

Proposed Statewide Baseline Groundwater Sampling and Monitoring Rules

Staff Presentation

Cause 1-R, Docket No. 1211-RM-04

November 14, 2012

Presentation Outline

- Part 1:
 - Introduction
 - Existing COGCC Sampling Rules and Orders
 - COGA Voluntary Sampling Program
- Part 2:
 - Details of Proposed Rule 609
 - Benefits of the Proposed Groundwater Rule

Introduction

Oil and Gas operations occur in multiple areas throughout the State where citizens obtain their water supply from groundwater sourced by water wells or springs.

Groundwater users have expressed concerns to COGCC, Oil and Gas Operators, and local governments.

COGCC receives on average, two requests to sample a water well every week.

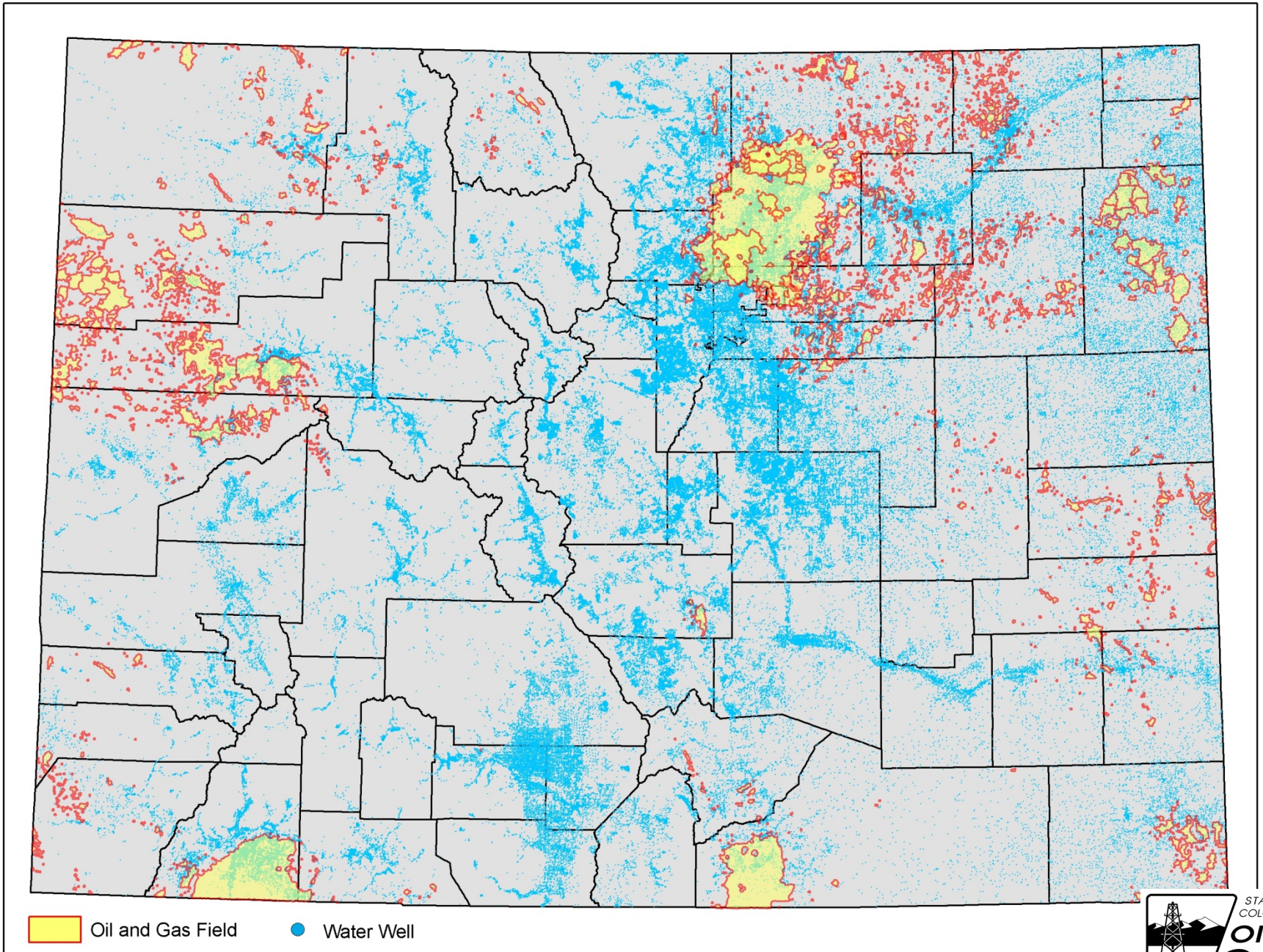
Several local governments have proposed or adopted rules/policies regarding groundwater sampling near oil and gas wells and facilities.

