

Minutes of the Oil and Gas Advisory Committee
City of Aurora, Colorado
March 17, 2021

Virtual Meeting

Meeting was called to order at 4:04 p.m. by Chairman Pierce.

The following were present:

Brad Pierce, Committee Member, Chair, Citizen
James Spehalski, Committee Member, Surface Owner - ABSENT
Jim Rogers, Committee Member, Industry - ABSENT
Marc Cooper, Committee Member, Surface Owner
Philip Holmes, Committee Member, Industry
Polly Page, Committee Member, Citizen
Tom Tobiassen, Committee Member, Citizen
William Gollhofer, Committee Member, Citizen
Max Blair, Committee Member, Industry
Josh Reddell, Committee Member, Vice-Chairman, Citizen

Jeffrey S. Moore, City of Aurora, Oil & Gas Division Manager
Colin Brown, City of Aurora, Senior Planner
Forrest Thorniley, City of Aurora, Senior Inspector
Ian Best, City of Aurora, Assistant City Attorney

David Carro, Oakwood Homes, Director of Acquisition and Entitlement, Surface Owner Applicant

1. Brad Pierce, Chairman, called the meeting to order at 4:04 p.m. There was a quorum of 8. Max Blair joined the meeting late.
2. Chairman Pierce introduced himself and proceeded to call role. He asked that each person include their category of membership on the committee (industry, public, etc.) for the benefit of the guest presenter, Bob Raynolds. Aurora City Staff introduced themselves.

Chairman Pierce provided a brief update on Mr. Carro's application for the vacant Surface Owner position on the Committee. Chairman Pierce sent his application and packet to the City Clerk's office. His application will go to City Council Study Session on Monday March 22nd. Once his application is heard during Study Session, his application will be heard and voted on at the next regular City Council meeting to be voted on. The next City Council meeting is Monday April 12th.

Chairman Pierce asked members of the public to introduce themselves. There were no members of the public present.

3. Election of Officers – Officers of the Oil and Gas Advisor Committee are supposed to be nominated and elected at the first meeting of the year. Since it didn't occur at the January 20th meeting, officers will be elected at this meeting. Polly Page suggested that the Committee keep the officers the same. She nominated Brad Pierce for Chairman and Joshua Reddell for Vice-Chairman. Tom Tobiassen seconded Ms. Page's motion. The motion was approved unanimously.

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4. Approval of January 20, 2021 Minutes – Polly Page moved for both minutes to be approved as amended. Marc Cooper seconded. The motion passed.

5A. Colin Brown provided the following update of oil and gas applications since the January 20, 2021 Meeting: Crestone Peak Resources had their proposed amendment changes to the Operator Agreement approved by City Council at the January 25th City Council meeting. Their amendment removed two well site locations from the Operator Agreement, but increased the well count at other well site locations. The Crestone Peak Rush North and Rush South well site applications have been Administratively Approved. The mylars for both locations are in the process of being recorded. The Crestone Peak Lone Tree North Phase 2 well site application has been Administratively Approved, which is a location that had it's well count increased as a result of the approved Operator Agreement amendment. There are no updates on any Axis Exploration applications. Based on communication with Axis, they are not planning on doing any work within the City this year, but that could change. GMT Exploration has withdrawn their MCC application. They were in negotiations with the Aurora Highlands to shift that pad. GMT has not said where the new pad location would be.

5B. Forrest Thorniley provided the following update of oil and gas inspections since the January 20, 2021 Meeting: Since the January 20th meeting, there have been no complaints or spills within the City. Forrest has performed an initial site visit to all facilities and the majority of the known pipeline appurtenances within the City. Forrest visited Crestone Peak's workover rig and their surface drilling rig, and will be visiting a Crestone P&A well site and their horizontal drilling rig. In the beginning of April, he will be working with the Regional Air Quality Council and will be using their infrared camera. He will be inspecting all of Crestone's facilities with the infrared camera during the first week of April. He has acquired the majority of all his necessary field equipment and is close to being fully operational. Forrest explained the purpose and function of the infrared camera. The camera contains a cooling mechanism that allows the user to visualize gas leaks. The camera looks specifically for methane leaks that are not visible to the naked eye. It is a tool that has been used in the oil and gas industry for over a decade and it used primarily to capture emission leaks from oil and gas storage facilities. Many operators, including Crestone, have their own infrared camera and currently conduct their own inspections. Forrest's inspections will be an audit on Crestone's inspections. If any leaks are found, they will be fixed by the Operator.

