

**COLORADO OIL AND GAS CONSERVATION COMMISSION
(COGCC)**

2016 ANNUAL REPORT

to the

WATER QUALITY CONTROL COMMISSION (WQCC)

and

WATER QUALITY CONTROL DIVISION (WQCD)

of

**THE COLORADO DEPARTMENT OF
PUBLIC HEALTH AND ENVIRONMENT
(CDPHE)**



COLORADO
Oil & Gas Conservation
Commission

IN ACCORDANCE

with

THE AUGUST 28, 1990 MEMORANDUM OF AGREEMENT

and

THE IMPLEMENTING PROVISIONS OF SENATE BILL 89-181

December 30, 2016

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	WQCC/WQCD and COGCC COORDINATION AND PUBLIC OUTREACH	1
2.1	Inter-agency Coordination	1
2.2	Public Outreach	1
3.0	COGCC ORGANIZATION	3
3.1	COGCC Commissioners	3
3.2	COGCC Staff	3
3.3	COGCC Information/Data Systems	6
3.3.1	eForms	7
3.3.2	GIS- Geographic Information Systems	7
3.3.3	Environmental Database	8
3.3.4	Data Downloads	9
3.3.5	Online Environmental Reports	10
3.3.6	Daily Activity Dashboard	11
3.4	COGCC Environmental Program and Project Funding	11
4.0	NEW COGCC REGULATIONS AND POLICIES	12
5.0	OIL AND GAS EXPLORATION AND PRODUCTION ACTIVITY	13
6.0	SPILLS/RELEASES AND REMEDIATIONS	14
6.1	Statewide Spills/Releases and Remediations	14
6.2	Investigations into Thermogenic Stray Gas Impacts to Domestic Water Wells	15
7.0	ENFORCEMENT	16
8.0	SPECIAL ENVIRONMENTAL PROJECTS	16

LIST OF APPENDICES

- 1 - COGCC Commissioners**
- 2 - COGCC Organization Chart**
- 3 - Spill Analysis by Year Since 1999**
- 4 - Example Analytical Report**
- 5 - Permit Statistics**

1.0 INTRODUCTION

The Colorado Oil and Gas Conservation Commission (COGCC) is an implementing agency for water quality standards and classifications adopted by the Water Quality Control Commission (WQCC) for ground water protection. This authority was provided by Senate Bill (SB) 89-181, and is restated and clarified by a Memorandum of Agreement (MOA) that was adopted by the agencies on August 8, 1990.

Section 5.1 of the MOA specifies that the COGCC must report annually to the WQCC and the WQCD about how its programs assure compliance with WQCC water quality standards and classifications for the activities that are subject to the jurisdiction of the COGCC.

This 25th annual report provides an overview of COGCC functions and a summary of calendar year 2016 activities, with a focus on groundwater protection programs. Major issues concerning the implementation of water quality standards and classifications are also reported.

2.0 WQCC/WQCD and COGCC COORDINATION AND PUBLIC OUTREACH

2.1 Inter-agency Coordination

In 2016 the COGCC, WQCC, and WQCD worked in close coordination implementing the provisions of SB 89-181 and the MOA. COGCC and the CDPHE Office of Emergency Preparedness and Response staff communicated frequently through email and telephone calls regarding spills at or near oil and gas facilities when there was some question as to whether a spill was exploration and production (E&P) waste or not. COGCC took the lead for all E&P waste spills.

The COGCC staff met with WQCD/WQCC on March 1, June 21, September 14, and December 7, 2016 to discuss program issues. One topic of discussion at these meetings was reuse and recycling produced water. Specifically, COGCC and WQCD discussed the criteria for discharge to surface water and thresholds for spill reporting for an individual operator within the Denver-Julesburg (DJ) Basin. Reuse and recycling of produced water remains an area of keen interest for the COGCC, as well as for the regulated community and a growing number of third-party non-governmental organizations.

2.2 Public Outreach

The COGCC employed the following strategies for effective communication with the public and the regulated industry:

Commission Hearings:

- In 2016, the COGCC held two of its regular eight hearings outside of Denver: one in Glenwood Springs, Garfield County (July) and one in Sterling, Logan County (October). A third Commission Hearing scheduled to be held outside of Denver, in Trinidad,

Colorado, was rescheduled for Denver due to a major winter storm forecast for the entire Front Range.

- Staff reports were prepared prior to all eight hearings for the COGCC Commissioners. Ongoing staff activities such as compliance and enforcement actions, environmental and landowner issues, and other topics relevant to the mission of the COGCC were summarized in these reports. The 2016 reports were distributed widely to interested parties and they are posted on the COGCC website www.cogcc.state.co.us.

COGCC staff participates in regularly scheduled meetings with the regulated community and other interested stakeholders in parts of the State with active oil and gas operations. The Gas and Oil Regulatory Team (GORT), established by COGCC Order, met in Durango three times in 2016, focusing on oil and gas operations in the San Juan basin in southwestern Colorado. GORT provides a forum for meaningful dialogue between operators, citizens, county and local governments, the Southern Ute Indian Tribe (SUIT), the Bureau of Land Management (BLM), the US Forest Service (USFS), and the COGCC.

The Northwest Colorado Oil and Gas Forum (NWCOGF) usually meets in Rifle or Grand Junction, also three times yearly, and focuses on the Piceance basin and other operations in the northwestern part of the state. The NWCOGF is co-chaired by Garfield County and the COGCC; other State, Federal, and local government agencies, the oil and gas industry, and concerned landowners and citizens regularly participate. COGCC staff and the Director or Deputy Director regularly attend GORT and NWCOGF meetings and give presentations on emerging issues, hot topics, as well as routine updates on operations statewide and in the respective geographic areas.

COGCC has developed a web-based interface for citizens to file complaints about oil and gas operations. This tool allows a complainant to track COGCC's progress toward resolving the complaint and increases the transparency and accountability of COGCC's complaint response process. In 2016 (through November), the COGCC responded to 238 complaints regarding issues such as noise, dust, odors, and reclamation, among others. Included in these 238 complaints were 17 water well concerns which the COGCC investigated.

COGCC continues to solicit participation in the regulation of oil and gas exploration and production. Stakeholders, including the oil and gas industry, local governments, citizens, other regulatory agencies, agriculture interests, and the environmental community provide input into permitting, policy development, rulemaking, and other processes. During 2016, COGCC staff participated in 82 meetings at the request of municipal, county, and other local governments, EPA, BLM, trade organizations, and special interest groups. COGCC's Local Government Liaisons (LGL) were actively involved in this outreach, participating in 51, or about 62%, of the total.

The Local Government Designee (LGD) process was created by the COGCC in 1992 to provide a conduit of information between local governments and the COGCC. Two LGLs, hired in 2012, facilitate participation in the LGD program through training, answering questions and providing information, data, and presentations about specific aspects of oil & gas operations,

COGCC rules, and the COGCCs role as a regulatory agency within the Department of Natural Resources. In total, 161 entities (55 counties, 101 municipalities, and 5 special districts) currently participate in the LGD program.

The COGCC continues to use its website, <http://cogcc.state.co.us>, to make announcements and distribute information/data. COGCC information and data systems are described in Section 3.3.

3.0 COGCC ORGANIZATION

3.1 COGCC Commissioners

The Colorado Oil and Gas Conservation Act specifies the composition of the Commission. The Act requires nine Commissioners, seven of whom are appointed by the Governor with the consent of the Senate, and two ex officio voting members who are the Executive Directors of the Department of Natural Resources and the Department of Public Health and the Environment. At least two members are appointed from west of the continental divide and the other members are appointed taking into account the need for geographical representation of other areas of the state with high levels of oil and gas activity or employment. Of the seven, three members are to have substantial experience in the oil and gas industry and at least two of these must have college degrees in petroleum geology or petroleum engineering; one member must be a local government official; one member must have formal training or substantial experience in environmental or wildlife protection; one member must have formal training or substantial experience in soil conservation or reclamation; and one member must be actively engaged in agricultural production and also be a royalty owner.

The Commission welcomed three members in 2016, two new and one returning. A chart showing the makeup of the COGCC Commission is included in Appendix 1; Commissioner biographies can be found on our website <http://cogcc.state.co.us/about.html#/commissioners>.

3.2 COGCC Staff

The COGCC has 111 authorized FTE positions located in the Denver office and throughout the State in field offices. COGCC is currently holding nine vacant positions open due to a decline in projected agency funding. The Staff are made up of engineers, environmental protection specialists (EPSs), field inspectors, permitting technicians, hearings specialists, and a variety of administrative professionals. Table 3-1 summarizes each group and their primary functions.

The current organizational chart and a series of maps showing regional areas of responsibility are included as Appendix 2.

Table 3-1

Group	Number of FTE	Primary Functions
Executive	3	Director and Deputy Director, Executive Assistant.
Environmental	21	Spills, Remediations, Pit Closures, Complaint response, Environmental projects, Oil and Gas Location Assessments & Pit Permitting, Environmental database.
Engineering	16	Permitting downhole wellbore plans, UIC Permitting, Oil/Gas Facility oversight, Plugging orphan wells, flowline integrity.
Field Inspection	31	Inspection of Oil/Gas wells, facilities, and locations; Complaint response; Interim and final reclamation.
Permitting & Technical Services	24	Permitting oil and gas wells, Bonding, Production reporting, Database management/support, GIS, Website development/support, eForm development/support.
Hearings	12	Hearings, Rulemaking, Enforcement, Local Government Liaisons.
Financial	4	Budget Management, Procurement, Purchasing.

Staff functions that directly relate to water resource protection and compliance with groundwater and surface water standards include the following:

Permitting- Applications for Permit to Drill (APDs) are reviewed to ensure compliance with all rules related to aquifer protection. Oil and gas wells must be designed and installed to prevent the migration of fluids or gas between formations or into aquifers. Permit technicians and engineering staff review drilling permit applications for surface casing and cementing requirements, among other requirements designed to protect aquifers.

Location Assessments- Under the Form 2A process, Operators are required to provide site specific environmental information about surface locations. Consultation by the Colorado Department of Public Health and Environment (CDPHE) and Colorado Division of Parks and Wildlife (CPW) with the COGCC, the surface owner, and the operator is required in some circumstances. Oil and Gas Assessment Location (OGLA) specialists in the environmental group review and evaluate Form 2A applications, as well as publicly available information, to determine whether the proposed oil and gas operations have the potential to negatively impact water resources; public health, safety and welfare; the environment; and/or wildlife resources. Site-specific conditions of approval (COAs) may be placed on permits to prevent or mitigate potential impacts.

Underground Injection Control (UIC) Permitting- Through November, COGCC Staff approved 16 Class II UIC well permits in 2016. COGCC staff continues to work with WQCD and EPA staff to ensure that operators of Class II injection wells in Colorado are in compliance with groundwater standards and classifications. COGCC's staff geologic experts review UIC permits for site specific matters, such as the occurrence of faults and potential seismic issues.

Injection operations in the Raton Basin and in Weld County are being actively managed by the COGCC in conjunction with the U.S. Geological Survey Earthquake Notification Service,

through the installation and continuous monitoring of several local seismometers to evaluate if injection of produced water has some relationship to local seismicity. In Weld County, COGCC has required injection well operators to plug back certain wells, and continues to work closely with those operators to reduce injection volumes and closely monitor seismic activity in the vicinity of their operations. COGCC has instituted a “traffic light” monitoring system, which dictates specific mitigation measures, up to requiring injection to be halted, if seismic activity reaches specific levels.

Pit Permitting- Operators construct pits at oil and gas locations for a variety of purposes; most commonly to contain drill cuttings, produced water and flow back, and for the reuse and recycling of produced water. COGCC is responsible for permitting pits (Form 15), inspecting their operation and overseeing their closure. The OGLA and EPS staff review pit permits for construction and operational details, and evaluate the environmental setting to ensure that the pit can be used without causing adverse environmental impacts. The Director may apply conditions of approval with additional provisions to protect waters of the state, public health or the environment. In 2016, 17 new pits were permitted. Applications for new pits are down significantly over previous years (106 permits in 2013, 45 permits in 2014, and 17 in 2015) reflecting both a decrease in new O&G activity in areas that traditionally have used pits for produced water disposal and widespread industry use of “pit-less” drilling and completion activities.

Centralized E&P Waste Management Facility Permitting- Non-commercial centralized exploration and production (E&P) waste management facilities are permitted by COGCC under Rule 908. Generally these facilities are larger than a typical tank battery or pit that might handle wastes from only one or a few wells. These larger facilities handle wastes from many wells and often from more than one field or lease operated by a single oil and gas operator. These facilities may include lined pits, land farms, drill cuttings solidification facilities, and tank batteries. A permit is required for these facilities and, as part of the approval process, staff evaluates the proposed site, operation, financial assurance, environmental impacts and preliminary closure plans. These facilities are currently required to have financial assurance in an amount equal to the estimated cost for proper closure, abandonment, and reclamation. During 2016, the COGCC permitted 5 new centralized E&P waste management facilities. There are 40 active permitted centralized E&P waste management facilities in the state.

Oversight of Produced Water Disposal - Approximately 50% of the water co-produced with oil and gas is disposed or used for enhanced recovery by underground injection. Most produced water that is not injected is disposed in evaporation and percolation pits or discharged under a Colorado Discharge Permit System (CDPS) permit. Disposal facilities may be Commercial and subject to oversight by CDPHE or they may be private and subject to oversight by COGCC. A small amount of produced water is used for dust suppression on oil and gas lease roads. In addition, to minimize waste and the use of fresh water, many operators are reusing and recycling produced water and other fluids for drilling and well completion activities including hydraulic fracturing treatment operations. COGCC staff review UIC permits, pit permits, centralized E&P waste management permits, and other proposals, including water reuse and recycling plans, to ensure that produced water is handled appropriately.

Complaint Response- COGCC responds diligently to complaints received from individuals and other agencies. Complaints are tracked in the COGCC’s database and can be accessed via the COGCC website. In 2016, COGCC received 17 complaints related to groundwater or surface water issues. The environmental staff follows up, where appropriate, and collects samples for laboratory analysis. A letter report is provided to the complainant explaining the analytical results, regardless of whether an oil/gas impact is indicated. When oil/gas impacts are detected, Operators are required to perform additional investigation, remediation, and mitigation, as needed, to bring sites into compliance with soil and groundwater standards.

