

OIL AND GAS INSPECTION PROGRAM CITY AND COUNTY OF BROOMFIELD

1. OBJECTIVES OF THE OIL AND GAS INSPECTION PROGRAM

The objectives of the CCOB oil and gas inspection program are to protect the health, safety and welfare of CCOB citizens by:

1. Verifying compliance with regulatory requirements;
2. Verifying conformance with best management practices, risk mitigation strategies and other commitments made in operator agreements, MOUs, or Use by Special Review provisions;
3. Evaluating the field conditions of active oil and gas facilities to:
 - a. Determine if there are measurable leaks and/or spills;
 - b. Determine if process protocols are being adhered to;
4. Identifying deficiencies and requiring corrective actions;
5. Providing information to the public

2. EXISTING WELLS & HISTORY OF BROOMFIELD OIL AND GAS REGULATIONS

The majority of CCOB's existing well sites are operated pursuant to Use by Special Review Permits approved under the Oil and Gas Regulations adopted in 1993 (Previous Regulations). The Previous Regulations required notice and a public hearing before the Planning and Zoning Commission and a public hearing before the CCOB City Council. The permits granted included, but are not limited to, requirements in landscaping and fencing; noise, dust, and light mitigation; traffic circulation plans; and emergency response plans.

The City Council adopted new Oil and Gas Regulations (New Regulations), Ordinance No.1986, in September 2013. The New Regulations incorporated best management practices to mitigate potential oil and gas hazards. The best management practices targeted air and water quality; chemical disclosure and storage; spill reporting; and coordination of emergency response efforts. The New Regulations left the current Use by Special Review Permit process in place and provided a new alternate path, known as an Administrative Approval by Memorandum of Understanding (MOU).

On July 10, 2018, City Council adopted new oil and gas regulations that the draft regulations, included in Ordinance No. 2067, ensure that oil and gas facilities are designed, modified, commissioned, constructed, equipped, operated, maintained, suspended, and abandoned in a manner that prioritizes the protection of human health, safety, and welfare. The regulations also contain provisions related to the location of proposed oil and gas well sites, including a requirement that operators conduct an alternative site analysis. Both operator agreements and use by special review permits are subject to City Council approval, under the new regulations. The 2018 oil and gas regulations also include provisions for the following:

- Air quality requirements that include electric power for drilling equipment, tankless production, quiet design mufflers, and 99% or better hydrocarbon destruction;
- Pipelines in place prior to production;
- Berms and secondary containment devices;
- No permanent storage of chemicals;
- Water quality monitoring and well assessment including baseline and subsequent soil and groundwater testing;
- Bradenhead monitoring of well casing;
- Water source sampling and testing;
- Well location that allows extraction of resources and mitigates impacts;
- Reduction in the number of wells on a single pad;
- Minimization of equipment, including low profile tanks and less intrusive equipment;
- Landscaping and irrigations;
- Buffering of visual impacts;
- Leak detection plan; and
- Financial assurances to include letter of credit, insurance, and bonding requirements.

The process of extracting oil and gas is complex and involves constructing the well pad; drilling; well stimulation and completion; production; transmitting product; and plugging and abandoning of the well. At this point in time, all of the well sites in the City are in the production phase as no wells are currently being drilled in the City.

3. OIL AND GAS INSPECTION PROCESS OVERVIEW

INSPECTION PROGRAM

In the discussion of the inspection program, it is important to understand various terms used. These include:

A. DEFINITIONS

Conformance - voluntary adherence to a standard, rule, specification, requirement, design, process or practice.

Compliance - adherence to a law, regulation, rule, process or practice.

Leak - Observed release of gas from a site or well.

Spill - Observed release of liquids (oil, produced water, or emulsion) from a site or well.

Site/Facility - Consists of production equipment (tanks, separators, emission control devices, piping and valving) and the wells that are piped to the production equipment.

Well Head - The top of a wellbore at the ground surface where piping, fittings, valves, and other equipment is installed to control and direct the flow of borehole fluids.

In 2015, the CCOB Oil and Gas Inspection Program began by conducting a baseline assessment to gather information, such as the number of active wells and locations; identifying issues that may need to be addressed; and fostering working relationships with oil and gas companies operating within CCOB's jurisdiction. This assessment was also

to ensure that all companies were operating in a safe and compliant manner. The baseline assessment consisted of four guiding principles, including:

1. Compliance standards - Inform, review, and assist companies in being compliant under local regulations.
2. Transparency - Communicate and report observations to City Council, oil and gas companies, the public, and other key stakeholders.
3. Identifying and addressing health issues - Mitigate health and environmental impacts.
4. Process and engagement - Coordinate with COGCC and CDPHE on reporting issues that need attention.

Operators were contacted via email to notify them that an inspector would be visiting active facilities to create a baseline assessment as part of the OGI Program. A Well Site Visit Checklist was created by the contracted inspector using the Previous Regulations and

applicable items from COGCC and CDPHE inspection forms to document results. The COGCC and CDPHE items were added because a recent COGCC report entitled, *Risk Based Inspections: Strategies to Address Environmental Risk Associated with Oil and Gas Operations*, identified that spills and air releases were the key hazards most likely to occur during the production phase of oil and gas operations.