Max Blair had a question regarding what the notification process and follow up process is if Forrest finds a leak at a certain facility to ensure the leak is fixed. Forrest is still developing that process and finalizing the details. He is unsure is a Crestone representative will be accompanying him to each site through the duration of his inspections. If so, Forrest will default to the representative's preference for how to identify those leaks. If Forrest is on his own during his inspections, he will determine the best way to track and record those leaks and will present his findings to Crestone at the end of the day or week. The expectation is that Forrest will communicate his findings to the Operator and will expect a response from them within a certain period that details how they will address the leaks. Forrest will also be sending a copy of his inspection results to the Regional Air Quality Council. Max Blair asked a follow up question about FLIR cameras and their inability to quantify the amount of gas leaked. Forrest said the camera he will be using does not have the ability to quantify the amount of gas, but some cameras do.

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Jeffrey Moore made a note that we are working with the City's IT department to acquire some inspection report software that would enable the City to automatically send a copy of the inspection report to the Operator.

Chairman Pierce asked how Forrest would prioritize well sites for inspection. Forrest said our initial plan is to rent the infrared camera at least every quarter, but hopefully increase that to a monthly rental. That would give him the ability to inspect every Crestone facility within that time frame. There is no priority ranking in terms of Crestone facilities, but there are state regulations related to production volumes and frequency of inspections. As facilities come online and have higher production volumes, they are inspected more frequently. As production tapers off, the inspections are less frequent. Forrest's inspections will be occurring on routine basis. Crestone will also be sharing their own inspection results with the City going forward.

5C. Update on Oil and Gas Manual – Jeffrey Moore provided an update on the status of the Oil and Gas Manual. The Oil and Gas Manual was heard at the February 1st Study Session. It was voted on and forwarded to the next City Council meeting. There were many comments and suggestions based on the Study Session and a new redlined version was posted online around February 15th. Since then, Jeffrey has received a few comments from citizens and from industry groups. The industry group comments center around the City's authority to regulate and inspect pipelines. There are many complexities related to pipeline regulatory authority and which government entity has the ability to regulate and inspect different pipeline segments. The City's primary focus is on understanding the pipelines within the City, making sure we understand where they are, what each pipeline is transporting, who has regulatory authority and making sure all citizens and the environment are safe. The Operator Agreement best management practices don't necessarily apply and are no longer appropriate in a regulatory framework. Mr. Moore is in the process of making some additional changes to the pipeline regulations as a result of meeting with the City's outside council and City legal staff. He expects to post the latest redline Oil and Gas Manual in the coming weeks. The manual is scheduled to have the first reading of the Oil and Gas Manual at the April 26th City Council meeting. Members of the public can attend and comment on the Manual. Jeffrey will send out the latest redlined copy of the Manual to the Committee once it is complete.

Jeffrey provided further explanation on the call up provision in the Oil and Gas Manual and how it relates to the Operator Agreements. There is nothing in the Operator Agreements that limits City Council from calling up an Administrative Decision on any well site listed in an Operator Agreement. The permit cannot be unduly withheld, but a City Council call up is allowed. In the future, well site applications subject to the Oil and Gas Manual could be called up by City Council after the application is first approved by the Planning and Zoning Commission or after the final approval by the Oil and Gas Division. City Council can call up any administrative decision by any department, but there is a deadline for when that call up must occur by.

The Advisory Committee has a consensus as it relates to the call up provision in the Oil and Gas Manual. The Committee believes that the addition of a call up provision in the Manual represents a shift in policy and may lead to uncertainty for Operators. The opinion of the Committee has been provided to City Council and will be included in the packet for the April 26th City Council meeting. All members of the Advisory Committee agree that the call up provision is still a concern for them. Max Blair provided some comments on the call up provision and voiced his support for the Committee's opinion. Polly Page

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also provided some comments on the call up provision and voiced her support for the Committee's opinion.