No oil & gas issues were observed in the 17 complaints investigated this year. The COGCC staff frequently observes relatively poor overall water quality in many private domestic wells, often related to nuisance bacteria or natural water conditions.

Spill/Release Response and Remediation Oversight- Spill response by the environmental staff includes onsite inspections, sample collection, remediation oversight, and review of reports, remediation plans, analytical data, and operating practices, to ensure protection of surface and groundwater, in accordance with COGCC rules and WQCC standards and classifications. Spills are tracked in COGCC’s Master Records Database (MRDB) and can be accessed via the COGCC website. In response to numerous public and media inquiries, COGCC maintains a table summarizing annual spills reported since 1999. This table is updated quarterly on our website and is attached as Appendix 3. Spills, releases, and remediation projects are discussed in more detail in Section 6 of this report.

Plugging Orphan Wells- COGCC engineering and reclamation staff used appropriated funds and claimed financial assurance to plug and abandon and to reclaim orphaned oil and gas sites in twelve counties including Adams, Larimer, Garfield, Jefferson, La Plata, Mesa, Moffat, Montrose, Morgan, Ouray, Yuma, and Weld. Seven wells were plugged and ten well sites were remediated and/or reclaimed during Fiscal Year 2016. In Fiscal Year 2017 the engineering staff plans on plugging, abandoning and reclaiming up to 20 orphaned oil and gas wells and/or well sites in twelve counties including Adams, Ouray, Moffat, Montezuma, Larimer, Logan, Weld, Logan and Mesa counties.

3.3 COGCC Information/Data Systems

Each year COGCC works to improve its data management systems and geographic information systems (GIS) as time and resources allow. Primary data systems that were improved or developed in 2016 include:

- eForms – additional forms were developed and some existing forms were revised.
- Geographic Information Systems.
- Environmental Database – Database improvements.
- Data Downloads – new data sets were made available.
- Online Environmental Reports
- New Daily Activity Dashboard developed and launched on website

Brief descriptions of the changes for each system are provided in the following sections.

3.3.1 eForms

The eForm application allows Operators to submit forms electronically. eForms currently in use or pending completion (*) are:

- Form 2 – Application for Permit to Drill
- Form 2A – Oil and Gas Location Assessment
- Form 4 – Sundry Notice
- Form 5 – Drilling Completion Report
- Form 5A – Completed Interval Report
- Form 6 – Well Abandonment Report
- Form 7 – Monthly Operations Report
- Form 10 – Certificate of Clearance/Change of Operator
- Form 14 – Monthly Report of Non-Produced Water Injected*
- Form 14A – Authorization of Source of Class II Waste for Disposal*
- Form 15 – Earthen Pit Report/Permit
- Form 17 – Bradenhead Test Report
- Form 19 – Spill/Release Report
- Form 21 – Mechanical Integrity Test (MIT) Report
- Form 22 – Accident Report
- Form 23 – Well Control Report
- Form 26 – Source of Produced Water for Disposal
- Form 27 - Site Investigation and Remediation Workplan (release date January 1, 2017)
- Form 31 – Underground Injection Formation Permit Application
- Form 33 – Injection Well (UIC) Permit Application
- Form 41 – Trade Secret Claim of Entitlement
- Form 42 – Field Operations Notice
- Form 43 – Sample Analytical and Data Form*
- FIR – Field Inspection Report
- FIRR – Field Inspection Report Resolution Form
- NOAV – Notice of Alleged Violation
- Warning Letter

With eForms, operators are able to submit forms and attachments electronically online. COGCC staff review and approve the forms electronically, and data from the forms are uploaded to the MRDB instantaneously upon approval. For forms that require review by multiple staff members (i.e. permitting, engineering, etc.), each staff member involved in the process passes their task within the eForm system.

3.3.2 GIS- Geographic Information Systems

The GIS Online map is a critically important tool used by staff, industry, and other agencies to submit and process permits, create reports, and view information related to exploration and development. The COGCC interactive map is also the go-to-resource for the general public and interested stakeholders regarding environmental concerns and siting issues, including location

proximity to CDPHE 317B Buffer Zones, Sensitive Wildlife Habitats (SWH), and/or a Wildlife Restricted Surface Occupancy (RSO) Area.

The GIS Online map contains over 150 spatial datasets including oil and gas well locations, permits, spacing orders, field boundaries, and useful reference information such as cities, rivers, roads, sections, land ownership, etc. Aerial photos, topographic quads, and geologic maps are also included as valuable information resources. The newest version of our online mapping system allows a user to zoom to a street address (available in early 2016), has improved printing functionality, and includes a live connection to our environmental sampling database. To aid operators and other interested parties with their own GIS work, the COGCC website provides GIS shapefiles for download, including files that have daily updated well information, permit and pending permit data, and wellbore traces for directional and horizontal wells across Colorado. The COGCC's online mapping tool is regularly cited as one of the best state-level oil and gas resources in the nation.

3.3.3 Environmental Database

The Ground Water Protection Council (GWPC) in conjunction with the COGCC has developed a publicly-available, searchable database of groundwater, surface water, and soil sample analytical results from throughout the state. This database is referred to as the COENV database. The COENV database has been active since September 2012. The database has sampling data dating back as far as 1941. The environmental database currently contains over 14,952 sample locations and 39,861 individual samples.

In 2016, 1,065 samples from 402 separate locations were added to the database. In addition to the 2016 samples, 481 samples from 2015 were received in 2016. Since the statewide rules for groundwater sampling went into effect (May 1, 2013), COGCC has received a total of 6,213 samples from 2,172 separate locations.

The data can be accessed through the GIS Online map. Sample locations with available water and natural gas data appear as green triangles when the "Sites with Lab Data" layer is turned on. The user can double click on a sample site and gain access to the analytical data for that site. An example analytical report is included as Appendix 4.

The database allows for electronic data deliverables to be used for input. New samples from COGCC staff sampling efforts, current COGCC baseline sampling rules (rules 317B, 318AE4, 608, and 609), and the COGA Voluntary Baseline Sampling Program are available.

In April 2014, the COENV database was made available for download in an Access database format for those who wish to query large datasets. Access to the download is under the HELP section of the COGCC webpage under DOWNLOADS. It is anticipated that the database download will be used by a number of entities such as scientific organizations, local governments, and others to better understand background water quality in their area of interest.

COGCC is currently working with OIT on an enhanced set of tools for interfacing with the COENV database. The Form 43 Project includes tools that have been requested by both the

COGCC and Operators. Tools that the COGCC staff requested include an integrated GIS search tool, automatic generation of commonly used diagrams, and enhanced data export tools. Tools for the operator include a streamlined data upload process with built in data quality checks and a printable document (Form 43) that will serve as a receipt for information submitted to the COGCC. The tools are expected to be ready for testing in early 2017.

Third Party Use of Environmental Data

In July, 2016 researchers from the University of Colorado at Boulder and California Polytechnic State University in Pomona published a paper in the Proceedings of the National Academy of Sciences. The paper, titled “Groundwater Methane in Relation to Oil and Gas Development and Shallow Coals Seams in the Denver-Julesburg Basin of Colorado,” relied heavily on COGCC’s water quality database, COGCC complaint investigations, and COGCC water well investigations data and documentation.

The authors referred to this body of source information as “one of the most comprehensive groundwater geochemical datasets related to petroleum development anywhere.” Though the report was not released until July 2016, the authors presented their findings at the February meeting of the Ground Water Protection Council (GWPC) in Denver.

The study evaluated data from 924 water wells, including 593 with dissolved methane detections, looking at stable carbon isotopes of methane, ethane, and propane and comparing results from dissolved gases to production gases from various producing formations in the basin. The study identified 42 water wells containing thermogenic stray gas in the study area, representing 32 cases of stray gas migration associated with oil and gas development over the period from 1988 to 2014.

The report concluded that the pathway for gas migration comes primarily from older vertical wells which were constructed under earlier regulatory frameworks, may have had short surface casing or un-cemented production casing intervals, and that “wellbore barrier failure...is the main thermogenic stray gas migration pathway.” The report went on to conclude that “...horizontal drilling with high-volume hydraulic fracturing has not had a discernible impact on the origin and occurrence of thermogenic stray gas in the DJ Basin.”

Finally, the researchers stated that “This study demonstrates the value of a large, continuously updated, and publicly accessible groundwater geochemical database from a petroleum industry regulator.” During their work, the authors built a custom data portal with improved functionality for querying and sorting data downloaded from the website.

3.3.4 Data Downloads

Historically, the COGCC has provided production data, spacing order data, and GIS shapefiles for download from the website. GIS Data available include well surface locations and directional data (updated daily), pits, oil and gas fields, sensitive wildlife habitat, certain significant geologic information, and approximate buffers associated with COGCC Rule 317B.

In response to the new floodplain Rule 603.h, GIS shapefiles for the 100-year floodplain have been created and are available for download on the website. In addition to GIS data listed above, and in an effort to increase transparency, the COGCC has begun to aggregate datasets directly from our master relational database (MRDB) and provide them for public use. The MRDB, managed and maintained by COGCC with assistance from the Governor's Office of Information Technology, is a comprehensive repository of Colorado's oil and gas data. Although all the data is available through interactive search tools on the website, these downloads allow the industry, public, non-governmental organizations, or other interested parties to access large amounts of data in searchable formats so that they may run their own analyses. These datasets are updated periodically.

The data downloads now available are:

- Complaints Data
- Notices of Alleged Violation (NOAVs) Data
- Mechanical Integrity Test (MIT) Data
- Water Well Data
- Spill and Release Data (released December 16, 2015)

The COGCC is developing additional data downloads for future release, including Remediation Projects, Inspections, and Enforcement Orders.

3.3.5 Online Environmental Reports

Written reports for COGCC managed baseline sampling projects and other special environmental studies, such as status reports for monitoring Project Rulison in Garfield County and the Methane Seep studies in Las Animas/Huerfano Counties are posted on the website under the "Library" tab where they are primarily organized by basin. Many of these reports are in PDF format and can be downloaded.

In 2013, a fact sheet, *Methane in Colorado Groundwater* was developed by COGCC staff and posted in the online Library. The fact sheet explains the differences between thermogenic and biogenic methane and also briefly covers how the COGCC determines if the source of methane in a water well is biogenic or thermogenic.

Although not new, the brochure, *How Well Do You Know Your Water Well* continues to be very popular. The brochure was updated and revised in 2011 to include information about mitigating methane in water wells, current contact information for various agencies, and water well maintenance and record keeping. COGCC provides this useful brochure to water well owners when water samples are collected from their wells by COGCC, operators, or third party contractors. The update project was initiated by the Colorado Oil and Gas Association (COGA) with support from the COGCC in cooperation with CDPHE and DWR. An electronic version of the brochure is available in the Library section of the COGCC website.

3.3.6 Daily Activity Dashboard

On October 20, the COGCC launched the Daily Activity Dashboard, a new web based tool designed to give local governments, the public, and other stakeholders a more efficient way to access, sort, and display the most commonly used data related to oil and gas operations. The Dashboard is a visual interactive tool that allows a user to generate custom statistical charts, graphs, tables, and simple maps based on data that is updated every day. The following data sets are currently shown in the Dashboard: pending permits, well status, production, well inspections, Notices of Alleged Violations or NOAVs, active notifications, and spills.

The Dashboard does not offer any new types of oil and gas data to the public, or replace existing ways of searching for online oil and gas data in the Colorado Oil and Gas Information System. This tool can be accessed by clicking “Dashboard” in the main menu of the COGCC homepage.

3.4 COGCC Environmental Program and Project Funding

The General Assembly annually appropriates a line item within COGCC’s budget for the environmental staff to respond to, investigate, prevent, monitor, or mitigate conditions that threaten or actually cause adverse impacts to air, water, soil, or to public health, safety, and welfare or to wildlife resources. This work includes, but is not limited to, the collection of water and soil samples, laboratory analyses of the samples, and the review and analysis of laboratory results and other environmental data. In fiscal year 2016-2017, the appropriation for this line item was \$312,033.

In addition, the General Assembly annually appropriates a budget line item to fund special environmental protection and mitigation studies including, but not limited to, gas seepage mitigation studies, outcrop monitoring studies, soil gas surveys in the vicinity of plugged orphaned wells, and baseline water quality and subsequent follow-up studies. The intent was to provide readily available funds for special projects as the need arises. The COGCC reports all expenditures made from this line item in the previous year to the General Assembly in its annual budget request. The appropriation for this line item was \$325,000 in FY 2016-17. The FY 2015-16 special environmental projects are described in Section 8.

In addition to the foregoing, COGCC receives an annual appropriation to respond to emergencies related to oil and gas operations that threaten or cause significant adverse impacts to public health, safety, welfare, or the environment. For FY 2016-17, this appropriation was \$750,000. The COGCC also receives an annual appropriation for plugging, abandoning, and reclaiming orphaned wells. For the past several years, this appropriation has been \$445,000.

4.0 NEW COGCC REGULATIONS AND POLICIES

Governor’s Task Force on Oil and Gas

In late 2014, Governor Hickenlooper convened a Task Force of 21 distinguished Coloradoans to evaluate and address oil and gas development conflicts with community development and citizens. The Task Force met monthly for six months across the state in regions with high levels of oil and gas activity. The Task Force heard from the oil and gas industry, local governments, environmental groups, regulatory agencies (including the COGCC), and the public. The Task Force ultimately issued nine formal recommendations to the Governor. COGCC promulgated new rules to implement two of the Task Force recommendations.

Recommendation #17 asked that COGCC specifically address “large oil and gas facilities” in urbanized areas, and Recommendation #20 proposed COGCC implement new rules to require operators to register with the municipalities in which they operate for the purposes of fostering communication and collaboration related to development planning. In Spring 2015, COGCC began a series of outreach meetings with interested parties, including industry, local government, and citizens to solicit input on how best to implement the recommendations. Eleven outreach meetings were held throughout the state, and generally focused on how “large facilities” should be defined, what measures could be taken during the siting of large facilities, how local governments can be involved in permitting and planning, and what mitigation measures could help alleviate the impacts from large facilities.