Existing COGCC Sampling Rules and Orders

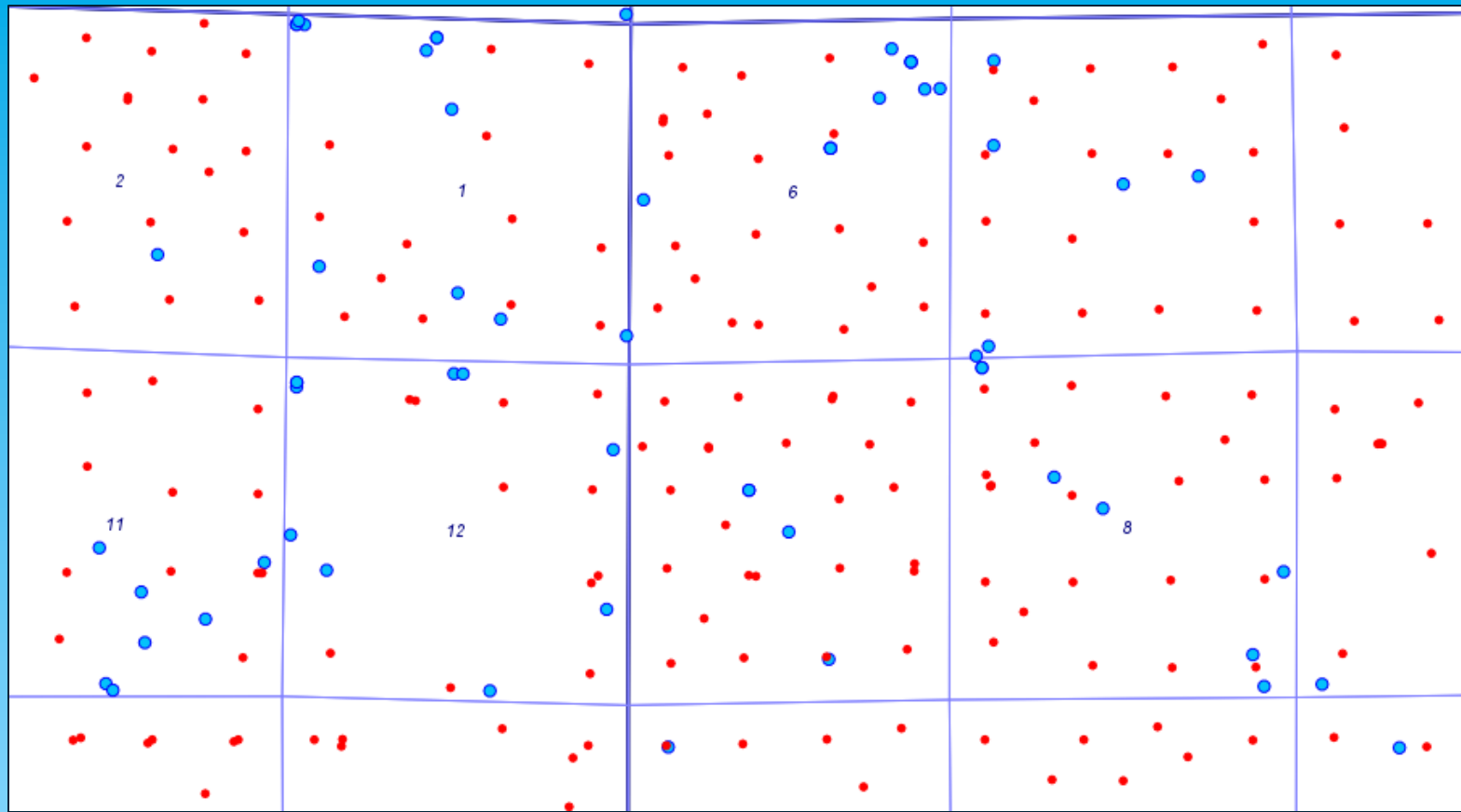
Date	Rule or Order	Description
Apr 2000	112-156 & 112-157	Sampling near CBM wells in the San Juan Basin
Dec 2005	Rule 318A.e	Sampling within GWA for infill wells
Apr 2009	Rule 608	Sampling near all CBM wells Statewide
April 2009	Rule 305.d	Provides for Conditions of Approval which can require groundwater sampling on Form 2A.
Sept 2011	Rule 318A	Expands required sampling to all of GWA

