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Progression of Louisiana Oil and Gas Laws and the Associated Risks with Orphan Wells

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Introduction

Completion and plug and abandonment procedures have changed due to various risk assessments and evolving environmental regulations. As a result of regulations put in place by the state of Louisiana, companies are required to meet specified drilling completions and plugging guidelines when handling oil and gas wells in Louisiana. The various processes in oil and gas operations dictate control procedures with numerous types of cement and isolation requirements. If a well is not plugged prior to abandonment, it can be considered an orphan well and will be acquired by the Louisiana Department of Natural Resources (DNR, 2010).

With wellbore and completions evaluation, an adequate plug and abandonment procedure may be determined, although that may not be the fate of this well. The study will go on to evaluate well permit counts at different periods of time throughout the last century. The primary focus of this study is to make a comparison between completion and plug and abandonment procedures used presently and those that were used in previous years in order to determine if risks are present as a result of changing regulations. This study will allow for a better understanding of environmental risks associated with the evolving oil and gas industry practices and how present completion and plug and abandonment regulations may better mitigate those risks. The importance of effective oil and gas regulations will be emphasized.

Background

Drilling began in the state of Louisiana in 1901 when the first well was drilled in Evangeline parish near Jennings. It was named the Clement No. 1 and was drilled by the newly established Jennings Oil Company (DNR, 2010). Since then, the state of Louisiana has been through a series of programs and amendments that have controlled how wells have been handled and ultimately plugged throughout time. The first plugging regulations were established in 1906, prior to the creation of a state program responsible for oil and gas. The first state program governing the handling of oil and gas wells, the Louisiana Commission for the Conservation of Natural Resources, was established in 1908 (Dimick, 1922). Since then, the plugging regulations have been handled by the Conservation Commission, Louisiana Department of Conservation, and most recently, the Department of Natural Resources created in 1976. The Department of Natural Resources contains the Office of Conservation and Office of Mineral Resources, both of which handle oil and gas resources in Louisiana (DNR, 2010). The current document establishing plugging regulations, Order 29-B, was first enacted in 1943 and was last amended in 2011. This document is used as a guideline for plugging wells in Louisiana, including orphan wells. The work presented in this document focuses on the importance of plugging orphan wells across the state of Louisiana.

Well plugging is a general process that has required various procedures. Plugging procedures may vary with different well locations, for example, offshore or onshore. They are also based on parameters such as depth of fresh water aquifers and distance from commercial areas. States did not start strictly enforcing plugging regulations until the 1930s, many decades after wells were first drilled in each state.

Therefore, there are many wells that have not been completed or plugged using procedures consistent with regulations in place today. These wells make up some of the orphan wells seen across the state. In Louisiana, the Department of Natural Resources has guidelines in place for well plugging. In 1993, they also put in place an orphan well program, The Oilfield Site Restoration Program. This program handles wells that were not properly maintained by their operators (DNR, 2010). The program takes wells that are in "critical" locations and/or in conditions where damage to the environment is likely, and restores them to a state that is acceptable to the environment. Often, this restoration ends in the plugging of a well. Close to 50 wells are plugged each year, depending on available resources (DNR, 2010). Successfully plugging these wells is important in meeting environmental regulations and improving environmental safety. Various procedures are developed to ensure this safety based on known parameters in specific areas.

Orphan wells generally have been abandoned without being plugged properly by the abandoning operator. They are often abandoned by the operator due to inability to comply with state regulations, primarily due to the lack of funding. These wells become the responsibility of the state of Louisiana and may be offered to other operators for bid. However, the ownership of the well remains with the original operator under statute. Operators who take over an orphan well may produce any remaining reserves in the well in exchange for taking over operating costs. Any wells that are deemed high risk due to surface location or wellbore conditions will be recognized as high priority to be plugged and abandoned by the Department of Natural Resources once funding is available. Millions of dollars have

been spent plugging these wells to date. As of June 2010, there were 2833 orphan wells remaining statewide, some dating back to the early 1900s (DNR, 2010). The wellbore conditions of most of these wells are unknown, leaving them as possible risks to the environment and ground water aquifers. One way to analyze this risk is to assess the completion and plugging regulations that were in place at the time a well was drilled.

Previously recognized problems associated with old plugging techniques include water flooding, disposal of salt water, and CO_2 injection. More recently, drilling and completion in shale reservoirs has been scrutinized due to gas appearing in drinking water in areas where old and even undocumented well sites exist. The pollution of these fresh water aquifers is the main concern when determining a plugging technique for a well. Plug placement and cement type are both key in planning current plugging procedures. Common plugging materials include different combinations of Portland cement and concrete. The main goals associated with plugging include isolation of formation fluids from fresh water sources and overall surface protection. There are similar goals associated with cement and casing completions that prevent access to open hole and isolate contamination sources from fresh water zones.

Early Regulations

The first plugging regulations were put in place in 1906 as a part of what was called Act 71. This called for a wooden plug to be placed below the producing zone of a well and another plug above the producing zone (Dimick, 1922). Outside of this

requirement, this first regulation did not contain substantial detail and merely enforced abandonment without plugging as a finable misdemeanor. Each following bill added more detail to the previous. Act 190 of 1920 added a significant amount of detail. The bill recognized two methods of plugging a well based on the existence of perforations. Diagrams of these two plugging procedures can be seen in Figure 1.