Formal rulemaking procedures began with stakeholder meetings in September 2015 followed by Commission rulemaking hearings beginning in November. The final rule amendments were approved on January 25, 2016, and became effective on March 16, 2016. COGCC has permitted only a few Oil and Gas Locations under the new rules, but that number is expected to grow in the near future.

Policies, Notices to Operators, and Operator Guidance

In 2016, COGCC established or updated the following policies:

- Rule 912 Flaring and Venting Statewide – Notice to Operators (March 18, 2016)
- Delayed Completions – Notice to Operators (August 30, 2016)
- Conductor Pipe Setting Procedures – Notice to Operators (October 6, 2016)

In addition, COGCC developed or updated the following Guidance Documents:

- Rule 603.h: Floodplain (February 3, 2016)
- Rule 317.p: Requirement to Log Well (February 16, 2016)
- Rules 1101 and 1102: Flowlines (February 25, 2016)
- Rule 603.f: Equipment, Weeds, Waste, and Trash (March 19, 2016)
- Piceance Basin Bradenhead Monitoring Area (BMA) and Nearby Fields – Casing and Cement Standards for Geologic Isolation (April 18, 2016)
- Task Force Efforts on Truck Traffic (November 23, 2016)

These Policies and Guidance Documents are part of COGCC's ongoing compliance assistance efforts.

5.0 OIL AND GAS EXPLORATION AND PRODUCTION ACTIVITY

Data used in the following discussion are current as of December 1, 2016 as reported in the December 2016 COGCC Staff Report.

One metric used to measure exploration and development activity levels is the number of approved permits. A total of approximately 2,565 permits to drill were issued in 2016, compared to 2,988 in 2015. Most of the permits, approximately 60 percent, were issued in Weld County (1,537 permits) in the active shale play of the Niobrara and Codell Formations. Of the 1,537 Weld County permits, 1,510 were for horizontal wells (approximately 98 percent). The second most active County for permits was Garfield County with 660 permits, similar to the 532 in 2015—however only 3 were for horizontal wells. Coal Bed Methane (CBM) development remains lower than historical levels as indicated by lower permit counts in Las Animas and La Plata Counties. Historic details of permit activity by County since 2000 are provided in Appendix 5.

Another metric to gage activity level is well starts. This number approximately represents the actual number of wells drilled. As of December 1, 2016, there were a total of 886 starts, compared to 1,470 well starts in 2015 and 2,239 well starts in 2014. In 2016, 695 wells starts were for horizontal wells, or approximately 78 percent of the total. As in 2014 and 2015, horizontal drilling associated with the Niobrara and Codell Formations in the DJ Basin dominated the drilling activity in 2016. It has been estimated that a single one-mile horizontal well may produce the hydrocarbons equivalent to six vertical wells in the same formation; on that basis, the horizontal well starts in 2016 could be compared to about 4,200 traditional well starts in years prior to the horizontal boom.

As of December 1, 2016, there were 53,993 active wells in the State. Figure 5-1 shows the approximate number of active wells by County. Weld and Garfield Counties have the most active wells, with more than 22,800 and 11,100 wells, respectively.

Oil and gas production reports for 2016 are not yet complete and therefore final production figures for 2016 are not available. COGCC expects production reporting to be finalized by April 15, 2017. With that caveat, we estimate that approximately 1.71 trillion cubic feet (TCF) of natural gas will be produced in Colorado during 2016. Of that, approximately 324 billion cubic feet (BCF) will be produced from coal bed methane operations. For comparison, the natural gas production in 2015 was 1.65 TCF. The COGCC estimates that statewide oil production for 2016 will exceed 114 million barrels (BBLs) after final accounting. This would be the second highest annual oil production on record, behind 2015 when 126 million BBLs of oil were produced in Colorado.

Operators are required to remediate environmental impacts associated with any spill of E&P Waste. The COGCC environmental staff review and approve remediation plans, evaluate analytical data, monitor the progress of the remediation, and ensure cleanup standards and other remediation requirements are met through verification sampling, data review, and other measures.

Where groundwater has been impacted, operators are required to: eliminate any continued release; investigate the extent of contamination; remove the source of contamination (such as the impacted soils in contact with groundwater or free hydrocarbon product); remediate; establish points of compliance; and monitor contaminant levels. In accordance with the MOA for Response to Spills/Releases to Surface Water, the COGCC notifies the CDPHE of releases impacting waters of the state. In 2016, seven releases to surface waters of the State were reported to CDPHE WQCD.

Remediation projects are tracked in the COGCC's database and can be accessed on the COGCC website. Through December 1, 2016, the COGCC received approximately 411 new remediation plans, and closed approximately 528 remediation projects. It should be noted that not all reported spills and releases are required to be closed under an approved remediation plan, but certain facilities, like production pits and partially buried produced water vessels are required by COGCC rule to be closed in accordance with an approved plan.

6.2 Investigations into Thermogenic Stray Gas Impacts to Domestic Water Wells

The engineering and environmental staff of the COGCC jointly investigate the causes of thermogenic gas when documented in domestic water wells. Currently, there are twenty-two such investigations ongoing in the Denver-Julesberg basin of northeastern Colorado. One new impact to a water well was discovered in 2016 as a result of required or voluntary sampling by an operator. Two enforcement actions with respect to four water wells impacted by thermogenic gas are in process.

Joint engineering and environmental investigations generally consist of a review of potential wellbore integrity issues of oil and gas wells within a 0.5 mile radius of the impacted water well, a geologic and hydrogeologic review of the area using well logs, and an evaluation of nearby water wells that may also be impacted. COGCC requests data from the operators of all oil and gas wells within 0.5 miles of the impacted water well; typically COGCC requests Bradenhead pressure data, and samples of production and Bradenhead gases to compare the gas composition and isotopic data to the methane in the affected water well. Well maintenance histories and production records are reviewed for anomalies that may be indicative of a breach in wellbore integrity or other historic problems.

7.0 ENFORCEMENT

As of December 1, 2016 the Commission had issued 55 enforcement orders, including 45 Administrative Orders by Consent, six Orders Finding Violation, and four orders foreclosing a financial assurance instrument this year. These orders resolved 101 Notices of Alleged Violations and imposed \$4,892,671 in gross penalties, of which \$1,126,520 was conditionally suspended.

The total penalties assessed amount is an all-time record high for a calendar year. As a part of approved enforcement orders in 2016, the Commission terminated the rights of four operators to conduct oil and gas operations in the state of Colorado based on finding, after a hearing, that those operators had engaged in a pattern of violations resulting in environmental impacts.

8.0 SPECIAL ENVIRONMENTAL PROJECTS

This section describes projects which were completed or underway during calendar year 2016 for which funding came from the special environmental projects and mitigation studies budget line (the list below includes work completed in Fiscal Year (FY) 2015-16 and ongoing for FY 2016-17):

3M4M Projects, La Plata and Archuleta Counties – Between 2001 and 2010, the OGCC installed 17 monitoring wells at 11 locations along the Fruitland Outcrop in La Plata and Archuleta Counties to monitor gas pressure changes in the Fruitland Coal Formation. All wells are equipped with downhole pressure transducers that report data via a satellite telemetry system to a central data center. In 2008 and 2009, the OGCC and its contractor designed and installed methane seep mitigation systems at two locations in La Plata County. The system at South Fork Texas Creek (SFTC) collects methane from a shallow “French drain” type network of piping and converts the methane to electricity. A passive collection system is installed at Pine River.

The OGCC has continued the monitoring and mitigation systems to provide ongoing operations and maintenance (O&M) support to ensure the systems stay in working order and continue to relay data as designed. The COGCC and its contractors have conducted the following activities:

- Conducted routine operations and maintenance activities of all system locations (after seven years, replacing the 12V lead acid batteries at the eleven locations, in addition to replacing transducers three locations);
- Reviewed gas quality measurements stored in all data loggers;
- Collected weather station data;
- Conducted a system-wide field inspection tour;
- Collected well pressure measurements from a central data center; and
- Analyzed data and prepared the annual report.

Since May 2009, the SFTC system has collected 18,888 Mcf of methane and generated 266,540 kWh of surplus electricity which is transferred to the La Plata County Electric Association grid.

Project Rulison and Rio Blanco Nuclear Test Sites, Garfield County –The COGCC and its contractor have prepared a draft version of the planned revision to the Rulison Sampling and Analysis Plan (RSAP). The most significant modification to the plan is a proposed realignment of the Tier II buffer zone from a circular to an oblong shape in order to be congruent with the hydro-geologic fracture pattern of the site. This plan has been distributed to various stake holders including the CDPHE, Department of Energy (DOE), Garfield County, and various operators for review and comment. COGCC requested that comments be provided by calendar year end in order to review and incorporate as appropriate.

There has been no oil and gas activity near Project Rio Blanco over the past year and as such, modifications to the RSAP as it pertains to Project Rio Blanco have not been made.

Petrophysical Well Log Review, Parachute Field, Garfield County - COGCC has been evaluating the quality and quantity of potential groundwater resources in the Piceance Basin in Western Colorado. The COGCC retained a consultant specializing in petrophysical log analysis to evaluate the vertical distribution and migration potential of freshwater in the Wasatch Formation and Upper Mesaverde Group. The study results allow COGCC staff to more accurately identify production casing cement isolation requirements for new wells in the Parachute Field. COGCC staff also used the study to develop “Field Scout Cards” for the Piceance Basin, which more accurately delineate different geologic zones within the Basin.

CSU Real-Time Ground Water Monitoring Network – During FY 2015-16 the COGCC provided funding and technical assistance to The Center for Energy Water Sustainability (CEWS) at Colorado State University in Fort Collins. CEWS, along with assistance of the COGCC, has designed Colorado Water Watch (CWW), a real-time groundwater quality monitoring pilot program for the Laramie-Fox Hills Aquifer. The monitoring system is comprised of a network of groundwater wells near oil and gas operations in Weld County with sensors installed that are capable of detecting changes in groundwater quality due to natural or anthropogenic changes in water level or water quality. (<http://waterwatch.colostate.edu/>)

San Juan Basin Water Quality Study - The objective of this study is to assess potential long-term trends in general groundwater quality in the San Juan Basin based on data available in the COGCC database. In FY 2015-16, trend and data analysis for more than 2,000 water wells in the San Juan Basin from a period of more than 15 years was updated. The analysis included groundwater data collected from baseline and post-completion samples, for analytes including cations, anions, TDS, iron, manganese, dissolved nutrients and methane throughout the San Juan Basin in La Plata and Archuleta Counties. The analysis included mapping, time-concentration plots, and Mann-Kendall trend analysis as a means to filter a large amount of data to allow staff to identify and

focus on potential areas of concern. As in past evaluations, this year's analysis did not delineate any clusters of significant upward trends in methane or major cation/anion concentrations within the San Juan Basin. However, as a result of Commission Orders 112-156 and 112-157 and statewide sampling requirements, the dataset is constantly being increased and requires periodic evaluation.

Upper Pierre Aquifer Water Quality Study, Weld, Morgan, and Logan Counties - Several water court applications have been submitted to Colorado's Division of Water Resources requesting designation of the Upper Cretaceous Pierre Shale in eastern Weld County, Morgan, and Logan Counties as non-tributary ground water. The Upper Pierre Shale consists of shale with intervals of sandstone and silty sandstone that contain economic quantities of ground water. The water bearing sandstone intervals have collectively become known as the Upper Pierre Aquifer; and water well permit applications continue to be submitted in eastern Weld County for agricultural, commercial, and industrial uses, including applications for stock water and for oil and gas drilling and completion.

In response to this higher level of interest in the Upper Pierre Aquifer, the OGCC undertook a water quality study of the Upper Aquifer. The study objective is to document current water quality conditions and the presence and origin of methane in the aquifer. OGCC sampled ten water wells in FY 2015-16 and ten additional wells in FY 16-17 for a total of 20 wells. OGCC staff is currently evaluating the results and will prepare a publicly available report.

Weld County Methane Study - During FY 2015-16, the OGCC oversaw an evaluation of possible fugitive methane gas emissions in a limited portion of the Greater Wattenberg Area (GWA) in Weld County and retained a contractor to collect and analyze data. The contractor surveyed an area measuring approximately 36 square miles in Township 3 North Range 66 West, a portion of the GWA where the OGCC is investigating several water wells with thermogenic (production) gas impacts.

The contractor conducted a driving survey, using an infrared spectroscopy (IRS) instrument to identify methane gas emissions, between April and June 2016. The IRS instrument accurately records the location of the seeps, and the contractor documents meteorological conditions such as wind speed, direction, etc. The study results have been used by the COGCC to look for existing gas seeps, identify existing and/or old oil and gas wells with gas leakage issues, and to document areas where gas seepage is not occurring. Three minor anomalies were identified and no old or existing O&G wells or facilities were found to have detectable gas leakage. The three anomalies are under evaluation by the COGCC staff for possible follow-up studies. A summary report (*Ground Survey in Weld County for Methane Anomalies*) is available in the COGCC Library under Area Reports, Denver Basin.