Note: COGCC can require samples at any time pursuant to Rule 207.

Water Wells and Oil/Gas Fields of Colorado



Example – Proximity of Water Wells to Oil/Gas Wells



Red Dots: Oil and Gas Wells
Blue Dots: Water Wells

Rule 609 – Supplement to Existing Rules

The proposed rule will provide additional groundwater data in areas of oil and gas development, as a supplement to existing COGCC groundwater protection rules, such as:

- Surface Casing – Rule 317.d., e., f., g., 317A.a., b.
- Well Cementing – Rule 317.h., i.
- Bradenhead Testing – Rule 317.j, 341
- MIT Testing – Rule 326
- Pit Lining – Rule 904
- Form 2A Process for Siting and Constructing Surface Facilities – Rule 303.d.

Rule 609 –Supplement to Existing Rules

The proposed rule IS NOT a comprehensive groundwater study and/or monitoring program designed to detect all potential impacts for all users at every water well or spring.

Complaint driven investigations will continue by COGCC, as they have in the past, to specific situations.

COGCC will also continue to require groundwater investigations at new reported and known spills.

Existing COGCC Sampling Rules and Orders

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Existing Rule 608 Summary

- Applies to all CBM areas within the State.
- Analyze for complete analytical list in 608.b.(2).
- Collect initial baseline, 1 year, 3 year, and 6 year samples.
- Submit data to water well owner and COGCC.
- COGCC posts to public website.

COGA Voluntary Baseline Groundwater Sampling Program Summary

- Effective January 2012.
- Sample 2 groundwater water wells, springs, or seeps within 1/2 mile radius of the surface location.
- Analyze for complete analytical list on Table 1 in the COGA Sampling and Analysis Plan.
- Collect initial baseline and a 1 year sample.
- Submit data to COGCC for posting on Public Website