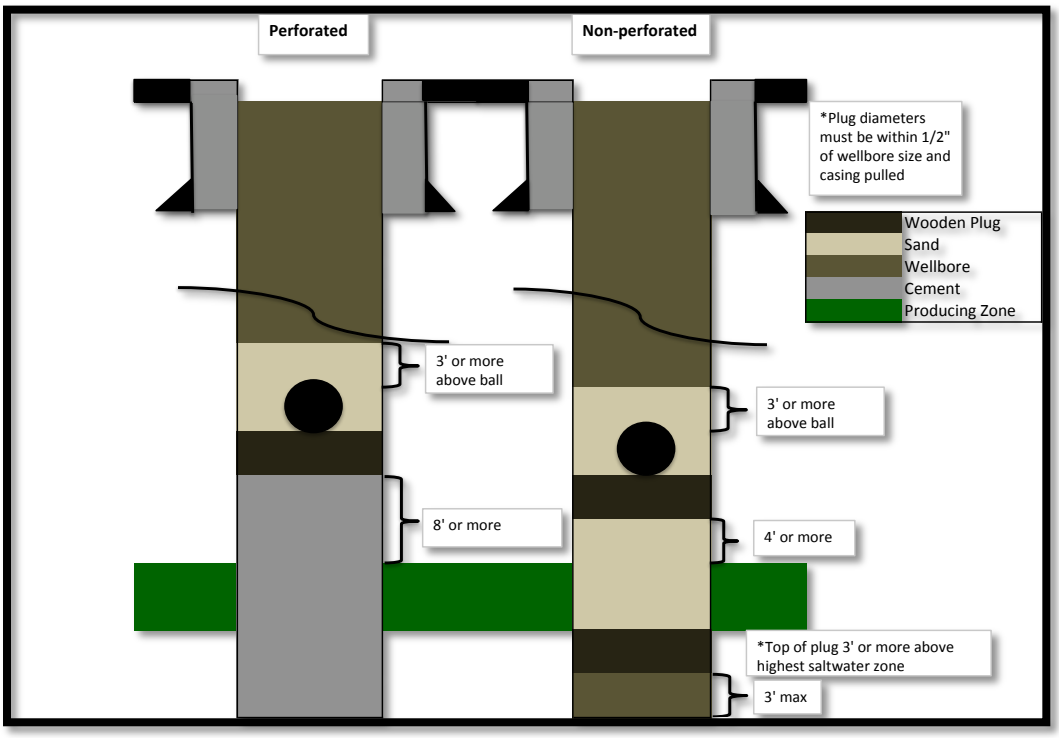

Figure 1: Perforated versus non-perforated plugged wellbore

In the case of a well that had not been perforated, it called for a wooden plug to be placed no more than three feet above the bottom of the well, and to extend at least three feet above the first salt water zone. Sand was then to be packed onto the top of this plug, at least four feet above the producing zone, onto which another plug was to be placed. If the well was perforated, the well first needed to be filled with sand and cement from the bottom to eight feet above the producing sand and then plugged on top with a wooden plug. For all wells, the diameters of all plugs had to

be at least within one half inch of the wellbore size. Casing needed to be pulled, and an iron ball needed to be dropped on top of the plugs after they were “rammed”. Lastly, the iron ball must be covered “with at least one yard tall of sand” (Dimick, 1922). If a well was abandoned without being plugged, anyone on the land had the right to take action, plug the well on their own, and then sue for recovered cost and expenses of well control. Act 172 of 1910 created the Conservation Commission. In 1910, the Board of State Engineers also came into play. Regulations stated that any “wild” well that was not contained or plugged might be taken over by the Board of State Engineers if the operator failed to take action. Once under control, the well could then be sold in order to regain expenses owed to the State (Dimick, 1922).

Once the Department of Conservation was established in 1912, a set of general rules and regulations were published. The Department of Conservation stated that all producing strata within a well must be confined, in addition to plugs and cement, with mud laden fluid 25 percent heavier than encountered waters prior to casing being pulled. These rules also briefly mentioned the protection of freshwater, although leaving out any detail on the means of protection. The Department of Conservation under Act 250 of 1920 established the right to take over any wild well 5 days after a compliance notice was given to the operator if action to plug the well was not taken. The Department was led by a Commissioner and conservation agents gave notice to operators and enforced any infractions on plugging regulations (Dimick, 1922).

Under Act 268 of 1918 (adopted in 1920), casing regulations for drilling wells were established. These first casing regulations only focused on wells in select

parishes, beginning with Ouachita, Morehouse, Richland, and Union parishes. Operators were required to use three strings of casing in these parishes, 10", 8", and 6". The first two strings were to isolate the waters and the third was to be cemented near the producing zone. The cement was to be brought up the hole to the surface, isolating all water zones. In 1921, Resolution No. 36 called for each casing string used within these parishes to be individually pressure tested up to 1500 psi using cold water throughout each string capped at both ends. Resolution No. 37 in the same year added a requirement of no less than 100 sacks of cement to be used, allowing it to set for ten days. Rules for Claiborne parish were adopted in 1919 under Act 268 of 1918 to isolate a shallow oil zone. Cement requirements for 6" casing set at 100 feet were as seen in Table 1.

Size of Hole	Outside Diameter of Pipe	Sacks of Cement to Be Used	Sacks of Sand to Be Used
7-7/8"	6.625"	8.52	4.26
8-1/2"	6.625"	12.15	6.25
9-7/8"	6.625"	23.54	11.77

Table 1: Claiborne 6" Casing Parameters

In 1922, the Department of Conservation called for wells being drilled in the parish of Webster to use 10", 8", and 6" casing strings. The 10" as surface casing and the 8" had to be set at least 1200 feet and thoroughly cemented. Again, at least 100 sacks of cement had to be used to cement the 6" casing. Need for different size casing strings in any specified parishes was to be proposed and approved by the Department of Conservation (Dimick, 1922). New revisions continued to be added to the rules as knowledge of the oil and gas industry progressed. Advances in technology and

understanding were made evident by the changes in regulations and occurred for years to come.

A major regulating document was released a few decades later in 1943 by the Department of Conservation. The Department published Order 29-B, a statewide order that regulated drilling and production of oil and gas wells in Louisiana. This order included extensive detail in comparison to earlier laws, everything from the initial casing programs, to plug and abandonment procedures. This set of guidelines was more detailed than any of those in years past. Each casing string had an individual set of guidelines and tubing and completions were also included. Blowout preventers were also mentioned for the first time in a legal document (Order 29-B, 1943).