APPENDIX 1

COGCC Commissioners

Colorado Oil & Gas Conservation Commission Statutory Requirements

*Please note that information within parentheses is additional background information and not a statutory requirement

Commissioner (Officer)	2 Executive Directors (ex-officio voting members) (Current Employment)	2 West of Continental Divide (Resident County)	3 with Substantial Oil & Gas Experience (Employed by Oil & Gas Industry) (Current Employment)	2 Out of 3 Must Have a College Degree in Petroleum Geology or Petroleum Engineering	1 Local Government Official (Current Employment)	1 with Substantial Environmental or Wildlife Protection Experience (Current Employment)	1 with Substantial Soil Conservation or Reclamation Experience (Current Employment)	1 engaged in Agricultural Production and a Royalty Owner (Current Employment)	Maximum of 4 from Same Political Party (excluding Executive Directors)	Current Term Expires
Ashley L. Ager		X (La Plata)					X (Geologist)		D	7/1/2020
Kent Jolley		X (Garfield)						X (Rancher)	R	7/1/2020
Tommy Holton		(Fort Lupton)			X (Ft. Lupton Mayor)				R	7/1/2019
John H. Benton <i>Vice Chairman</i>		(Littleton)	X	X					R	7/1/2019
James W. Hawkins		(Jefferson)	X	X					D	7/1/2019
W. Perry Pearce		(Denver)	X	X					R	7/1/2020
Andrew L. Spielman <i>Chairman</i>		(Denver)				X (Attorney)			D	7/1/2019
Robert W. Randall	X (Department of Natural Resources)	(Denver)								
Dr. Larry Wolk	X (Department of Public Health and Environment)	(Denver)								

Commissioner requirements are set by statute in the Oil and Gas Conservation Act at §34-60-104 (2) (a)(1), C.R.S. (Current as of August 12, 2016)

