Oil and Gas Water Quality Permitting,
Design, and Construction Laws

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I. Date of Protocol: December 20, 2015

II. Scope: Statutes, rules, and regulations pertaining to water quality that are relevant to the development of unconventional shale oil/gas.

III. Primary Data Collection


Data Collection Methods: With 11 states in the original scope of the project, four researchers collected laws in two states each, two researchers shared two states because of their complexity, and the supervisor of the project collected laws in one state. Upon completion of primary research, researchers swapped states and conducted redundant research. From July until December 2015, the dataset was expanded with additional jurisdictions (AK, AR, CA, and IL) using identical methods.

c. Databases used:

   Alaska: http://dog.dnr.alaska.gov/Notices/Regulations.htm;
   http://www.legis.state.ak.us/basis/folio.asp;
   http://www.legis.state.ak.us/basis/folioproxy.asp?url=http://wwwjnu01.legis.state.ak.us/cgi-bin/folioisa.dll/aac;
   http://www.legis.state.ak.us/basis/aac.asp; and

   Arkansas: http://www.sos.arkansas.gov/rulesRegs/Pages/default.aspx;
   http://www.arkleg.state.ar.us/assembly/2015/2015R/Pages/Home.aspx;
   and http://www.arkleg.state.ar.us/SearchCenter/Pages/historicalact.aspx.

   California: https://govt.westlaw.com/calregs/index?_InTS=20151216190326400&transi;
   http://www.leginfo.ca.gov/statute.html; http://www.legislature.ca.gov/port-
   bilinfo.html; http://leginfo.legislature.ca.gov/face/s/billSearchClient.xhtml;
http://leginfo.legislature.ca.gov/faces/codesTextSearch.xhtml; and

**Colorado:** http://cogcc.state.co.us/; http://www.lexisnexis.com/hottopics/colorado/;
http://www.sos.state.co.us/CCR/NumericalCCRDocList.do?deptID=16&deptName=1000%20Public%20Health%20and%20Environment&agencyID=7&agencyName=1001%A0Air%20Quality%20Control%20Commission

**Illinois:**


**Montana:**

**New Mexico:** http://www.nmcrp.state.nm.us/nmac/ and http://www.nmonesource.com/nmnxtdadmin/NMPublic.aspx


**Ohio:** http://codes.ohio.gov/; and http://epa.ohio.gov/dapc/genpermit/oilandgaswellsiteproduction.aspx

**Oklahoma:** http://www.deq.state.ok.us/rules/100.pdf; http://law.justia.com/codes/oklahoma/2006/os27a.html; and http://www.oar.state.ok.us/oar/codedoc02.nsf/All/026BA7D22726D81986257C0F00750788?OpenDocument


d. Search terms:

Due to the wide scope of examining water quality regulations pertaining to oil and gas development, search terms were highly specialized to each identified segment of oil and gas development category: Permitting, Design & Construction, Well Drilling, Well Completion, Production & Operation, and Reclamation. The search terms used for each category and questions are listed below in each category:

**Permitting, Design, and Construction**

acre/mile; Ban; Best Management Practices; Closed-Loop Drilling; Disturbance; Holding containers; limit; Pit liner; Prohibited; Recommended practices; size; Storage Tank; well pad; well site; abandonment; aquifer; baseline; biological; chemical; class II; defense; disclosure; erosion; exemption; horizontal; hydraulic fracture; injection; liability; location; monitoring; notification; notify; Oil and Gas; permit; physical; pit; plugging; pond; pool; presumption of liability; reclamation; sampling; seismic; setback; siting; spacing; stormwater; subsurface; tank; testing; underground; waiver; water; well-density

**Well Drilling**

[name of state regulatory authority]; air cooling; annular; API RP; aquifers; BOPE; bottom-hole; casing; cement bond logs; compliance; drilling; drinking water; fresh water; monitoring; permitting; pressure; recommending practices; recording; standards; testing; well site spacing; well-bore; American Petroleum Institute; Annulus; blowout prevention equipment; cement-bond logs; drilling fluid; groundwater; Horizontal drilling;
mechanical integrity; monitoring; reporting; Stage cementing; surface casing; well bore; well-bore cementing