Order 29-B first required that all abandoned wells be filled by a fluid with a hydrostatic weight greater than any encountered formation pressure. Cement plugs were to be placed at locations to prevent different fluids from mixing from one formation to another. This included above and below all producing zones, with cement that is bonded to the borehole walls. All plugs were to be displaced by the displacement method. A cement plug was also required at the surface. The District Manager was required to approve all plugging jobs to determine if they met regulations (Order 29-B, 1943).

Casing design regulations at this time applied to all parishes in Louisiana. Surface casing cement design parameters can be seen in Table 2. These applied to

areas where no freshwater sources were threatened. Circulation to the surface meant that enough cement was to be used to fill the annular space plus ten percent.

Depth (ft)	Total Depth of Contact Casing Required (ft)	Number of Sacks Cement	Surface Casing Test Pressure (psi)
0-2500	100	200 or circulate to surface	300
2500-3000	150	500 or circulate to surface	600
3000-4000	300	500 or circulate to surface	600
4000-5000	400	500 or circulate to surface	600
5000-6000	500	500 or circulate to surface	750
6000-7000	800	500 or circulate to surface	1000
7000-8000	1000	500 or circulate to surface	1000
8000-9000	1400	500 or circulate to surface	1000
9000-deeper	1800	500 or circulate to surface	1000

Table 2: Surface Casing Cement Parameters

After 200 feet of the mud had been displaced with water at the top of the annular column, the surface casing was to be pressure tested using the pressures in Table 2. The pressures needed to hold for thirty minutes without a greater than ten percent decrease in applied pressure to be acceptable. Cement was required to stand a minimum of twelve hours in order to be considered set (Order 29-B, 1943).

Intermediate casing was defined as casing that was used to protect against caving formations or when segregation of various formations was unnecessary. Production casing was defined as the string used for segregating the production

zones and forming communication from that horizon to the surface. Order 29-B required that all strings be new or reconditioned, set at a depth that cuts off all gas formations above the producing oil formation, and cemented above the gas/oil contact. The cement needed to fill the annular space to a point approved by the District Manager in order to protect all oil and gas formations. Enough cement needed to be pumped to fill the annular space to 500 feet above the casing shoe. At least 20 feet of cement needed to be left within the casing while the cement was setting. Under the same conditions described above for surface casing pressure tests, the intermediate and production casing needed to be tested following the guidelines shown in Table 3. Cement requirements are also listed below. Tubing within the wells were to be no larger than 2-1/2" and a valve needed to be installed below any tubing outlet connections (Order 29-B, 1943).

Set Depth (ft)	Number of Sacks of Cement	Production String Test Pressure (psi)
2000-3000	200	800
3000-6000	300	1000
6000-9000	500	1200
9000- deeper	500	1500
*In every case, no less cement may be used than calculated amount necessary to fill annular space to 500 feet above the shoe		

Table 3: Intermediate and Production Casing Cement Parameters

In addition to periodic amendments made over the next few decades, Order 29-B received the next major revision in 1974 during the start of a reorganization of the Louisiana State Government. This new publication incorporated all prior amendments made up to 1974. The well design now incorporated conductor casing, although it was not made a requirement. The use of conductor casing was left up to

the operator. The cement and pressure test requirements for surface, intermediate, and production casing remained the same as in 1943, as well as tubing and completion requirements (Order 29-B, 1974).

The amount of the document dedicated to plug and abandonment procedures changed significantly in 1974. The owner or operator of the well still maintained the responsibility of plugging their abandoned well and the Department of Natural Resources had the ability to take over the well if this criterion was not met. It is no surprise that it is still required that all oil and gas bearing formations be isolated in the plugging procedure. Enough cement needed to be used to isolate each perforated zone in the wellbore. A cement plug of at least one hundred feet needed to be placed immediately above the highest perforated interval. A bridge plug could be used with a minimum of ten feet of cement on top above each producing interval. Perforated liners did not need to be pulled, as it was deemed unnecessary. A one hundred foot cement plug was required to be placed just above the top of the liner. If production casing was pulled or was not present in the wellbore, a cement plug needed to be placed from at least 50 feet below to 50 feet above the surface casing shoe. If fresh water formations were exposed due to the lack of casing or casing being pulled, a cement plug placement was required from at least one hundred feet below the deepest formation to at least 150 feet above the base of the deepest formation. A plug needed to be placed within the top thirty feet of the wellbore and a thirty-foot cement plug needed to be placed at the top of the wellbore. Mud fluid of a nine pound per gallon minimum had to be placed in all portions of the wellbore without a plug or cement in order to ensure the containment of at least normal

pressured formations. This set "minimum" meant that high-pressure formations must still be contained with adequate mud weight. A comparison of a well plugged with and without production casing can be seen in Figure 2. On land, the casing could be cut a minimum of two feet below "plow depth". For water locations, the casing could be cut at a minimum of ten feet below the mud-line unless the well could be turned into a salt-water disposal well. The conversion to a salt-water disposal well needed to first be approved by the District Manager (Order 29-B, 1974).