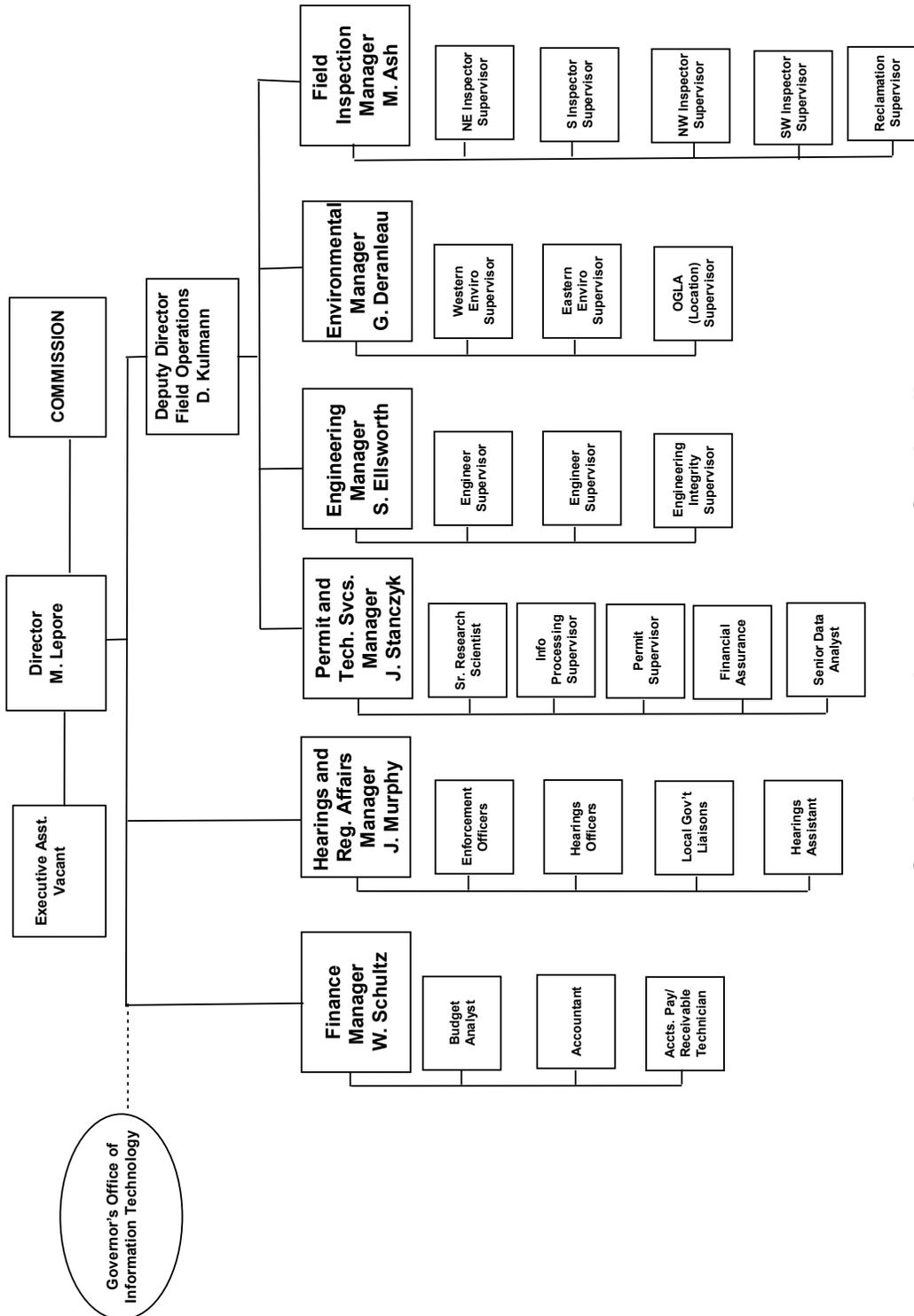
APPENDIX 2

COGCC Organizational Chart



Organizational Charts and Statistics

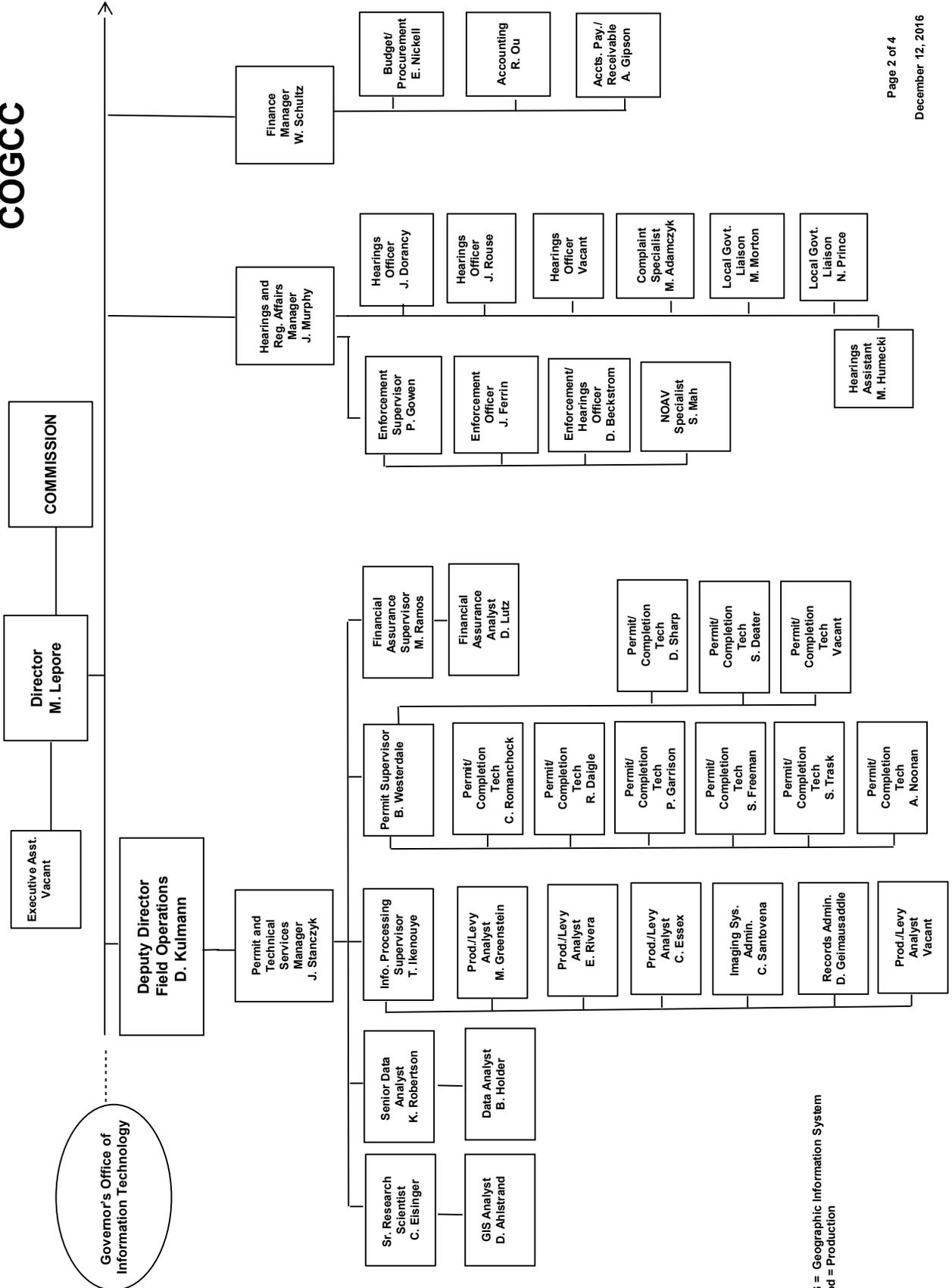
COLORADO OIL & GAS CONSERVATION COMMISSION



See the next three pages for details



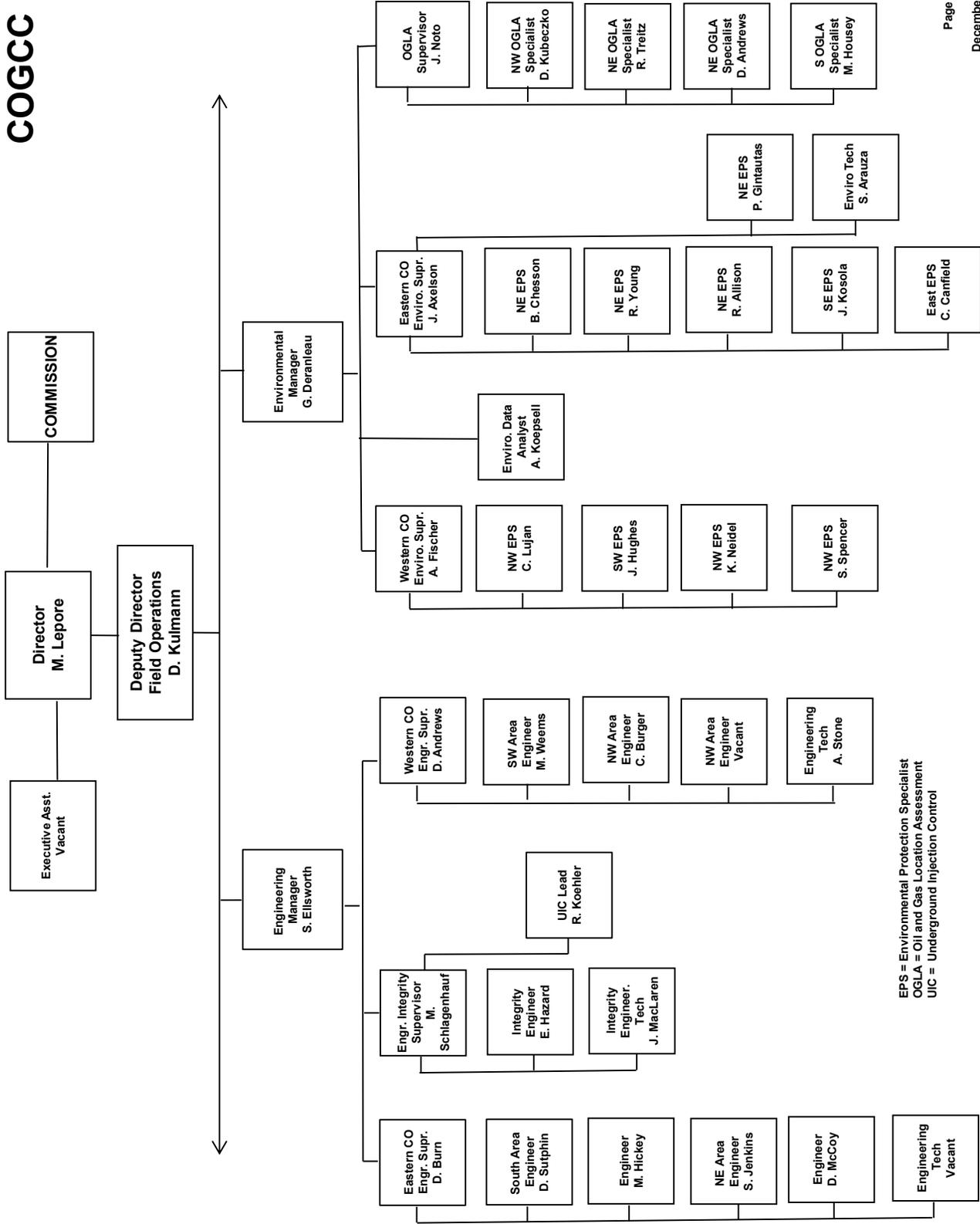
COGCC



GIS = Geographic Information System
Prod = Production



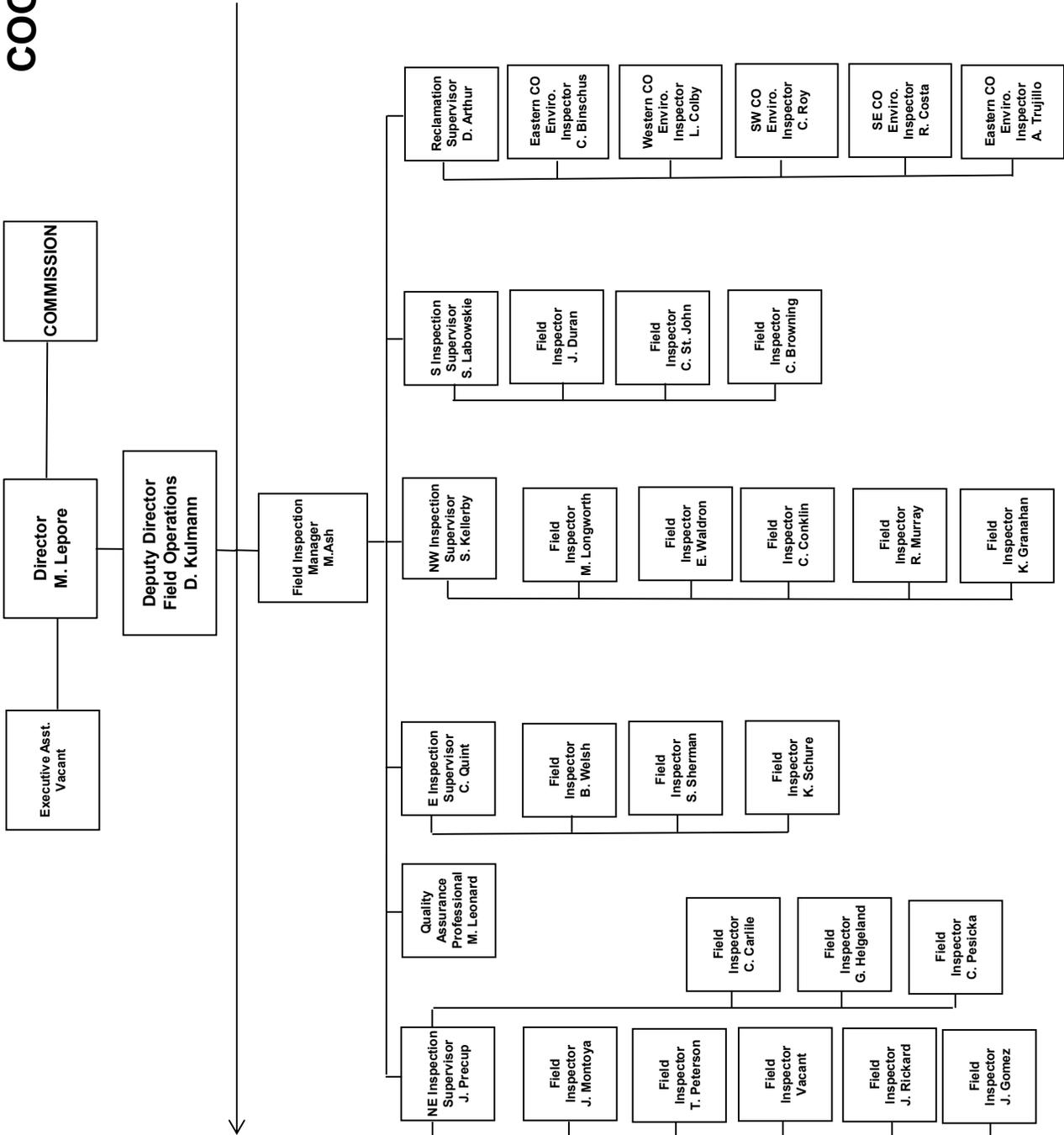
COGCC



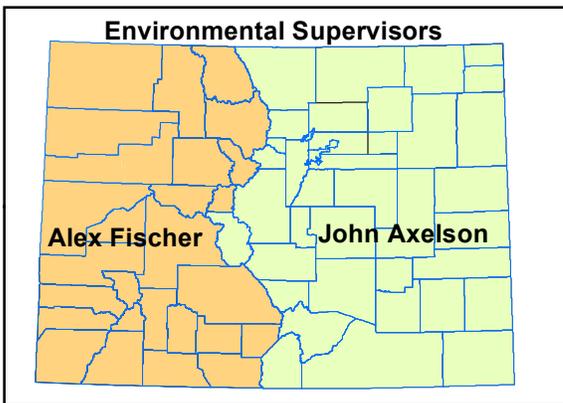
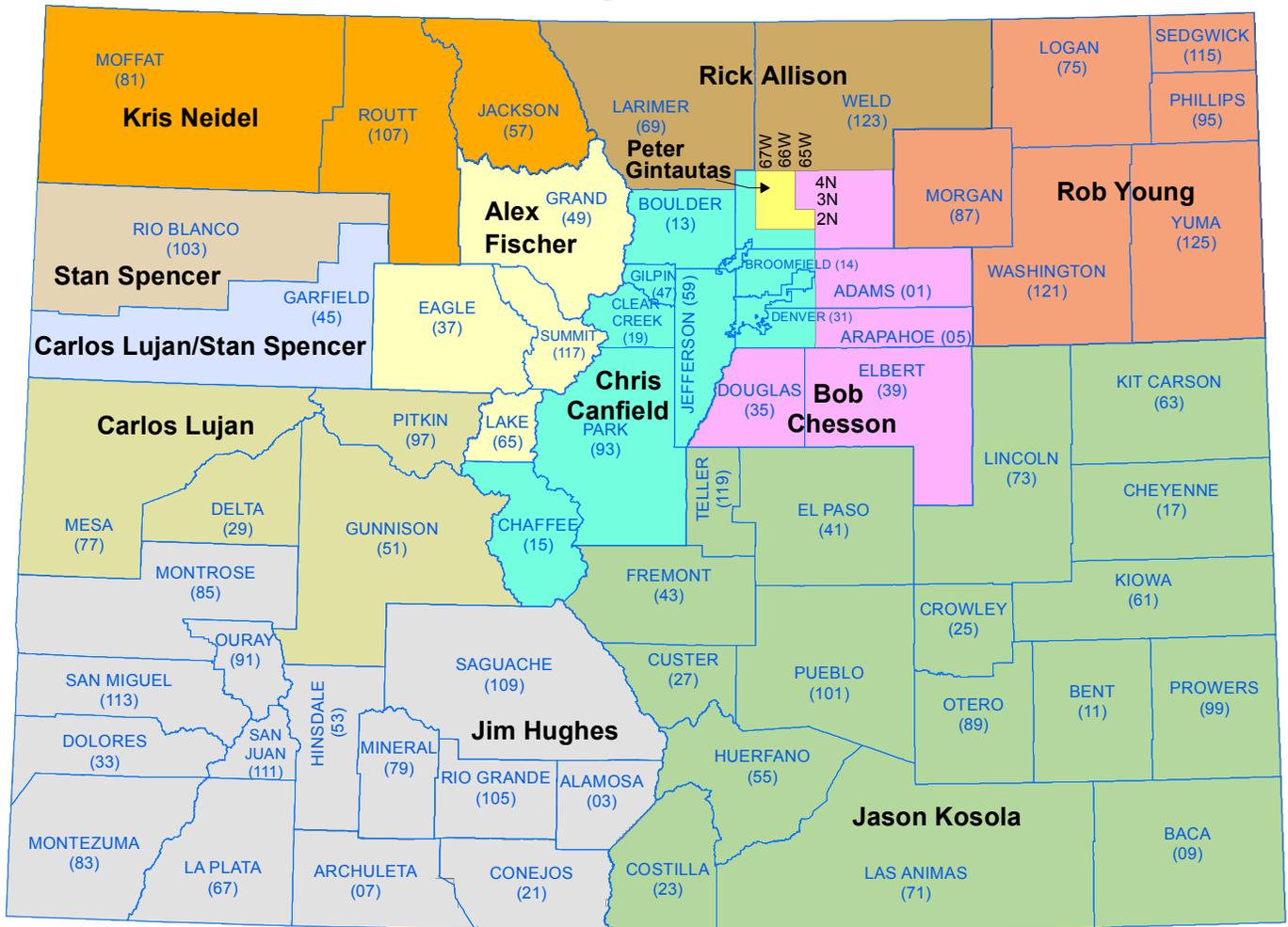
EPS = Environmental Protection Specialist
 OGLA = Oil and Gas Location Assessment
 UIC = Underground Injection Control



COGCC



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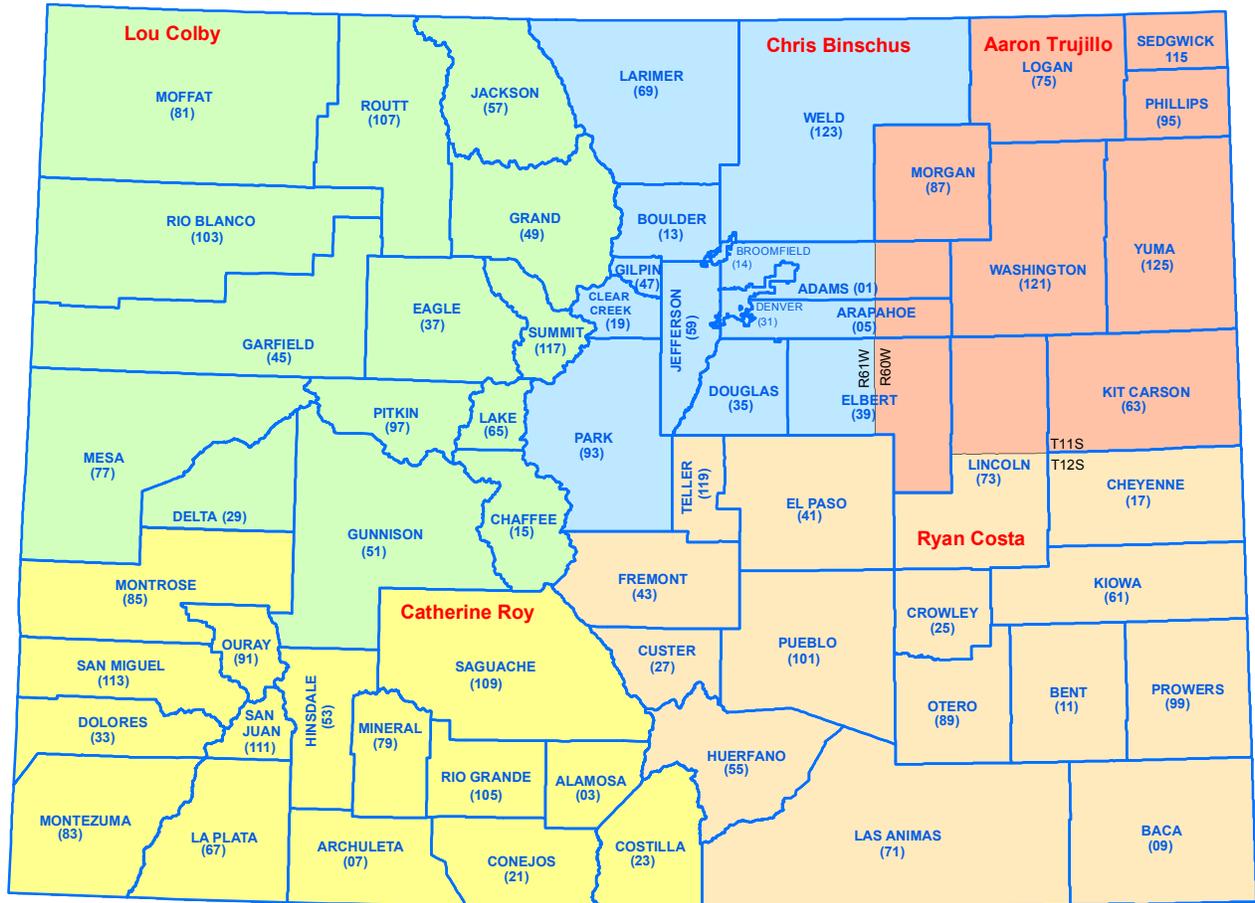
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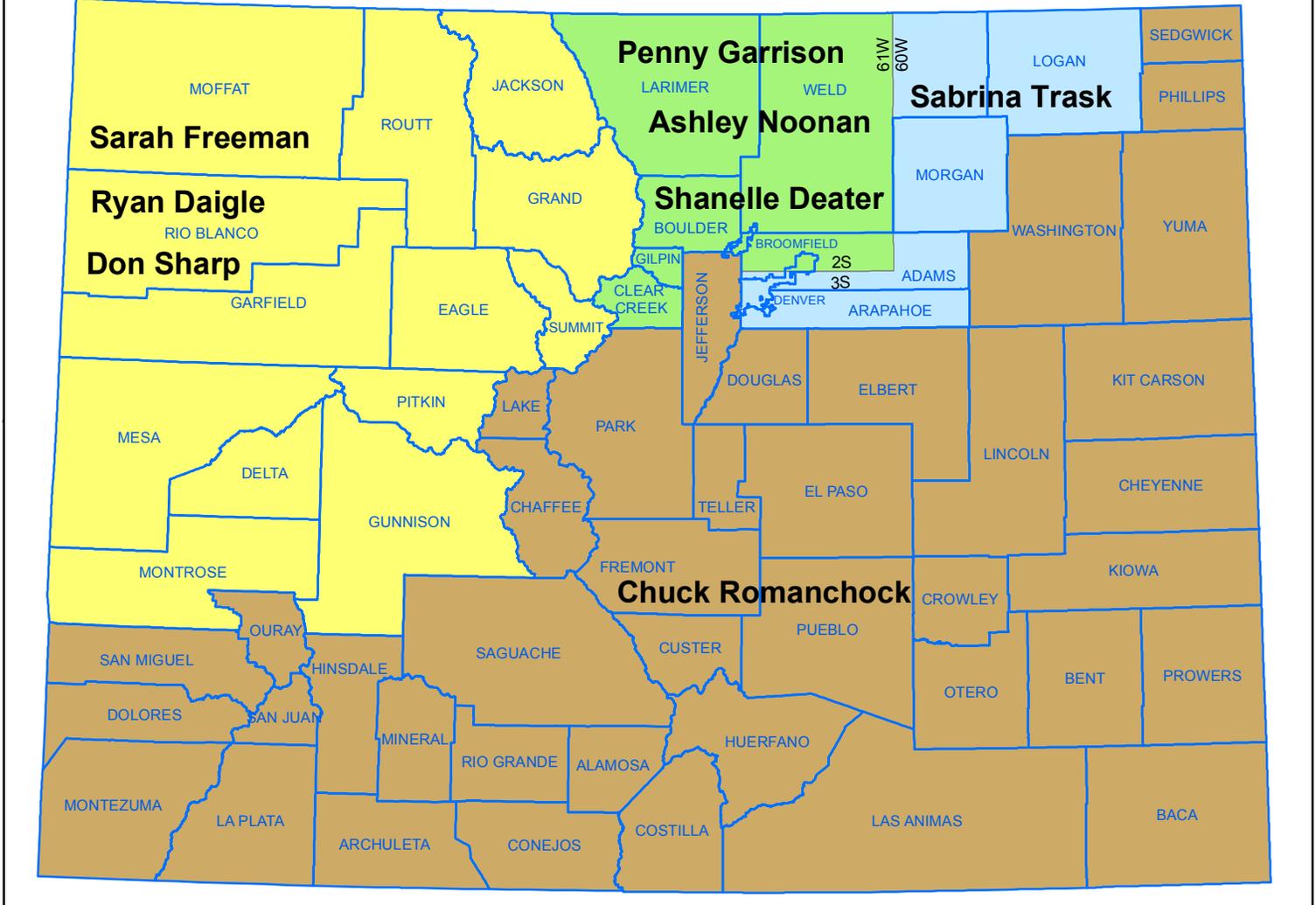
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Shanelle Deater 303-894-2100, Ext 5149
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South & East Colorado