6. Public Comment Period – There were no public attendees or comments.

7. Colorado Aquifer Presentation by Bob Raynolds of the Denver Museum of Nature and Science – Chairman Pierce gave a brief background of Mr. Raynolds education and professional experience. Mr. Raynolds received a Bachelor's Degree from Dartmouth College, a Master's Degree from Stanford, and a Ph.D. from Dartmouth College. He has worked for Exxon and Amoco Production Company. Currently, he is a consulting geologist and a research associate with the Denver Museum of Nature and Science, and an adjunct faculty member at the Colorado School of Mines. He has also held many different teaching positions, mostly dealing with geology, sequence stratigraphy, and geophysics. He has written several research papers and had the opportunity to work on several international geology projects.

Mr. Raynolds spoke briefly about his background and some of the current projects he is working on. His background and education have allowed him to gain an understating of aquifers, which are the sedimentary rocks that hold ground water. He has done extensive research on the Denver Basin and the aquifers and geology within the basin. He also has knowledge of the relationship between rocks that contain the aquifers and the rocks that contain the oil and gas resources in the basin.

Mr. Raynolds then began his presentation. The situation that the Denver Front Range faces is interesting because we have an urbanized area that faces a critical issue of water sources. Most of the water that the Front Range uses is located on the western slope, while the urbans areas on the eastern slope. Through one of his research projects, he was able to gain an understanding of the water bearing rocks in the Denver Basin through the analysis of well cores. He mapped the various aquifers in the Denver Basin through that project. There are about 84 active oil and gas wells in Aurora city limits, while there are thousands of oil and gas wells in the Denver Basin. Those wells are producing oil and gas from sedimentary layers of rock that was deposited by an ocean that used to be in the area, millions of years ago. Those layers are approximately 7,000-8,000 feet below the surface of the ground. Some of the wells have been drilled vertically, mostly the older wells, while the newer wells are drilled vertically and then horizontally to produce oil and gas. The horizontal wells are then hydraulically fractured to help produce the oil and gas resources.

The water resources along the Front Range are derived from ground water sources and surface water sources. The ground water resources are not very sustainable because the aquifers are not being recharged and are not a viable source of water for municipalities to depend on. Early on, the City of Aurora recognized this and made decisions to find reliable surface water supplies for the City. Today, 95% of Aurora's water comes from surface water sources and is not reliant on ground water sources or municipal water wells. In order for ground water sources to recharge and refill, it occurs over a very long time period, on the order of millions of years. That is why ground water resources are not sustainable and not a viable water source for urban areas. The relative depth of ground water sources is roughly 500 feet to 2,000 feet deep, depending on the area. Some of the deeper aquifers can be up to 2,000 feet deep. Most water wells are shallow. Most oil and gas production is down to 7,000-8,000 feet. Mr. Raynolds used a piece of paper to demonstrate the scale of how deep water wells are compared to oil and gas wells. If you flip a piece of paper on its side, so that the short side of the page is vertical, and you say 1-

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inch equals 1,000 feet, one inch down from the top of the page would represent how deep a water well is. Seven to eight inches would represent how deep an oil and gas well is. The oil and gas producing layer is much deeper than the water producing layer. When an oil and gas well is hydraulically fractured, the stimulation doesn't expand more than a few hundred feet past the wellbore, so it stays relatively close to the wellbore and deep below the surface.

Both layers, oil and gas and water layers, produce from porous layers of rock. The oil and gas layer is a much tighter rock layer and less permeable than the water producing layers. There is not a lot of interference or communication between the two layers because they are separated by thousands of feet of impermeable shale rock. The impermeable layers of rock do not allow fluids to pass through and migrate to other layers. The issue with an oil and gas well is that the wellbore does go through the layers that contain the aquifers and ground water. The public and operators are interested in maintaining the wellbore's integrity as it passes through the ground water. There is also a lot of oil and gas infrastructure on the surface and above the ground water. That infrastructure is also a risk for spills and leaks. They can leak and they do leak. Leaks can cause contamination of near surface aquifers and surface water sources, like streams.

Water resources are very important, especially for arid regions. The City of Aurora does not depend heavily on ground water sources. There is a need for care and attention for possible failures of engineering that would allow oil and gas to get outside of the wellbore and pipelines. The City of Aurora has gone to great lengths to obtain water rights and water storage facilities to ensure their water resources.