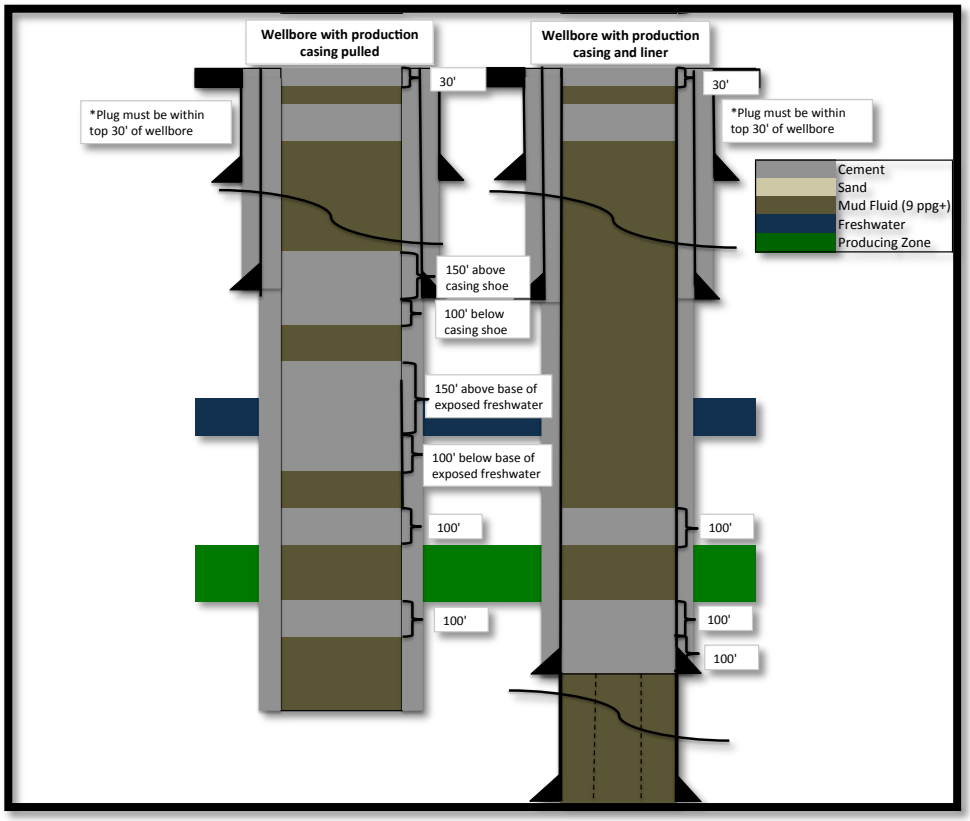

Figure 2: Plugged wellbore without production casing versus wellbore with production casing and liner

In addition to new plugging regulations, there was an emphasis placed on pollution control in Order 29-B of 1974. No oil waste was permitted to be disposed

in any body of water or depression leading to a body of water. Water was permitted for disposal in pits or subsurface formations not containing oil and gas after approval from the Commissioner (Order 29-B, 1974). It is evident that pollution control was becoming a more prominent issue with oil and gas wells in Louisiana and an increase in pollution regulations was seen over the next few years.

Present Regulations

Shortly after Order 29-B was revised in 1974, the Louisiana Department of Natural Resources was established during the reorganization of Louisiana State Government. The creation of this department also established a regulating body at that time dedicated solely to oil and gas. In 2011, a revised Order 29-B was published which included all amendments or additions up to 2011. The casing program again remained the same as it was in 1943. Plugging procedures also remained the same as in 1974 and were now contained in section 137 of the order. However, new regulations required that a diverter system be put in place in all locations where drilling hazards are known to exist. The characteristics of the diverter system are also laid out in the present order. New BOP characteristics were added in 2011 and Order 29-B now contains chapters dedicated to pollution control. A significant amount of these chapters is dedicated to disposal wells or enhanced recovery injection wells, but these wells are still plugged in accordance with section 137 of Order 29-B. Most of these new measures seem to be blowout mitigation methods as a result of the Macondo incident.

A chapter is now dedicated to the process of "tubingless completion" (Order 29-B, 2011). For tubingless completions, the order first indicates that all freshwater sands must be cased off by the surface and/or first intermediate casing string. Tubingless completions allow for the produced oil and gas to flow through the production casing, so a significant amount of regulation is placed on the design of the production string. The casing must be tested at the greater pressure of 1.25 times maximum anticipated bottomhole pressure or "mill tent pressure", the maximum pressure indicated by the casing production company. All upper gas zones must be cased off as well and the production casing set at bottomhole with cement below the gas/oil contact. The tension rating of the production string needs be high enough to withstand all testing mechanisms to bottomhole. No tubingless completion may be permitted in corrosive or extreme pressure, a gradient higher than 0.5 psi/ft (barely above the 0.465 psi/ft normal hydrostatic pressure) or 4500 psig surface tubing pressure, unless safety measures have been approved by the District Manager (Order 29-B, 2011).

As technology and governmental understanding of the oil field has progressed, new regulations have been put in place to control the presence of oil and gas wells across the state. They have a similar basis as those put in place in the mid-1900s; however, it is evident that we have come a long way since the first regulations were put in place in 1906. Louisiana oil and gas regulations will continue to advance as new prospects are discovered and new processes are developed. Methods protecting freshwater zones will always be essential within these processes and will only grow more efficient with time. The evaluation of

brine wells is also becoming more significant as sinkhole problems arise in Louisiana. The completions and plugging procedures of brine wells are included in a separate section of Title 43 of the Department of Natural Resources and were not evaluated for this study. However, let it be known that the procedures for brine wells are different than that of oil and gas wells and will likely continue to contain separate procedures as they are further developed in the future.

Many revisions to Order 29-B that apply to well completions and protection of freshwater were proposed in July 2012. They include more detailed cement requirements, with a new subsection devoted solely to cement top verification. The removal of a cement requirement based on number of sacks of cement per setting depth was therefore also included. Another important revision includes the addition of blowout preventer equipment requirements based on depth and pressure gradient for offshore and onshore wells separately (Advanced Notice, 2012). These proposed amendments are presently being evaluated and will hopefully be established sometime in the near future. Amendments to oil and gas regulations will continue to be proposed as the industry continues to explore and develop different sources of hydrocarbons. Louisiana well regulations are in a continual state of progression and there is much to look forward to in the years to come.

Evaluation of Risk

The risks associated with orphan wells rely mainly on the well casing design and completions. Drilling and completion regulations were not established until 1919-

1920, and even then, they were limited to a few parishes. However, the first known well drilled in Louisiana was drilled in 1901 (DNR, 2010). This leaves a period of close to twenty years of wells being drilled in Louisiana without any regulations and the opportunity for wells to be drilled without casing with freshwater sources exposed.