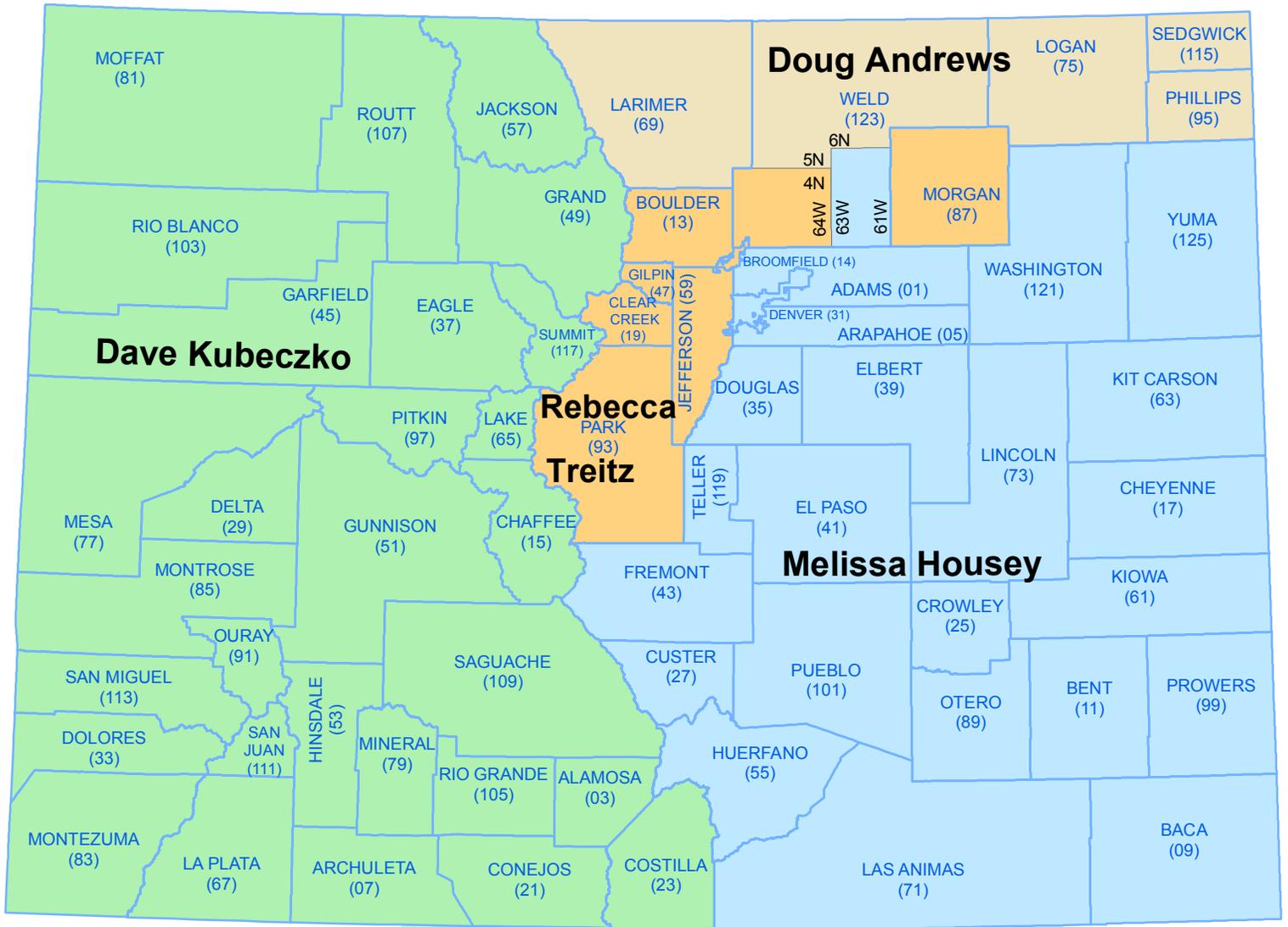
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COLORADO
Oil & Gas Conservation
Commission

Department of Natural Resources

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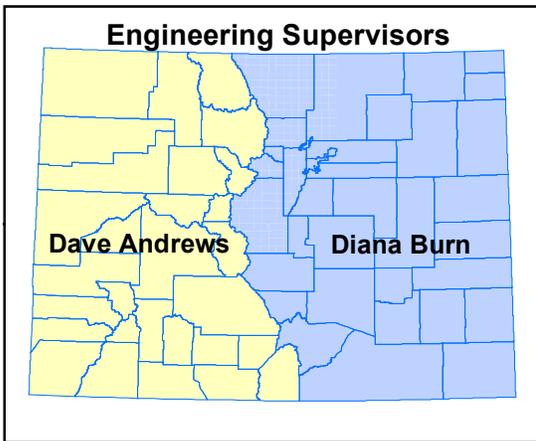
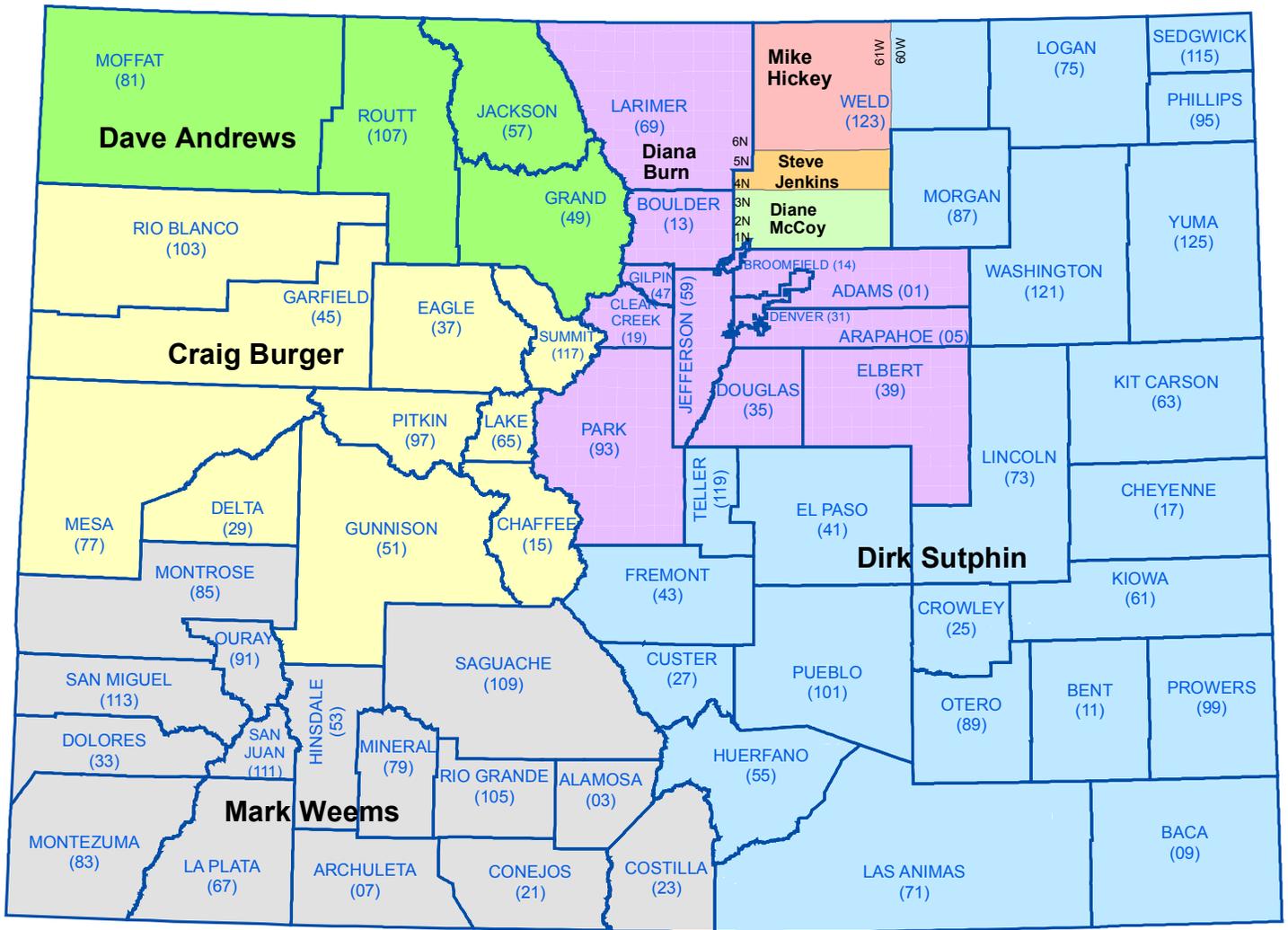
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APPENDIX 3

Spill Analysis by Year Since 1999

Colorado Oil and Gas Conservation Commission

Spill Analysis by Year 1999 – 3rd Qtr 2016

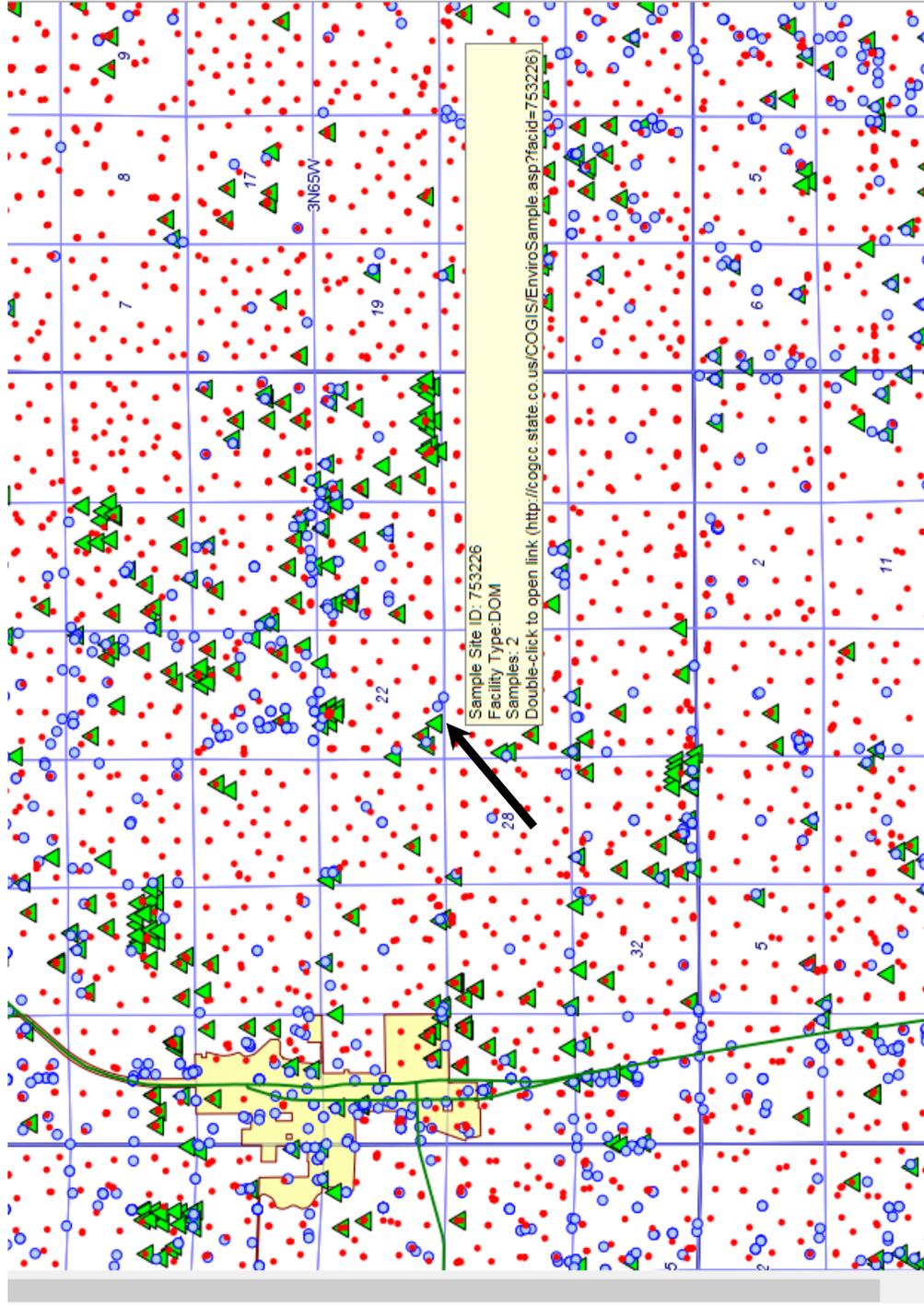
BBL = Barrels

Year	Spills	Oil Spilled (BBL)	Water Spilled (BBL)	Oil Produced (BBL)	% Produced Oil Spilled	Water Produced (BBL)	% Produced Water Spilled	Active Wells
1999	263	2,283	41,363	19,697,935	0.012%	229,907,691	0.018%	21,745
2000	254	3,579	22,540	20,022,629	0.018%	253,023,955	0.009%	22,228
2001	206	1,939	10,582	20,181,250	0.010%	266,262,051	0.004%	22,879
2002	193	3,200	57,842	20,572,343	0.016%	283,089,934	0.020%	23,711
2003	213	2,924	19,528	21,604,760	0.014%	302,793,148	0.006%	25,042
2004	222	4,005	37,095	22,570,536	0.018%	295,548,726	0.013%	26,968
2005	326	5,014	24,638	23,228,718	0.022%	347,085,975	0.007%	28,952
2006	336	2,605	33,443	24,500,894	0.011%	398,122,460	0.008%	31,096
2007	376	4,074	27,096	26,194,568	0.016%	393,828,988	0.007%	33,815
2008	408	3,195	71,959	29,947,467	0.011%	367,805,162	0.020%	39,944
2009	368	2,787	22,213	30,367,633	0.009%	359,287,569	0.006%	37,311
2010	499	3,279	33,647	32,992,308	0.010%	362,071,888	0.009%	41,010
2011	501	3,286	33,801	39,453,398	0.008%	344,372,874	0.010%	43,354
2012	407	4,503	14,678	49,588,703	0.009%	333,644,976	0.004%	46,835
2013	633	3,946	14,345	66,160,021	0.006%	328,853,946	0.004%	50,067
2014	791	2,446	17,923	95,832,361	0.003%	335,718,655	0.005%	51,737
2015	623	1,471	28,103	126,213,006	0.001%	329,456,717	0.009%	53,054
2016	460	2,282	14,679	96,492,153	0.002%	245,552,615	0.006%	53,652