Rule Element	COGCC Rule	COGA Voluntary Program*	Colorado Petroleum Association	EDF/Shell
APPLIES TO:	All new oil and gas locations except CBM wells	Voluntary	New oil and gas wells and multi-well sites	All new oil and gas well sites except CBM wells (Rule 608)
	Requirements supercede Rule 318A for GWA		Not applicable to Rule 318A wells	Implicitly applies to GWA wells
	Applies to 2A locations, may include pits, tank batteries		Not applicable -- limited to oil and gas wells	"Well site" includes areas disturbed during drilling, subsequent operations or affected by production facilities of oil/gas/injection well
	Dry holes are exempt from follow-up samples			
NUMBER OF WELLS:	Sample 2 water wells/springs	Sample 2 GW water wells, springs, or seeps	Sample 2 water wells/springs	All available water sources within radius
LOCATION OF WELLS:	Within 1/2 mile radius of location	Within 1/2 mile radius of the oil/gas well surface location	Within 1/2 mile radius of well or multi-well site	Within 1/2 mile radius of location
	Search to 1 mile if 1/2 miles search is unsuccessful			Search to 1 mile to get minimum up-and down-gradient sources
	Samples do not need COGCC staff pre-approval			
	Permitted, well-maintained well or spring		Permitted domestic wells in regular working order; springs for domestic purposes	"Water sources" includes various registered water wells, permitted or adjudicated springs, and certain monitoring wells; properly maintained, operational and suitable
	Closest to O&G well or other location		Closest to O&G well only	Closest to well site
	Consider topography and hydrogeology		Consider topography and hydrogeology	
	Sample opposite sides of the location		Sample opposite sides of the well(s) site	At least one up-gradient and two down-gradient
	Sample deepest aquifer for well locations		Sample deepest aquifer for well locations	Attempt to sample multiple aquifers
	Sample shallowest aquifer for surface facility locations		Not applicable	Attempt to sample multiple aquifers
				May propose alternative sampling regime if number of available sources is exceptionally large
			Can sample additional water sources that do not meet all requirements	

Rule Element	COGCC Rule	COGA Voluntary Program*	Colorado Petroleum Association	EDF/Shell
ANALYTES and PROCEDURES:	Analytes list from Rule 609.e.(2) (see table)	Analytes list (see table)	Analytes list from Rule 609.e.(2) (see table), excluding slime and coliform, hydrogen sulfide by field test	Analytes List in Appendix A
	Analyze for gas composition and stable isotopes if methane exceeds 1.0 mg/l			
	Procedures to industry standards, Rule 910.b.(2)			Sampling according to a Sampling and Analysis Plan
TIMING:	Collect baseline	Collect Baseline	Collect Baseline	Collect Baseline
	Prior to drilling or surface facility installation		Prior to drilling only	Sample within 12 months of drilling a single well or first on multi-well pad
	Prior to restimulation if >12 months from baseline or recent re-stimulation sampling		"Restimulation" changed to hydraulic fracturing only	Sample within 12 months of re-stimulation
	Use data from previous sample if collected within 18 months		No time limit on use of previous samples	May use data from previous sample if collected within 12 months and no significant oil and gas activity within one-mile during the 12 months
FOLLOW-UP SAMPLING:	Follow-up: two samples	Follow-up: one-year		
	#1- 12 - 18 months after well completion or facility installation		#1- 12 - 18 months after well completion only	#1- 6 - 12 months after single well completion or final well on multi-well pad
	#2- 60-78 months after previous sample		Not applicable	#2- 60 - 72 months after single well completion or final of multi-well pad
	Additional post-completion may be required if changes in water quality identified		Additional post-completion may be required if director believes changes are due to O&G activity	Additional post-completion may be required if changes in water quality identified
	Director may require further well sampling in response to complaints		Director may require further well sampling in response to verified complaints within 1/2 mile of well site(s)	Director may require further well sampling in response to complaints
			One sample event can satisfy both initial baseline and subsequent sampling if criteria are satisfied	
				Annual sample during active drilling and completion of multi-well pad