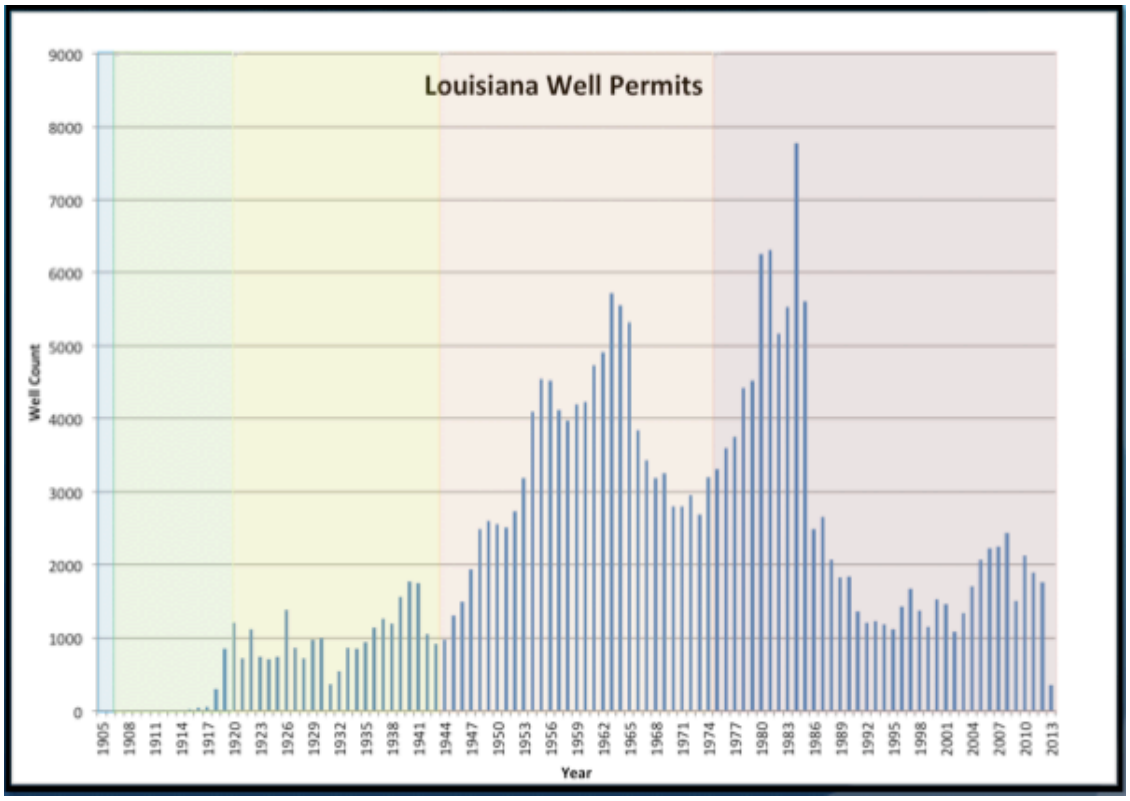

Figure 3: Number of permitted wells in Louisiana by year (data from DNR, 2013)

Figure 3 depicts the permitted well count from 1905 to present acquired from the Louisiana Department of Natural Resources Sonris Database (DNR, 2013). Permits for wells prior to 1905 were not obtained and recorded so the well count is unknown. With the few permitted wells recorded between 1905 to 1910, lack of industry understanding, and limited exploration and drilling capabilities, it is likely that few wells were drilled during this time unlike several other states. Those wells

in Louisiana that were drilled around this time were also mostly shallow, so there were few high-pressure risks outside of shallow gas.

A higher risk may be associated with the years after 1910 where the wells drilled per year increased significantly. In 1918, permitted well count more than quadrupled from about 50 to close to 300 wells. It is evident that at this time drilling oil and gas wells became a concern as drilling regulations were established a year later. They were first adopted in northern parishes of Louisiana where major shallow aquifers, like the Sparta aquifer in Figure 4, were being penetrated.

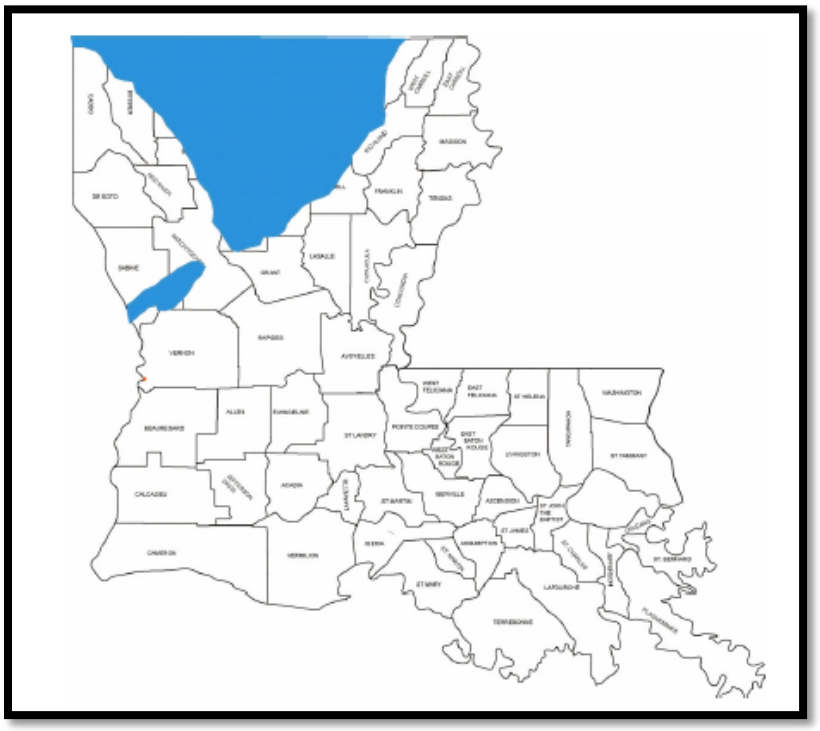

Figure 4: Location of Sparta aquifer in northern Louisiana (Carlson and Van Biersel, 2009)

This is a major aquifer directly above the Wilcox formation in central-northern Louisiana. It is known for having high salinity in the lower portions of the included

formations and is only a few hundred feet deep in some areas as seen in Figure 5 (Carlson and Van Biersel, 2009).