**Well Completion**

Access information; Additive type; As soon as possible; Before well simulation; Chemical Abstract Service (CAS) number; Chemical compound name; Class II well; Commercial waste disposal facility; Concentration rates; Confidential; Days after completion; Days following completion; Detailed information; Diagnosis or treatment; Disclosure; Disposal of well stimulation fluid; Drilling fluid waste; Drilling fluids intended for recycling; Each additive; Emergency; Encourages the recycling of drilling; Exempt; Feasible; Fracfocus; Fracturing fluid; Gallons per thousand gallons; Health care; Hydraulic fracturing; Hydraulic fracturing fluid; Land farming; Land treatment/application; Lined pits; Migratory birds; No later than; Oil and Gas; Oil and gas commission; Overall concentration; Parts per million / parts per billion; Percentage by volume; Percentage by weight; Pits; Pounds per gallon; Privileged information; Proposed concentration; Protection; Protective of groundwater; Public access; Public health official; Recycle of flowback; Reuse for fracturing operations; Road spreading; Solids removal equipment; State agency; State website; Stimulation fluid source; Storage; Tanks; Total volume of recycled; Trade names; Trade Secret; Trade secret exemption; Well completion; Well completions; Well stimulation fluid

**Production and Operation**

(within regulations) inspections; agency authority to inspect; Class II Injection Well; disposal requirements; frequency; frequency requirement inspections; inspection; measurement of water; monitoring; notification; oil and gas; pipeline; produced water; recycled water; reporting; spills and accident reports; tanks; waste disposal; water volume; oil and gas; Centralized Waste Treatment facility; Collecting; Drilling; Evaporation; exploration and production waste; Holding; inspection; inspections; oil and gas; pits; Produced water; Publicly Owned Treatment Works; Roadspreading; well inspection

**Reclamation**

Abandoned; application for permit to drill; assurance: backfilled; blanket; bond; days; disturbed; filled; final; financial; forbs; forfeiture; gas; grasses; holes; indigenous; interim; land; months; native; percentage; pits; plan; plugged; reclamation; release; remediate; removal; removed; restoration; return; security; shrub; shut-in wells; single new well; state inspection; statewide;
IV. Coding

a. Background Information: The initial two weeks of the research project consisted of the six researchers meeting to discuss the scope of the project. They were given background reading assignments about unconventional oil and gas development to establish subject matter knowledge. A subject matter expert from the University of Colorado law school delivered a presentation about shale gas and the impacts of oil development. Each researcher then collected grey literature pertaining to oil and gas water quality impacts.

A general outline of the stages of oil and gas development and potential statutory and regulatory subjects was built for the researchers. The outline was a starting point in order to identify and develop proper water quality questions. The stages and potential statutory and regulatory subjects had been developed in coordination with our partners, the Environmentally Friendly Drilling program. Six stages were initially identified, and each stage was assigned to a researcher, with two stages consolidated into one dataset by the end of the project. The potential statutory and regulatory subjects for each stage were analyzed by the researchers to determine their adequacy; subjects were added and removed depending on that research. Potential statutory and regulatory subjects were presented to entire group and finalized.

At this point, each researcher was assigned a number of states and began collecting statutes and regulations for their states that corresponded with the finalized subjects. Upon completion of this initial collection, the researchers swapped states and checked, at a minimum, five questions per state as a quality control measure. Simultaneously, while this work was being conducted, each researcher was developing draft questions for the LawAtlas database. The drafts were written utilizing the Workbench User Guide. Finally, a day-long group editing session was held to finalize the questions for the database. This session was held because the researchers spent considerable time concentrating on one stage of the oil and gas development process and because the process of collecting statutes and regulations for individual states had provided all researchers with a better understanding of the nuances of regulatory structure across jurisdictions and development stages.

Once the questions were coded and entered into LawAtlas, each researcher began transferring the appropriate statutes and regulations into the legal text box and answering the questions. During this process, questions and answers were edited with consent from the entire group.
b. **Coding methods:** The coding is done on an individual basis with each researcher responsible for assigned states. Upon completion of coding, the researchers swapped states and a minimum of five questions were randomly double checked. If concerns arose during this portion, questions and suggestions were shared with the entire team. Weekly meetings were also held to discuss any discrepancies or concerns.

c. **Test with Naïve Coder:** Naïve coders were brought on toward the end of the coding process to code 13 randomly selected records (15% of 88 records). Once the naïve coding was finished, the project leader analyzed the divergences between the original coder and the naïve coder. Conversations were held with the naïve coders to better assess the divergences and clarification to questions and answers followed.