APPENDIX 4

Example Analytical Report

GIS Online Sampling Data



- Active
- Closed
- Unknown
- Permits
- Pending Permits
- Pending2As (Diamond)
- Well Status
- COGCC Data
- O&G Locations
- Directionals
- COGCC Rules
- COGCC Oil & Gas Fields
- Seismic Permits
- Environmental
- Sample Sites
- Roads & RRs
- Water Resources
- DWR_Wells
- Discontd.GW.Wgnt
- Dsgntd Basin
- REG42 Aquifers
- Planned Reservoirs
- Lakes
- Rivers-Streams
- Floodplains
- SecTwpRng
- Wildlife CPW
- State Lands
- Indian Lands
- BLM Lands
- Surface Lands
- Places
- Counties_Zoom
- CityPolygons
- Surface Owner
- Special Projects

GIS Online Sampling Data

COGIS - Environmental Sample Site Information

#753226 Information [Doc](#) [GIS](#)

Sample Site ID: 753226
Facility Type: DOM
County: WELD - #123
Elevation: 5006
DWR Receipt #: [3616678](#)

ProjNumber: SESW 22 3N 66W
Location: 40.20446/-104.76767
Lat/Long: 300
WellDepth: 300

Related Facility/Well

NonFacility ID: [-99999](#) No Facility
Status: CL Operator Name: UNKNOWN # 1 Location:

COGCC Water Quality Database Disclaimer:

The analytical data and other information in this database are a compilation of data collected by COGCC staff, data submitted to COGCC from a variety of third parties, and historical data. All analytical data collected by or submitted to the COGCC is public information and COGCC posts the data to this database as a public service. The data is provided for informational purposes only. COGCC does not conduct a detailed review of quality control/quality assurance protocols, chain of custody procedures, or field or laboratory methodologies on data received from third parties. The level of review performed on historical data is unknown. COGCC does not regularly perform formal data validation for any of the data posted to this database. **The COGCC makes no warranties or representations of any kind, express or implied, regarding the quality, accuracy, reliability, merchantability, or fitness for a particular purpose of the data provided herein.**

Sample(s) All Export to CSV

<input type="checkbox"/> Sample ID: 537748	Sample Date: 4/16/2014	Matrix: WATER	Collection Point: Dom	Type: Dom	Lab: ALS Lab Group (formerly Paragon)
<input type="checkbox"/> Sample ID: 537750	Sample Date: 4/16/2014	Matrix: WATER	Collection Point: Dom	Type: Dom	Lab: ALS Lab Group (formerly Paragon)

GIS Online Sampling Data

#753226 Information

Sample Site ID: 753226
 Facility Type: DOM
 County: WELD - #123
 Elevation: 5006
 DWR Receipt #: [3616678](#)

Proj Number: SESW 22 3N 66W
 Location: 40.20446/-104.76767
 Lat/Long:
 Well Depth: 300

Related Facility/Well

Non-Facility ID: [99999](#) No Facility UNKNOWN # 1 Location:
 Status: CL Operator Name:

COGCC Water Quality Database Disclaimer:

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Sample(s) All Export to CSV

Sample ID: [537748](#) Sample Date: 4/16/2014 Matrix: WATER Collection Point: Dom Type: Dom Lab: ALS Lab Group (formerly Paragon)

Methodcode	ParamDescription	ResultValue	Units	DetectionLimit	Qualifier
BART	BACTERIA, IRON RELATED	ND	cfu/ml	1	U
BART	BACTERIA, SLIME FORMING	2500	cfu/ml	1	
BART	BACTERIA, SULFATE REDUCING	ND	cfu/ml	1	U
E200.8	BARIIUM	9.1	ug/L	1	
E200.8	BORON	61	ug/L	50	
E200.8	CALCIUM	13000	ug/L	1000	
E200.8	IRON	ND	ug/L	100	U
E200.8	MAGNESIUM	3400	ug/L	100	
E200.8	MANGANESE	28	ug/L	2	
E200.8	POTASSIUM	2700	ug/L	1000	
E200.8	SELENIUM	ND	ug/L	1	U
E200.8	SODIUM	550000	ug/L	1000	
E200.8	STRONTIUM	470	ug/L	1	
E300.0	BROMIDE	1.2	mg/L	0.4	
E300.0	CHLORIDE	87	mg/L	5	
E300.0	FLUORIDE	0.21	mg/L	0.2	
E300.0	NITRATE AS N	ND	mg/L	0.4	U
E300.0	NITRATE/NITRITE AS N	ND	mg/L	0.1	U
E300.0	NITRITE AS N	ND	mg/L	0.2	U

APPENDIX 5

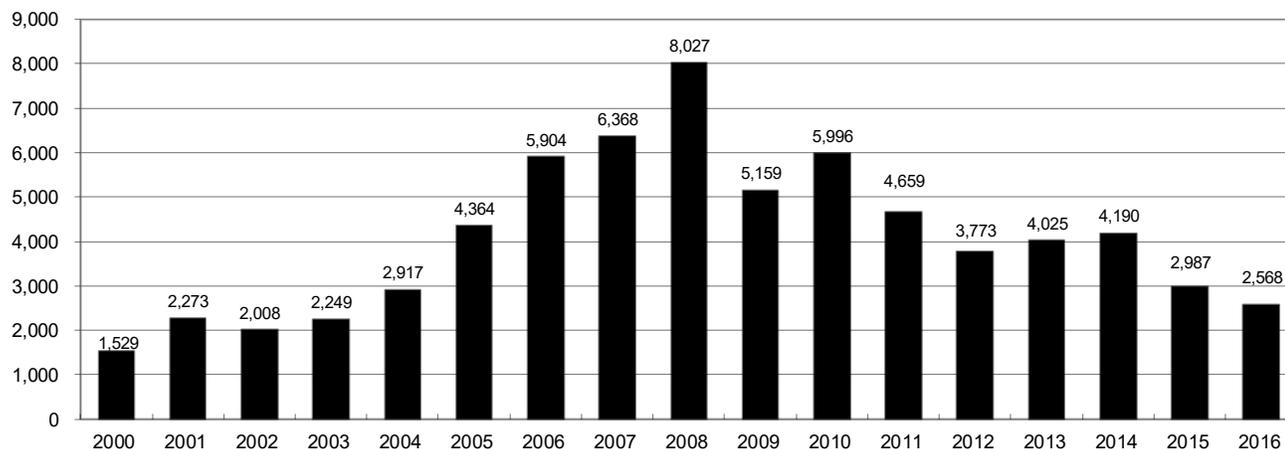
Permit Statistics



Annual Drilling Permits by County as of December 1, 2016

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ADAMS	38	28	9	26	39	34	37	89	51	35	21	8	40	40	51	96	72
ARAPAHOE		2	1	2	5	7	11	10	10	10	8	23	35	23	34	19	5
ARCHULETA	7	9	6	10	8	13	14	26	47	11	18	12	5	4	3	11	3
BACA	22	6	2	3	7	8	2	11	13	3	4	5	3	1	1		
BENT	2				5	3	8	1	1		5		2	1			
BOULDER	1	5	6	7	17	13	21	37	32	35	24	30	22				
BROOMFIELD			2	7		1	1		2	33	28	11	36		31		
CHEYENNE	3	3	3	3	3	10	21	15	33	12	13	16	31	50	26	9	
COSTILLA																	
CROWLEY															2		
DELTA			7	4	5	10	9	2			4	3	6	1	2		
DENVER		3					19	25	24								
DOLORES				1	1	1	6	10	12	21	8	8	13	12	3		3
EAGLE														1			
ELBERT	2						4			1		1	2	2	4	3	3
EL PASO										2	3	3	18	1	2		
FREMONT					1	3	2	4	14	13	22	14	11	2	8	2	2
GARFIELD	213	353	362	567	796	1,509	1,845	2,550	2,888	1,981	2,037	1,323	1,046	870	1,066	532	660
GRAND																	
GUNNISON			5	10	1	9	19	7	10	12	4	3	11	9	20	28	13
HUERFANO	41	27	27		8	2			7		2	1	9	1	13	2	
JACKSON	34	18	21	9	14	6	8	5	27	19	9	18	5	12	17	3	56
JEFFERSON	1						1	3	2					1			
KIOWA	11	18	2	4	2	1	11	9	26	7	16	17	17	12	5	3	
KIT CARSON				1	3	5	4	4	13	7	3	2	6	1	2		1
LA PLATA	127	156	104	162	102	115	235	251	328	298	191	99	71	32	87	106	95
LARIMER	2		1			1		5	46	12	41	8	13	2	4	28	4
LAS ANIMAS	268	400	259	180	332	413	500	362	303	88	92	85	11	2	1		
LINCOLN	2	2	1	6	3	4	1	2	58	44	48	31	36	87	129	24	3
LOGAN	4	7	3	3	6	13	17	14	5	9	17	8	27	4	5		1
MESA	13	27	30	27	54	136	265	293	501	427	306	127	150	105	74	126	6
MOFFAT	35	52	62	63	63	60	120	68	57	51	53	93	88	44	54	12	16
MONTEZUMA	4		5	8	8	11	5	12	22	39	19	27	29	14	25	3	1
MONTROSE	1	3	2	4	2		1	3	3		1	1					
MORGAN	9	9	2	7	9	7	3	6	2	1	6	13	5	16	6	4	28
OTERO																	
PARK										3	4	1					
PHILLIPS	1	2		7	13	17	12	69	82	45	64	112	56		11	2	
PITKIN					1			1								1	
PROWERS	2	5	4		7	5	7	5	8	1	3	1			1		1
RIO BLANCO	89	187	105	179	154	161	360	321	477	348	441	109	117	167	121	107	51
RIO GRANDE	1	1		1					1	1			2		1		
ROUTT	20	13	1		4	6	9	8	4	2	3	10	4	12	4	9	
SAGUACHE	2		2					2	1	2							
SAN MIGUEL	11	13	27	18	42	45	35	23	20	13	10	2	1		2	3	
SEDGWICK				1	5	2	7	2	1	19	11	12	2		7	1	
WASHINGTON	23	17	27	34	128	50	69	45	11	1	6	12	6	19	12	9	7
WELD	509	702	760	757	832	901	1,418	1,527	2,340	1,448	2,152	2,262	1,826	2,468	2,303	1,841	1,537
YUMA	31	205	160	138	237	782	797	541	545	105	299	148	11	9	53	3	
TOTAL	1,529	2,273	2,008	2,249	2,917	4,364	5,904	6,368	8,027	5,159	5,996	4,659	3,773	4,025	4,190	2,987	2,568

ALL COUNTIES





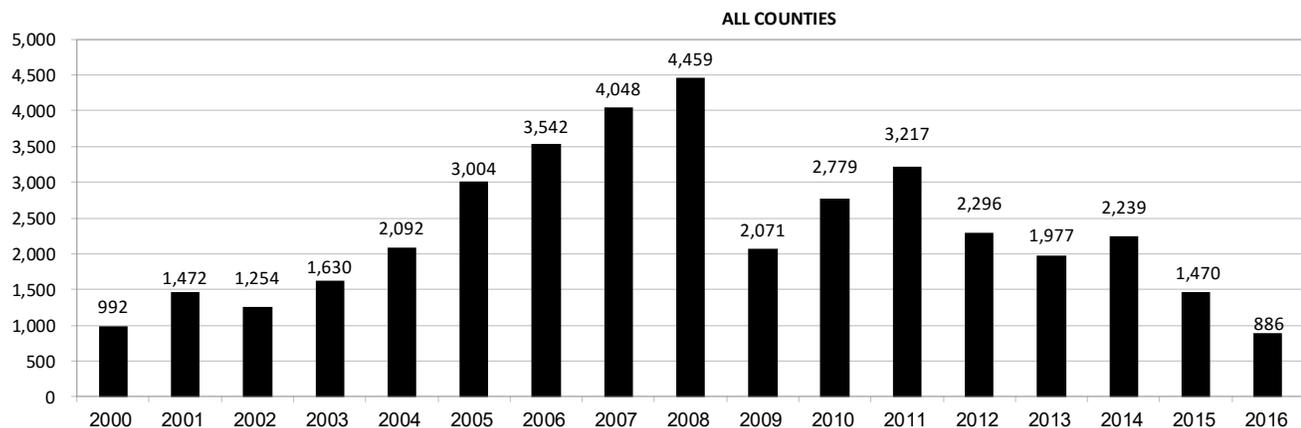
Horizontal Well Activity as of December 1, 2016