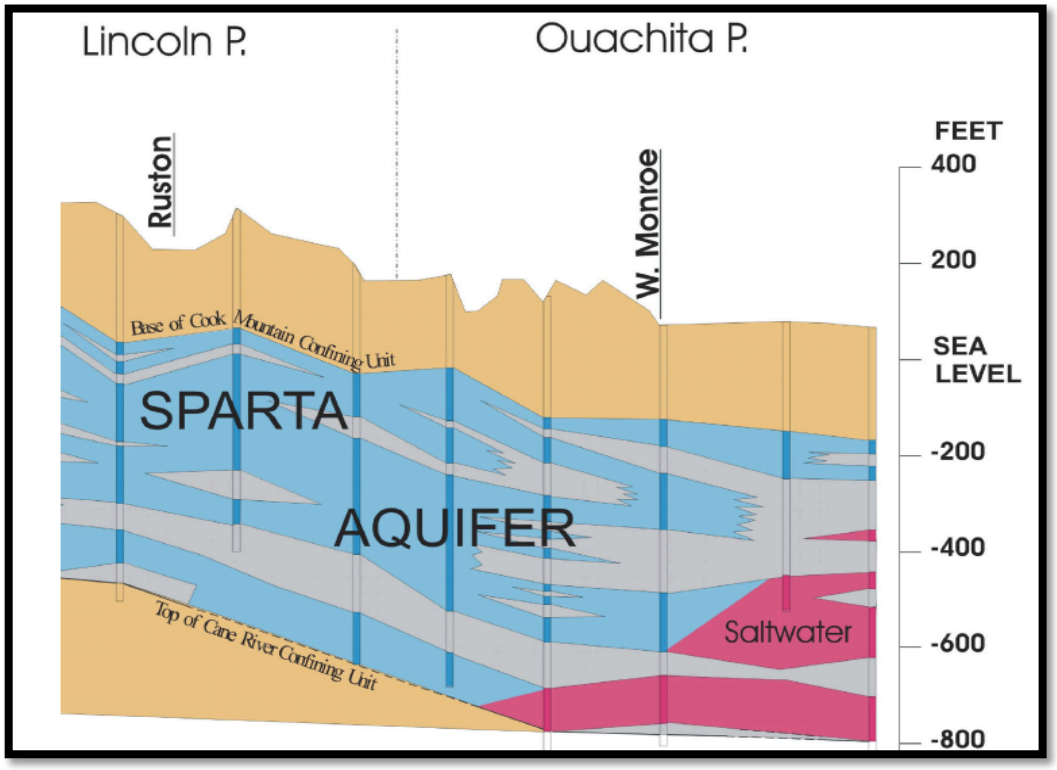

Figure 5: Sparta aquifer salinity at a depth of less than 500 feet below surface in Ouachita Parish (Carlson and Van Biersel, 2009)

It is likely that when wells were first being drilled in this area that fresh water contamination was seen in fresh water aquifers above the Wilcox and thus called for casing regulations to be established. As a result of these regulations in 1920, drilling deviated from the steady increase in well count seen previously. The well count decreased significantly as operators adapted to this new change in required drilling procedure. The impact of these regulations on the yearly well count is shown in Figure 6.

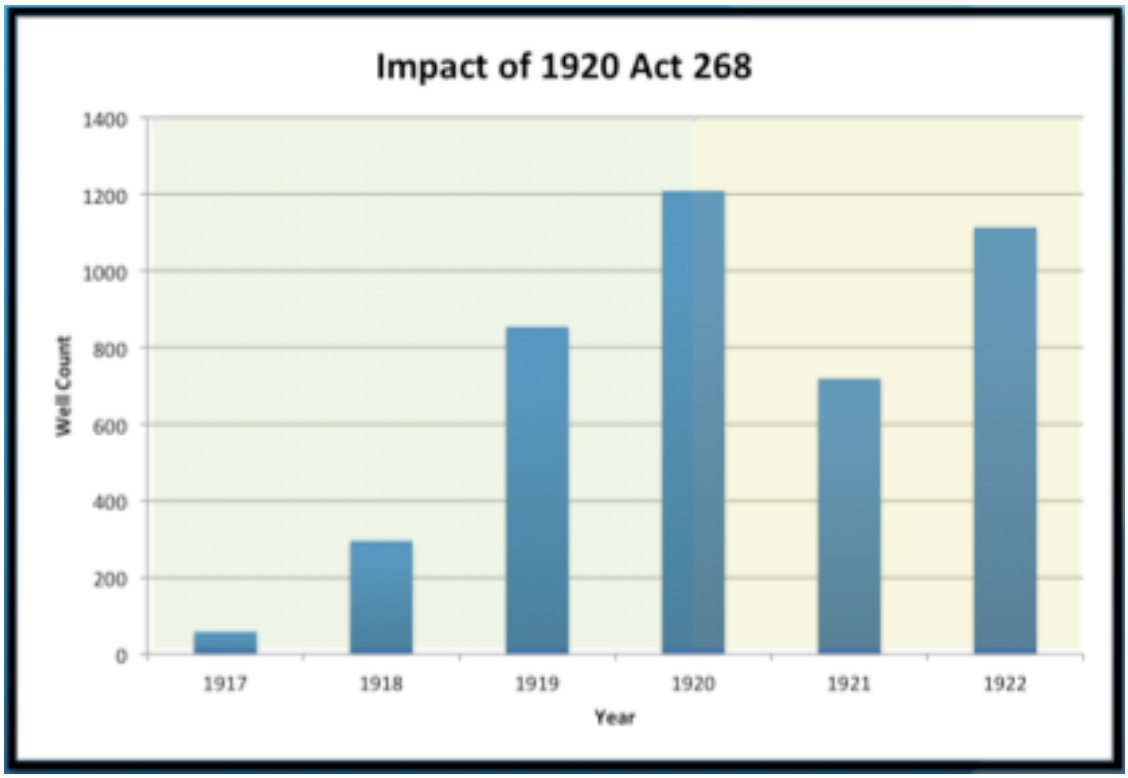

Figure 6: Impact of Act 268 on well permit count (data from DNR, 2013)