Rule Element	COGCC Rule	COGA Voluntary Program*	Colorado Petroleum Association	EDF/Shell
TRANSPARENCY:	Submit data to well/spring owner and COGCC for posting on public website	Submit data to COGCC for posting on public website		Submit data to COGCC for posting on public website (Appendix A)
	Submit GPS coordinates with data			
	Submit in electronic data deliverable format within 3 months of collection		Submit in electronic data deliverable format within 3 months of collection	Provide results to landowners, water source owners and COGCC within 3 months of collection (Appendix A)
	Immediate well owner notification with thermogenic gas, > 5 mg/l increase between sampling, or methane >=10 mg/l		Well owner notification upon receipt of written data if with thermogenic gas, > 5 mg/l increase between sampling, or methane >=10 mg/l	
				Obtain consent of water source owner (access and publish results)
EXCEPTIONS:	Request exception if no wells/springs identified		No need to request exception	Certify failure to obtain required samples with specified reasonable efforts.
	Request variance if landowners refuse access for sampling		No need to request exception	Certify failure to obtain required samples with specified reasonable efforts.
CONFLICT OF LAW:			Rules binding with respect to operational conflicting local government rules/permits/conditions	Nothing in section limits existing COGCC authorities
LIABILITY:				Section does not affect liability of operators for water quality changes

* COGA Voluntary program as described by COGCC at November 14, 2012 hearing

Recommended Analytical Parameters for Colorado Oil and Gas Commission Rule 609

Draft -- Please email corrections or additions to kathryn.mutz@colorado.edu

Parameters	Approx RL	Possible Methods (others may be appropriate, and lab may use different methods for some parameters than those listed)	COGCC Recommended Parameters	COGA Recommended Parameters	EDF- Shell Recommended Parameters	Boulder County	New York State Department of Health Recommended Water Well Testing (draft Environmental Assessment)	Marcellus Shale Coalition
						compliance with COGCC parameters		
Microorganisms								
Total Coliforms (including fecal coliform and E. coli)	PIA, MPN	SM 9225 or SM 9221B	Included, but not specified			Included, but not specified		Included, but not specified
Turbidity	0.10 NTU	EPA 180.1						Included, but not specified
Iron Bacteria		Field Test Kits	Included, but not specified					
Inorganic Chemicals (for metals, both total and dissolved)								
Antimony	1 ug/l	EPA 200.8						
Arsenic	0.5 ug/l	EPA 200.8	0.39 mg/kg*2		0.01 mg/l	Included, but not specified		Included, but not specified
Barium	0.5 ug/l	EPA 200.8	15000 mg/kg*2			Included, but not specified	Included, but not specified	Included, but not specified
Beryllium	0.5 ug/l	EPA 200.8						
Cadmium	0.2 ug/l	EPA 200.8	70 mg/kg					
Chromium (total)	0.5 ug/l	EPA 200.8	(III) 120,000 mg/kg			Included, but not specified		Included, but not specified
Hexavalent Chromium	0.01 mg/l	EPA 218.6 or SM 4500CR-D	23 mg/kg					
Copper	0.5 ug/l	EPA 200.8	3100 mg/kg			Included, but not specified		
Fluoride	0.1 mg/l	SM 4500F-C	Included, but not specified			Included, but not specified		
Lead	0.2 ug/l	EPA 200.8	400 mg/kg			Included, but not specified		Included, but not specified
Mercury (inorganic)	0.2 ug/l	EPA 245.1	23 mg/kg					
Nitrate (measured as Nitrogen)	0.05 mg/l	EPA 300.0A, 353.2	Included, but not specified			Included, but not specified		Included, but not specified
Nitrite (measured as Nitrogen)	0.05 mg/l	EPA 300.0A, 353.2	Included, but not specified			Included, but not specified		
Total Nitrate/Nitrite (as Nitrogen)	0.05 mg/l	EPA 300.0A, 353.2		0.1 mg/l	.1 mg/l			
Selenium	0.5 ug/l	EPA 200.8	390 mg/kg	Included, but not specified	0.01 mg/l	Included, but not specified		Included, but not specified
Thallium	0.1 ug/l	EPA 200.8						
Aluminum	1 ug/l	EPA 200.7 or 200.8						
Chloride	1.0 mg/l	EPA 300.0A	<1.25x background*3 (in water)	1 mg/l	1 mg/l	Included, but not specified	Included, but not specified	Included, but not specified
Iron	0.05 mg/l	EPA 200.7 or 200.8	Included, but not specified	Included, but not specified	0.05 mg/l	Included, but not specified	Included, but not specified	Included, but not specified
Manganese	0.010 mg/l	EPA 200.7 or 200.8	Included, but not specified	Included, but not specified	0.015 mg/l	Included, but not specified	Included, but not specified	Included, but not specified
pH	0.01 units	EPA 150.1 or SM 4500H	Included, but not specified	Included, but not specified	1 (pH unit)	Included, but not specified	Included, but not specified	Included, but not specified
ORP (oxidation-reduction potential)		Field test						
Silver	0.2 ug/l	EPA 200.8	390 mg/kg					