County	Prior Years		2009		2010		2011		2012		2013		2014		2015		2016		Total		Completion						
	Drilled	DA PA	Permit	Spud	Permit	Spud	Permit	Spud	Permit	Spud	Permit	Spud	Permit	Spud	Permit	Spud	Permit	Spud	Spud	AC	PR	DA	PA				
ADAMS			6	5	2	3	1	1	17	2	26	2	42	18	92	3	71	2	35	3	19	1					
ARAPAHOE	2				1	1	10	1	22	4	11	13	22	11	9	5	1	32	2	30	1		1				
ARCHULETA	17		7	6	15	7	10	8	5	9	2	1	1	1	6	3	2	1	51		51						
BENT									1	1	1							1	1		1						
BOULDER							4											0	0		1						
CHEYENNE	5	4							6	1	7	2	1	1	1	1		9		1	1		5				
DELTA						2			6	1	1		2					3		3							
DOLORES	9		18	2	6				9	3	5	4	3	1				19		11							
EL PASO									10									0									
ELBERT									1									0									
FREMONT	7	6	6	6	12	5	3	4	4	1	1	1	1	1	1	1		18		10	7	1	1				
GARFIELD	10	2	1	1	16	2	18	6	43	6	18	4	20	11	12	7	3	47		35			1				
GUNNISON	1				1				3	2	2		9		18	2	7	1	6		4						
HUERFANO									4	1			2					1		1							
JACKSON	8	1	1	8	3	4	9	1	4	4	8	5	15	4	3	51	24	46		21			2				
KIOWA									1		4	2	1					2		1							
KIT CARSON	1								1		1	1	1					2		4							
LA PLATA	28	2	11	2	28	3	18	7	12	1	5	1	43	7	42	3	66	7	59		596	1	3				
LARIMER	3	2							5	1	2	1	2		22	8	4	3	18		11		2				
LAS ANIMAS	16	2	4	4	1	1			1									17		16							
LINCOLN			2	1	2	1	1				6	4	2					4		1			3				
LOGAN	2								1									2		2							
MESA	3	2	36		22	7	24	13	14		9	2	9	1	6	3		29		27	2		4				
MOFFAT	7	1	6	3	4	4	9	4	44	6	18	13	15	1	5	2	2	37		30			2				
MONTEZUMA	6	1	23	6	11	2	8	2	18	6	3	4	15	2	4	1	28	28		31			7				
MORGAN									6	2	1	13	1	6				5		5							
PARK									1	1								1		1							
RIO BLANCO	7	2			1	1	11	2	15	2	4	5	3	2	3			19		12	3						
ROUTT	10	6	1						1		1				3			10		1	6		1				
SAN MIGUEL	1																	1		1							
WASHINGTON	1																	1									
WELD	11	3	12	5	208	84	763	229	964	594	2,114	1,099	2,215	1,427	1,789	1,061	1,510	655	5,165		3,712	10	60				
YUMA	1		6															1		1							
TOTAL Horizontal	156	25	14	147	31	333	901	280	1,203	641	2,260	1,161	2,428	1,488	2,016	1,094	1,749	695	5,669	5	4,632	31	104				
Percent of Total HZ																							0%	82%	1%	2%	
Total All Permits																							5,159	4,659	3,773	2,988	2,565
HZ Percent of Total																							2.8%	19.3%	31.9%	67.5%	68.2%



Annual Well Starts by County as of December 1, 2016

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ADAMS	18	13	4	19	22	24	13	41	14	14	21	1	15	6	29	3	2
ARAPAHOE					6	1	5	2	1	1	3	9	9	25	21		1
ARCHULETA	4	4	2	5	4	10	5	7	29	9	12	10	11		1	7	4
BACA	19	6	2	1	6	6	2	6	12		5	4	2	1			1
BENT	2				3	2	8	1	1			1	2				
BOULDER					2	5	11	9	14	25	16	13	7	14			
BROOMFIELD			2		1					10		21	11	5			
CHEYENNE	2	1	3	3		9	14	15	14	8	12	11	17	35	19	3	
COSTILLA																	
CROWLEY																2	
DELTA				5	4	6	5	2			9	2	3				
DENVER		2					7	5	4								
DOLORES					2		2	13	6	2		1	5	10	4		
EAGLE														1			
EL PASO											2		5		1		
ELBERT	2						1										3
FREMONT					1	3	2	2	5	3	9	16	9	2	4		1
GARFIELD	190	251	245	417	585	799	1,005	1,304	1,689	765	905	877	495	391	361	175	131
GUNNISON			1		1	1	9	5	1	4	5	2	4	1	2	4	1
HUERFANO	25	14	19	3	6	2			2		2		2	1	4	1	
JACKSON	24	2	4	10	10		3	3	12	1	8	7		7	7		24
JEFFERSON								2									
KIOWA	8	16	2	4	2	1	7	7	2	5	15	14	10	12	3	2	
KIT CARSON				1	1	6	2	1	14	3	1	1	3	1	2		
LA PLATA	99	135	118	110	103	104	108	179	199	131	67	54	3	10	40	38	39
LARIMER	1	1				1		4	8	1	28	2	10	4	1	9	3
LAS ANIMAS	202	286	205	221	296	384	413	326	222	14	7	78	1		1		
LINCOLN	2	2	1	5	2	2	1	2	18	11	14	21	23	41	41	12	2
LOGAN	4	6	3	3	2	11	12	12	3	7	3	9	13	4	6		
MESA	2	12	12	13	25	89	156	209	225	14	11	41	4	11	16	77	
MOFFAT	18	23	25	28	19	40	60	42	26	18	15	32	26	27	3	6	3
MONTEZUMA	2	3	5	5	1	7	2	4	22	10	3	8	18	12	8	1	
MONTROSE		3		2	1			1	2		1						
MORGAN	9	8	1	7	5	5	3	1	1	2	3	2	3	1	3	1	
PARK											2						
PHILLIPS	1			6	10	11	4	35	18	2	42	130	48		9		
PROWERS	2	4	4		5	5	6	3	5	2	3	1					1
RIO BLANCO	51	82	47	83	92	95	107	95	205	118	107	72	53	36	44	17	
RIO GRANDE														1			
ROUTT	5	12	1		1	6	3	2		2	1	2	4	2	2		
SAN MIGUEL	6	9	10	19	28	13	20	17	5	1	2	2			2		
SEDGWICK				1	2	1	1	5			3	8	3				
WASHINGTON	15	12	24	29	65	34	23	14	11	2	2	4	1	9	7	2	6
WELD	237	403	406	522	632	718	931	1,222	1,312	878	1,209	1,671	1,459	1,313	1,557	1,107	669
YUMA	42	162	108	106	144	597	593	445	336	27	213	106	16	13	39		
TOTAL	992	1,472	1,254	1,630	2,092	3,004	3,542	4,048	4,459	2,071	2,779	3,217	2,296	1,977	2,239	1,470	886





Oil and Gas Staff Report

December 12, 2016

25

Monthly Statistics as of December 1, 2016

Page 1 of 2

YEAR and MONTH	Baker - Hughes Rig Count	Permits										Well Spud Notices	Active			Public Visits		
		Drilling		Recompletion		Injection		Pits		Locations			Drilling Permits	Active Wells	Data	Office	Internet	
		Rcvd	Apvd	Rcvd	Apvd	Rcvd	Apvd	Rcvd	Apvd	Rcvd	Authz							
2011 TOTAL		4,709	4,659	325	320	44	32	190	192	2,382	2,267	3,218			187	1,294	1,337,865	
2012 JAN	73	372	258	26	21	3	0	11	5	142	129	243	5,217	46,958	12	106	112,686	
FEB	70	370	382	23	27	7	5	21	9	160	129	230	5,173	47,128	16	114	105,857	
MAR	66	292	347	21	14	2	2	17	24	133	172	293	5,132	47,263	26	138	111,746	
APR	66	410	235	16	24	5	5	9	2	137	106	241	4,785	47,377	12	108	107,627	
MAY	66	491	506	23	16	3	1	6	2	105	131	211	4,885	47,533	20	123	109,802	
JUN	69	326	377	11	19	8	6	5	8	110	89	147	5,136	47,860	11	111	108,849	
JUL	66	237	276	9	14	3	2	5	2	97	103	183	5,152	48,173	13	102	114,195	
AUG	62	313	288	6	9	6	4	23	5	83	97	178	5,031	49,153	11	112	110,908	
SEP	61	252	256	1	5	5	2	4	1	81	77	161	4,960	49,230	11	89	106,114	
OCT	62	326	265	9	3	7	6	2	19	94	82	162	5,009	49,236	8	105	108,833	
NOV	56	271	323	5	8	6	6	2	4	109	97	142	5,000	49,989	10	119	120,586	
DEC	57	322	260	4	8	8	5	9	3	122	81	105	5,081	50,067	9	78	107,240	
2012 TOTAL		3,982	3,773	154	168	63	44	114	84	1,373	1,293	2,296			159	1,305	1,324,443	
2013 JAN	53	538	331	6	0	3	5	6	8	176	124	142	5,060	50,265	9	108	47,406	
FEB	56	260	455	10	5	2	3	4	11	91	141	139	5,250	50,372	7	102	40,649	
MAR	57	344	241	5	9	3	8	15	6	129	84	172	5,093	50,540	9	133	43,019	
APR	61	331	333	6	5	5	5	6	8	146	117	163	4,925	50,687	3	132	46,459	
MAY	61	350	342	8	6	6	6	10	7	106	142	162	5,110	50,810	3	123	45,215	
JUN	62	349	273	2	8	8	8	5	3	114	85	144	5,273	50,909	8	122	41,015	
JUL	68	864	304	11	4	9	2	9	5	218	91	160	5,070	51,091	7	154	45,558	
AUG	69	232	291	6	4	3	2	4	1	35	76	206	5,200	51,255	20	130	44,722	
SEP	69	212	362	9	5	10	9	3	19	56	109	164	5,185	51,407	5	105	41,256	
OCT	72	319	376	5	9	7	5	1	8	67	88	238	4,967	51,598	5	135	45,151	
NOV	69	346	353	4	13	7	4	2	27	67	85	163	5,141	51,711	12	119	38,903	
DEC	64	336	367	2	4	4	6	2	3	63	71	124	5,129	51,737	4	93	32,381	
2013 TOTAL		4,481	4,028	74	72	67	63	67	106	1,268	1,213	1,977			92	1,456	511,734	
2014 JAN	62	278	232	3	2	3	4	14	8	90	43	171	4,926	51,840	1	90	46,150	
FEB	61	284	297	6	4	1	1	3	1	91	94	150	5,051	51,847	12	113	43,408	
MAR	62	367	329	4	6	7	1	6	6	110	88	183	4,997	51,952	16	140	46,620	
APR	63	276	317	2	3	2	5	8	3	89	99	172	4,897	52,060	11	188	45,558	
MAY	65	458	383	2	2	3	1	6	7	83	94	179	4,923	52,202	18	131	42,365	
JUN	67	429	377	3	0	6	7	5	2	134	92	223	4,924	52,337	10	156	42,518	
JUL	69	272	446	2	5	3	11	8	5	97	126	180	4,955	52,431	7	166	45,481	
AUG	73	376	259	4	3	4	4	3	4	111	87	220	5,060	52,582	8	145	42,431	
SEP	76	412	304	2	3	3	1	20	1	116	81	212	5,006	52,694	14	175	43,577	
OCT	76	459	371	3	2	9	2	4	6	93	109	190	4,827	52,785	19	138	46,030	
NOV	73	326	479	5	2	5	4	4	0	54	103	172	5,171	52,947	8	96	39,583	
DEC	69	286	397	1	2	2	7	1	2	45	99	187	5,236	53,054	6	144	37,964	
2014 TOTAL		4,223	4,191	37	34	48	48	82	45	1,113	1,115	2,239			130	1,682	521,685	
2015 JAN	64	349	316	3	1	2	9	3	1	60	43	194	5,060	53,195	17	114	41,502	
FEB	49	324	161	3	2	5	6	9	0	73	28	114	4,750	53,309	4	117	38,245	
MAR	38	246	294	1	6	1	5	7	5	44	70	166	4,983	53,414	6	146	42,513	
APR	37	194	165	3	1	2	5	1	2	46	37	92	4,854	53,456	1	125	39,559	
MAY	39	324	190	1	4	2	6	8	0	41	44	108	4,632	53,535	5	113	unavailable	
JUN	38	327	281	4	1	0	5	2	1	52	49	142	4,726	53,608	5	138	unavailable	
JUL	38	373	250	4	2	2	1	0	0	57	48	121	4,663	53,706	7	145	26,975	
AUG	37	289	300	2	6	3	0	5	5	32	46	121	4,847	53,766	2	109	30,674	
SEP	33	242	312	3	1	1	7	0	3	59	49	100	4,953	53,806	4	146	31,642	
OCT	30	372	223	2	2	3	1	1	0	54	51	108	4,694	53,898	12	119	33,199	
NOV	31	190	254	6	2	4	3	1	0	21	49	117	4,765	53,719	7	105	29,112	
DEC	25	275	242	1	5	3	6	1	0	42	43	76	4,594	53,652	3	112	25,659	
2015 TOTAL		3,505	2,988	33	33	28	54	38	17	581	557	1,459			73	1,489	339,080	
2016 JAN	22	250	126	1	0	3	5	0	0	34	9	68	4,528	53,698	2	118	30,105	
FEB	20	205	227	3	0	3	2	44	2	31	39	64	4,599	53,723	8	115	28,611	
MAR	17	268	268	0	0	2	2	5	0	34	36	70	4,530	53,710	3	132	30,902	
APR	17	185	224	0	1	3	4	6	0	24	39	61	4,511	53,774	4	113	27,914	
MAY	16	353	217	0	2	3	1	6	1	33	24	83	4,464	53,749	4	106	26,778	
JUN	16	315	233	0	0	2	3	6	1	38	30	58	4,456	53,651	2	80	27,284	
JUL	20	268	249	5	0	4	4	6	6	31	30	84	4,344	53,724	5	91	24,151	
AUG	21	141	150	1	3	5	3	6	0	33	23	85	4,436	53,740	1	106	29,192	
SEP	19	366	270	0	2	4	2	6	6	29	24	71	4,522	53,817	4	154	25,698	
OCT	19	334	297	6	1	6	3	7	0	42	29	92	4,601	53,903	1	135	25,893	
NOV	20	368	304	3	3	3	3	8	1	40	45	131	4,566	53,993	2	97	25,140	
2016 TOTAL		3,053	2,565	19	12	38	32	100	17	369	328	867			36	1,247	301,668	

Abbreviation Key: Rcvd = Received, Apvd = Approved, Authz = Authorized