The well site was then visually evaluated for proper signage, access road condition(s), weed control, proper operation of equipment, closed tank hatches, condition of containment, and signs of spills or releases. An added benefit to the inspection has been the availability of an infrared (IR) camera provided by the Regional Air Quality Council. The IR camera has proven to be an immensely useful tool allowing the inspector to identify gas leaks and confirm repairs that would otherwise go unnoticed.

After the evaluation of the well site, all issues or concerns observed were documented and communicated to the operator by email or direct communication on the well site. The inspector also provided follow-up communication with the operator or an additional well site visit to ensure all issues are corrected and resolved.

B. RESULTS TO DATE

From February 2015 through December 2017, the inspector conducted at least two visits to each of the active sites within the CCOB, in addition to any necessary follow-up visits to confirm that repairs had been completed. The well site visits allowed CCOB to gather data for a baseline assessment and evaluate current conditions in the field.

The baseline assessment indicated that the majority of the facilities are operating in compliance. The items documented have been related to weed control, proper signage, and soil staining issues. The IR camera has aided in detecting gas leaks and releases at the sites. The results of these inspections are summarized by year in the following sections.

2015

Conducted 73 site inspections at 38 facilities throughout CCOB.

The items that are typically found and documented during inspections have been related to leaks, weed control, proper signage, and soil staining.

An IR camera was also used at all active well sites.

- The IR camera/AVO detected gas leaks at 22 of the well sites.
- The leaks were detected at various points of production, including on storage tank thief hatches, separator valves, pneumatic devices, and wellheads.
- The inspector verified that 21 out of the 22 well sites were addressed by repaired the gas leaks. The remaining well was plugged.

2016

Conducted 73 site inspections at 37 facilities throughout CCOB.

The items that were typically found and documented during inspections included erosion and burrowing evident on the containment around storage tanks and separation equipment, improper or missing signs, weeds on the well pad and on and inside of containment, soil staining, and random trash that needed to be removed.

An IR camera was also used at all active well sites.

- The IR camera/AVO detected gas leaks at 26 of the well sites.
- The leaks were detected at various points of production, including storage tank thief hatches, separator valves, pneumatic devices, and wellheads.
- 25 out of the 26 well sites were addressed by repairing the gas leaks. The remaining well was plugged.

Started development of an interactive web-based platform that makes inspection results available to the public.

2017

In 2017, oil and gas inspections were no longer completed through the contract with the Boulder Public Health Department. In April 2017, Ed Pottorff was hired to perform all oil and gas inspections. Ed was added to Environmental Health staff because of his expertise in the regulations that are applicable to oil and gas. The following summary outlines the types of inspections conducted:

C. Types of Inspections

Routine	Scheduled and announced inspection of a well site
IR Camera	Routine inspection conducted with an infrared camera
Complaint	Response to a complaint and addresses particular criteria
Follow-up	Subsequent inspection based on findings from a previous inspection requiring follow-up to determine if issues have been resolved

Conducted 71 routine site inspections at 36 facilities throughout the City.

The items that were typically found and documented during inspections were minor in nature and included burrowing evident on the containment around storage tanks and separation equipment, missing signage, weeds on the well pad and on and inside of containment, and random trash that needed to be removed.

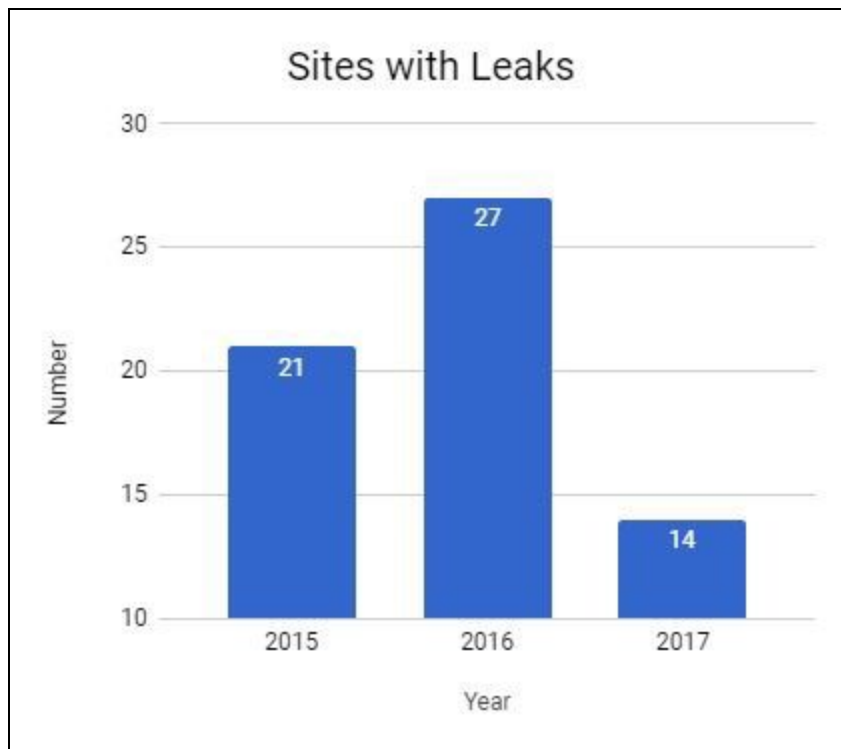
An IR camera was also used at all active well sites.