Polly Page asked if somebody in Weld County would be able to contaminate an aquifer that stretched into the City of Aurora. Mr. Raynolds responded that based on his previous experience and studies, and based on the structure of the aquifers in the Denver Basin, this is highly unlikely. The aquifer is basically a large alluvial fan that begins at the mountains and extends east. The fans of the aquifer gets smaller and smaller the further east you go. There is not a significant sized aquifer on the east side of Aurora. She asked if we had more of a chance of pollution through spills than drilling. Mr. Raynolds replied that yes, he thought there was a better chance of contamination through spills than through drilling. There are more miles of pipeline near the surface and more oil and gas tanks on the surface, in terms of area, than there are miles of wellbores underground. He thought the likelihood of a spill occurring because of a pipeline leak was greater than experiencing a leak through the wellbore.

Jeffrey Moore asked if Mr. Raynolds knew the flow rate, over time, of the aquifers in the Denver Basin. Mr. Raynolds said that in a situation where there was no artificial help from humans, the flow rate would be very, very small and would be on a geologic time scale. With artificial help from humans, you would be pumping the water out. There are a few water wells in the Denver Basin where water is flowing from one aquifer to another.

Chairman Pierce made a comment about the Binney Water Treatment plant. The Prairie Waters Pipeline and the Binney Water Treatment Plant is like a giant water recycling system. Water is pumped out of the South Platte River, treated at the Binney Water Treatment plant and transported through the Prairie Waters Pipeline system to customers. Customers use that water, which then gets put back into the South Platte River and the cycle continues. In years where there is excess water and through that project, Aurora has the ability to sell excess water to water districts in Douglas County, where they do rely on ground

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water sources. Chairman Pierce also thought that Mr. Raynolds example with the piece of paper was very effective in illustrating the depths of wells. Chairman Pierce also agreed that wellbore integrity is a very important thing.

Forrest Thorniley mentioned that if anybody was interested in looking up potential ground water contamination on production sites, Form 27 is filed with the COGCC online. Based on his experience, any spill on a production site does not make it off the pad.

Mr. Raynolds finished up by saying that there is a robust water resources group in the Denver area and a large community of ground water experts in the area. If there is any further interest in learning more about the water cycle and oil and gas production, there is a large group that would be interested in sharing their knowledge.

Philip Holmes asked where the primary recharge areas for the aquifers are. Mr. Raynolds said there are erosion areas along the western edge of the Denver Basin that act as a recharge area, and one example area near Sedalia. The recharge rates are at a geological time scale, so very slow. He believes the ground water sources are a finite resource and that the recharge rate is not quick enough to refill the aquifers in our lifetime. Polly Page asked if there was any success with pumping water into the aquifers. Mr. Raynolds said that they Centennial Water District in Highlands Ranch has been experimenting with that, but does not know if they have had any success. You must treat the water before pumping it back into the aquifer and you must pump it at high pressure to get the water into the aquifer. He is not sure if this process is economical in Colorado. There are other areas around the country and world where it is successful and more economic.

Chairman Pierce thanked Bob for his presentation and time spent with the Committee.

8. 2021 Calendar and Discussion Topic Ideas (3rd Wednesdays of May, July, September and November) – Chairman Pierce informed the Committee that there are four Committee Members whose terms expire on June 30th. He will reach out to the members whose terms are expiring on June 30th to see if they would like to reapply for their position. The members with expiring terms are Max Blair, Polly Page, Josh Reddell, and Brad Pierce. All members that want to reapply will have to be interviewed at the May 19th meeting. Chairman Pierce will contact those members individually to see if they would like to reapply.

Polly Page asked if Jeffrey had done any research on what happens if the COGCC has a hearing on appeal from a city if they can overturn a permit application. Jeffrey has not researched it yet, but will and will get Ms. Page an answer. He said conceptually, on issues in the past, when there is a mix of state concern and local concern, courts typically side with the state. He believes if there was a conflict, that the State would likely win in court.

Chairman Pierce asked if the Oil and Gas Division would have anything to present during the May meeting regarding the updates and changes to the website. Jeffrey said that would be more likely something that could be covered during the July meeting.

9. The general meeting was adjourned at 5:22 p.m.