Although completion regulations were first seen in 1920 in some areas, they were not in place for all of Louisiana until 1943. Prior to 1943, over one thousand wells were being drilled per year as seen in Figure 7. The impact of the establishment of Order 29-B on the drilling of wells in Louisiana is evident. The decrease in well permit count likely due to this set of regulations indicates that the increased cost of implementing the regulations suppressed drilling. It may also indicate that a significant amount of wells were previously drilled that did not comply with these newly established casing requirements. The extent of completions in wellbores previous to order 29-B is unknown so risk due to exposed wellbores cannot be fully evaluated without further investigation of individual wells. However, it is known that wellbores without casing and cement have the potential

to be sources of contamination and that the opportunity for those to exist was present in the early years of drilling.

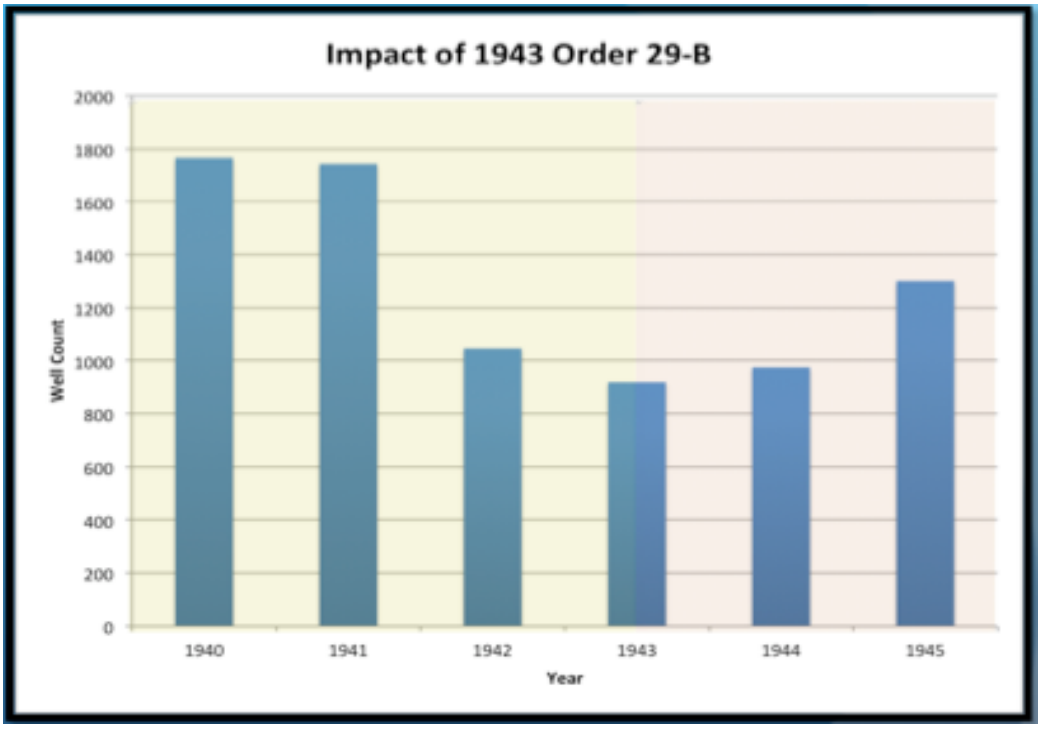

Figure 7: Impact of Order 29-B on well permit count (Data from DNR, 2013)

Since these first completion guidelines were adopted in 1943, they have not really changed much. The last revised document was published in 2011 with the same casing and cement guidelines as those seen in 1943. These guidelines have been reevaluated and apparently are still effective today. However, there are concerns with orphan wells that must be evaluated. The orphan well program was first put into place in 1993, 92 years after the first well was drilled in Louisiana. It was created with a concern for the risks posed by wellbores that were not properly abandoned. There have been almost 234,000 permitted wells in Louisiana and Figure 8 shows the cumulative distribution plot with regulation changes emphasized by color changes.

