each well would have a total risk factor between 1 and 5. To stretch the final risk factor to a larger integer range, the total risk factor will then be multiplied by 15. Therefore, the total risk factor range for any well will be between 15 and 75. The following is the formula:

$$(([\text{RF\_01}] * 0.10) +([\text{RF\_02}] * 0.20) + ([\text{RF\_03}] * 0.15) +([\text{RF\_04}] * 0.30) +([\text{RF\_05}] * 0.10) +([\text{RF\_06}] * 0.15))*15$$

The total RF values have been divided into the following three priority categories:

- Higher priority = RF >45.
- Average priority = RF 40 – 45.
- Lower priority = RF <40.

As of February, 2016, the distribution of wells into the three priority classes was roughly 12% higher priority, 25% average priority, and 63% lower priority.

### ***Risk Factor #1 – Population Density & Urbanization***

This risk factor contains a rating between 1 and 5 for each well based on the population density at the location of the well relative to a classification of all census block data for the state. Wells located in lower population density areas are assigned a score of 1 with the RF increasing as population density increases. Wells inside a city limit are automatically assigned a minimum score of 4 regardless of the population density. The risk score bins based on population density were manually distributed using a roughly Gaussian distribution of total surface area:

10% of Colorado (<0.5 people/mi <sup>2</sup> ):	RF = 1
15% of Colorado (0.5 – 1 people/mi <sup>2</sup> ):	RF = 2
50% of Colorado (1 – 6 people/mi <sup>2</sup> ):	RF = 3
15% of Colorado (6 – 25 people/mi <sup>2</sup> ):	RF = 4
10% of Colorado (>25 people/mi <sup>2</sup> ):	RF = 5

### ***Risk Factor #2 – Environmental Risk***

This risk factor contains a rating between 1 and 5 based on the sum of the four environmental risk parameters below, with each accounting for 25% of the total RF #2 score:

- Distance to ground-water wells (DWR)
  - Less than 1/10 of a mile = 5.
  - 1/4 of a mile = 4.
  - 1/2 of a mile = 3.
  - 1 mile = 2.
  - Greater than 1 mile = 1.
- Distance to surface water (DWR)
  - Less than 1/10 of a mile = 5.
  - 1/4 of a mile = 4.
  - 1/2 of a mile = 3.
  - 1 mile = 2.
  - Greater than 1 mile = 1.

- Wildlife habitat (CPW)
  - A 5 is assigned if the well is in a Sensitive Wildlife Habitat (SWH) or Restricted Surface Occupancy (RSO) area.
  - A 1 is assigned if the well is NOT in a Sensitive Wildlife Habitat (SWH) or Restricted Surface Occupancy (RSO) area.
- 317B Exclusion Zone
  - A 5 is assigned if the well is in the internal ½ mile buffer zone of a 317B area.
  - A 1 is assigned if the well is NOT in the internal ½ mile buffer zone of a 317B area.

### ***Risk Factor #3 – Time Since Last Inspection***

The time since the COGCC last inspected a particular well (or location) as recognized in the COGCC database. Wells that have not been inspected in greater than 5 years are classified as a higher risk.

### ***Risk Factor #4 – Years in Service***

The total years a well has been in service is calculated from the spud date as recognized in the COGCC database. Wells that have not been inspected in greater than 20 years are classified as a higher risk.

### ***Risk Factor #5 – Reported Spills***

The cumulative reported number of spills at a given location. In places with multiple wells and other facilities, a given spill may have no association to the well being evaluated. The RF #5 will in some cases be inflated as this assessment is made on a location basis.

### ***Risk Factor #6 – Corrective Actions***

The total number of corrective actions at a given location since the last inspection. Presently no weighting is given to the type of corrective action. Additionally, corrective actions may be associated with a nearby facility or other well, and not necessarily the well being evaluated.

### ***Model Output and Reports***

The GIS model runs daily and produces a table with calculated RFs for every well in the state. This data is ingested back into the COGCC database daily to provide near real-time data for analysis, tracking, and spatial display on COGCC's internal interactive map. Reports have been created for inspectors to easily identify the higher risk existing wells and facilities in their areas.

## #2 -- Inspections of Oil and Gas Activities

The February 2014 “Risk Based Inspections” report recommends that the COGCC perform more inspections during certain phases of oil and gas development. These phases include construction of the oil and gas location, drilling activities, hydraulic fracturing activities, and reclamation activities.

Oil and gas operators are required by COGCC rule to provide notice to the COGCC prior to conducting the above activities along with several other activities per rule 316C. These notices allow COGCC inspectors to perform an inspection during those activities.

COGCC inspectors will perform inspections of noticed activities per rule 316C based upon the following criteria:

1. A review of the well based upon the first three risk factors in the above table ensuring that each inspector has done at least 20% of construction, drilling, and hydraulic fracturing activities for which notices were received.
2. If a Local Governmental Designee (LGD) has formally submitted a request to the Field Inspection Unit Manager or the Deputy Director for the COGCC to inspect certain activities where notices per rule 316C are required, COGCC inspectors will inspect all such activities for their areas.

Reports have been created for inspectors to easily identify the notices received for their areas.

### Summary of FIU Inspector Workload

COGCC field inspectors will balance their inspection workload by focusing and splitting their time between the following:

- Higher risk existing wells and production facilities as identified in the risk based model above, which could and will vary between region to region.
- All existing wells classified as “High Risk” in that year will be inspected.
- Inspections during noticed activities as described above.
- Re-inspections for locations where corrective actions were discovered.
- Response to well control and accidents.
- Response to complaints from the general public. This has been, and will continue to be, a high priority for the FIU inspectors.

The exact split between these tasks will vary between each inspector and will depend on the number of notices and complaints received, whether the LGD requested certain activities to be inspected, and the number of high risk existing wells and facilities in their area.