- The IR camera detected gas leaks at 20 of the sites. None of these were from the same piece of equipment on the same site. In general, most leaks occurred at production equipment (as described in the definitions above) as opposed to equipment specifically at the wells or well heads.
- The pieces of equipment from which leaks were observed and the number of leaks observed at these pieces of equipment included:
 - crude oil/ condensate tank thief hatches - 6 leaks
 - ¼-inch tubing fittings at well heads - 2 leaks
 - pressure relief valves of crude oil tanks - 2 leaks
 - a separator thermostat - 1 leak
 - a separator back pressure regulator - 1 leak
 - a produced water tank thief hatch - 1 leak
 - a crude oil tank blowdown pipe valve - 1 leak
 - a produced water tank vent pipe - 1 leak
 - packing around a well surface casing - 1 leak
 - a separator house gate valve - 1 leak
 - a well motor valve diaphragm - 1 leak
 - a small hole in the top of a fiberglass produced water tank - 1 leak
 - a well tubing head assembly - 1 leak

- The oil and gas operators typically made repairs at the time of the inspection or within a week if the repair required ordering parts. A summary of the number of days to make repairs is as follows:
 - 14 leaks were repaired during the inspection
 - 1 leak was repaired two days after the inspection
 - 1 leak was repaired four days after the inspection
 - 1 leak was repaired 15 days after the inspection
 - 1 leak was referred to COGCC and was subsequently repaired
 - 2 leaks were observed at facilities that do not meet thresholds that require monitoring under Colorado Regulation No. 7.

For purposes of comparison, the gas leaks observed over the past three years (2015, 2016, and 2017) are summarized below.

- 21 of 38 sites had leaks in 2015
- 27 of 37 sites had leaks in 2016
- 14 of 36 sites had leaks in 2017



2018

In 2018, several inspection program enhancements were made in response to the Oil and Gas Comprehensive Plan chapter, the Extraction Operator Agreement, and Ballot Issue 301. Specifically, the following inspection program enhancements were implemented:

- Increasing the number of routine inspections from two to three per year/site, while continuing to conduct complaint and follow-up inspections.

- Developing and implementing a detailed inspection checklist for any sites that may experience spills or releases.
- Releasing an interactive web-based platform that was made available to the public in the first quarter of 2018. The web-based platform houses all of the inspection details from 2016 to present. Users are able to navigate the map by clicking on and dragging the screen, searching a specific well name, or searching a specific address. Each of the wells and well facilities are selectable and allow for navigation to an inventory of the site equipment, inspection details, and to obtain a printable PDF of individual inspection reports.
- Hiring a Public Health Protection Administrator that has a strong background in environmental regulations and process knowledge.

Currently, two of the three rounds of inspections have been completed for 2018. In addition, an IR camera was purchased, received, and is now being used in all of the inspections. A summary of the data for 2018 will be published when all of the planned routine inspections are complete. Generally speaking, leaks are trending down. Inspection reports are available for review at:

<https://www.broomfield.org/2713/Oil-and-Gas-Map-Viewer>

D. INSPECTION PROGRAM FOR NEW OIL AND GAS DEVELOPMENT

For 2019, enhancements will continue to be made to the oil and gas inspection program. These enhancements include:

- For 2019, Broomfield Public Health and Environment has developed and submitted budget decision packages that will add an additional inspector and a Public Health Protection Administrator to assist with Environmental Health related workload and allow more oil and gas focus by the Assistant Public Health Director, Laura Davis.
- Increasing the number of routine inspections from three to four per year/site, while continuing to conduct complaint and follow-up inspections.
- Developing new inspection checklists to correspond with the requirements outlined in the Extraction MOU, best management practices, and oil and gas municipal code. The new inspection checklists will be developed around the different “phases” of operation (construction, drilling, completion, production, and plugged and abandonment). Inspection and drilling inspection criteria will be completed first, followed by completions, production, and plugged and abandoned. They are being done in order and will be completed by the end of 2018.

- Conducting inspections for the plugging and abandonment of existing wells identified in the MOU, along with inspecting any other plugged and abandoned wells by other operators that may occur throughout the year.
- Purchasing new equipment to enhance the inspection program. For example, a hand-held sound level meter. This equipment will be purchased in 2018 and will be used for all of the 2019 inspections.
- Broomfield is contracting with Ajax Analytics to provide an air quality testing program that will include work by Colorado State University and provide for the identification and analysis of emission events.
- Broomfield is requiring new operators to conduct soil gas testing of plugged and abandoned wells within their spacing units and Broomfield is phasing in soil gas testing of other plugged and abandoned wells within Broomfield.