Intermountain Oil & Gas BMP Project

Natural Resources Law Center University of Colorado Law School

Intermountain Oil and Gas BMP Project

Welcome to the Intermountain Oil and Gas BMP Project Website

HOME SEARCH BIBLIOGRAPHY RESOURCES LAW & POLICY TRAINING & WORKSHOPS FORUM ABOUT US

BEST MANAGEMENT PRACTICES

The Natural Resources Law Center and its partners welcome you to this free-access website of Best Management Practices (BMPs) for oil and gas development in the Intermountain West. BMPs are mitigation measures applied to areas being developed for oil and gas to promote energy development in an environmentally sensitive manner.

The focus of this website is a searchable database addressing surface resources affected by oil and gas development. The database includes both mandatory and voluntary Best Management Practices currently in use or recommended for responsible resource management in the states of Colorado, Montana, New Mexico, Utah, and Wyoming.

The BMP database is not intended to represent a consensus on what the best practices are for specific applications nor to advise users on the current legal requirements for specific locations. Rather, the database describes each practice and documents the source of the practice (who requires or recommends it in what specific applications). The database provides a link to the source of the BMP and, where possible, it provides supplemental information, including construction specifications, illustrations, pictures, maps, monitoring reports, and evaluations of the potential of the practice for mitigating impacts of development. Because practices change over time, database users should check with appropriate authorities to verify the latest requirements and recommendations for your area.

BMP CATEGORIES

The database includes BMPs to address a variety of resources and issues.

- Air Quality and Emissions
- Aquatic and Riparian Values
- Community
- Cultural/Historic
- Grazing and Agriculture
- Human Health and Safety
- Land Surface Disturbance
- Noise
- Other
- Soils (Conservation, Pollution, Reclamation)
- Vegetation
- Visual Aesthetics
- Water Quality and Pollution
- Water Quantity and Rights
- Wildlife

[Browse all](#)

BMP SEARCH

What management practices are recommended or required for oil and gas development? To find out, use the drop down menus of the Keywords. For a more refined search, click "Advanced Search" or use the [BMP SEARCH](#) button.

Keywords:

Category:

Location:

[Advanced Search...](#)

SEARCH THE BIBLIOGRAPHY

Our searchable bibliography includes over 400 publications, including environmental impact statements, agency guidelines, and many technical reports, websites, and

WHAT'S NEW

Tribal governments have begun to regulate oil and gas development through tribal codes, ordinances, and constitutions, and, in some cases, through specific BMPs. Check out our new [Tribal Law](#) section for more information.

New Resources sections: [Hydraulic Fracturing](#) and [Economics of BMPs](#).

The Intermountain BMP Project is a work in progress. Currently, the database includes BMPs for a variety of resources (see the BMP Categories section) from a range of source documents (see the Bibliography), including project Environmental Impact Statements, Resource Management Plans, state wildlife agency guidelines, and industry and conservation group reports and websites.

PARTNERS

The structure and content of this website is being developed in conjunction with project partners and advisors from government, industry, the conservation community, academia and

TRAINING AND WORKSHOPS

[Best Management Practices – What? How? and Why?](#) Thank you to everyone who participated in

This and other documents discussed during the workshop can be found on the BMP Project website

www.oilandgasbmps.org/workshops/COGCCgroundwater/index.php