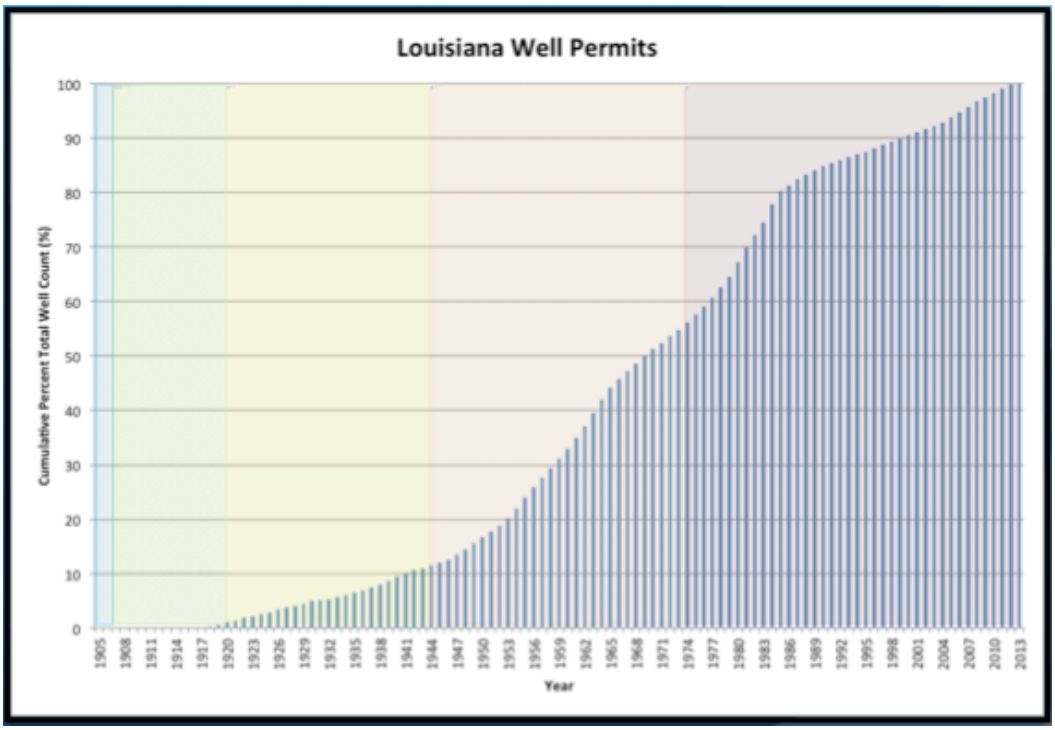

Figure 8: Cumulative distribution of total well count by year (Data from DNR, 2013)

The thousands of known orphan wells in Louisiana include some drilled prior to 1943, although most were abandoned in more recent times when oil prices were low and wells were no longer economical. It is impossible to know the full extent of the completions within each well without reentering the wellbore, but poor wellbore completions are certainly possible and quite likely in these early wells. However, as noted in the figure, less than 11% of the total permitted wells in Louisiana were drilled prior to 1943, leaving almost 90% of wells drilled after acceptable completion regulations were established. Thus, we can conclude that permitted wells drilled after 1943 pose a lower risk in regards to completions. The associated risks across Louisiana are not as high as one would think relative to other states due to the early establishment of the initial completion regulations and the slight delay in establishing an oil and gas industry in Louisiana.

Unfortunately, there are nearly 2000 wells permitted prior to 1943 that have Sonris database activity codes in active, temporarily abandoned, shut-in, gas storage, or water well categories. Of these, there are 113 listed as orphan wells. More importantly, there are 455 permitted wells listed as "unable to locate" (425), "unknown" (11), or "bad data" (19). Thus there are 568 wells with known issues that pose a threat to the environment, even if all known abandoned wells were not considered a threat (DNR, 2013).

Fresh water contamination risk may also be dependent on plugging procedures. It is interesting to note, however, that the first plugging regulations were put in place in 1906, prior to the first completions guidelines. Risks associated with plugging are therefore lower than those associated with completions. Plugging guidelines changed significantly though, so there is a wider variety of concern that may be associated with the inadequate methods practiced previously. First and foremost, the use of wooden plugs instead of cement plugs must be addressed. Wooden plugs offer a significantly less stable seal within the wellbore and easily allow for transmission of fluids to the surface. This is especially problematic with wells drilled without casing. However, these are the wells that we do not know much about and cannot evaluate effectively. Cement plugs were not required until 1943 in Order 29-B. This leaves many wells that may not be plugged adequately prior to 1943. Also, as of 1943, wells temporarily abandoned were required to be plugged as established in Order 29-B, simply leaving out the surface plug. It is important to again note that these wells make up 113 of the orphan wells known today (DNR, 2013). Wells plugged inadequately may offer high risk of contamination

and should be of high concern. It is important to identify these wells as soon as possible in order to prevent extensive damage to the environment and our water resources. In addition, it will be very important to locate the 425 wells permitted prior to 1943 in order to assess their status.

The enforcement of adequate completion guidelines early on has been beneficial to Louisiana and informs us that the state may be a lot better off than many across the state may believe. Much concern arising from the danger of old wellbores may be relieved knowing that the majority of wellbores drilled in the past were completed in ways protective of our water resources and the environment as a whole.

Further Study

This study is simply identifying the presence of risks due to completions and plugging across the state of Louisiana. Further analysis may be done in order to identify specific risks and the extent of these risks in individual wells where detailed wellbore information is available. The information presented in this study may be used to guide the identification of various risks and concerns across Louisiana associated with oil and gas wells. With known regulations, one may address where the greatest areas of concern are with wells drilled in the past and offer up specific beneficial mitigation methods. This will all support the prevention of future wells that pose any immediate threat to the environment.

As new areas are being developed across Louisiana, it is possible that early wells in fields may be reevaluated using newly developed technology such as

seismic imaging. Seismic imaging may be a reliable tool for determining if wells in the area are adequately plugged and completed without additional cost. Seismic imaging allows for the depiction of subsurface environments, which in turn may indicate subsurface wellbore environments. A lot of exploration is taking place in newly discovered unconventional plays and it would be useful to know which wells may be encountered in these area in order to determine opportunities for further risk evaluation.

Conclusion

Although it has been recognized that completion and plugging guidelines were in place in early years to prevent extensive problems within Louisiana, the presence of these regulations is not the only concern. The real concern is how strongly these regulations were enforced and followed. It is impossible to know if regulations were truly followed without evaluating the wellbore or reviewing documentation. Even documentation is not fully reliable. We have identified that risk does exist with these wells and it is important to continue to evaluate orphan wells and other wells drilled prior to 1943 when risk was high. Though this risk exists, the beginning of the establishment of oil and gas laws by the State of Louisiana in the early 1900s is an action that may have saved the state from a lot of problems seen in other areas of the country.

The Louisiana Department of Natural Resources has developed an orphan well program that sends representatives to evaluate orphan wells and rate them based on their apparent level of threat to the environment. The wells that are

critical are ranked the highest and will be plugged first once appropriate funding has been attained. A downhole evaluation is not performed and the rank is initially based solely on the location and surface appearance. Wells in highly populated areas are of higher importance than those in areas less apparent. Being that there are orphan wells drilled prior to 1943, it would be very beneficial for the state of Louisiana to put these early wells as top priority be evaluated and/or plugged, as they have a higher probability of posing a threat to the environment subsurface.

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