

Title: Characterization of Produced Water In New Mexico  
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#### Project Description:

The Petroleum Recovery Research Center (PRRC), a division of the New Mexico Institute of Mining and Technology, compiled data on quality and quantity of produced water (water produced as a byproduct of oil and gas production) into the NM WAIDS database. This database encompassed information on water quality/quantity in various producing regions of the state. Purposes of the original database included assessments of the amount and quality of produced water to support the design of water treatment systems to promote the use of produced water. Work on the database ceased about 10 years ago. The database is now out of date, and online access to the database is currently not available. The proposed project would update the NM WAIDS database, bring the database online, provide GIS user-friendly functionality and analysis tools, and identify and attempt to fill in data gaps in newly active plays in the San Juan and Permian basins.

The NMWAIDS database was taken offline in 2013 due to concerns about the security of the web pages and queries that accessed the database. In the ten years that have elapsed since the database was first put online, cyber security has become an increasingly important consideration and the old interface was becoming highly vulnerable. In addition, there is a need to obtain more data. Several oil and gas plays have come to the foreground since the bulk of the data was collected, including new horizontal plays in both southeast and northwest New Mexico.

#### Methodology:

The project objectives are:

- 1) Reactivate access to the current water quality/quantity database by recoding the web interface using current best practices,
- 2) Examine the existing produced water database to identify data gaps and make efforts to fill in those gaps,
- 3) Provide data access via online search queries, both text-based and through an online GIS based system if possible. Sufficient location information will be provided to enable users to map data in their own systems via a common format such as GIS shapefiles.

#### Results:

The website is ready for deployment but we have experienced delays with our IT staff at NMT and the web design firm that has assisted with the updated site. There are difficulties in the network access that must be overcome for remote administration of the web site. We are currently working to resolve difficulties in communication between the two entities.

Major efforts during the previous quarter were primarily trouble-shooting small problems with the new web site, ensuring that it was ready for publication, and documenting code,

database processing, and similar administrative processes. Additional work has focused on revamping the process that creates latitude/longitude coordinates based on the legal description for the oil and gas wells that provide the bulk of the produced water information. Location information is provided in the ULSTR format – Unit Letter/Section/Township/Range and footages from section lines. A land grid and a conversion algorithm is used to create latitude/longitude coordinates. The land grid we have been using is quite old (2000) and particularly in northwest New Mexico there were several “holes” in it, where there are townships without internal surveyed section boundaries. There have been updates to the land grid available from the U.S. Bureau of Land Management, and additional unofficial grids used by various state agencies have been made available. We are incorporating both sources of data and will do a comparison of well locations; ideally this will allow us to spot many wells that previously lacked lat/long coordinates.

A recent effort to digitize previously unpublished data that was collected by the USGS from wells in southeast New Mexico has been completed, and will add about 130 samples to the NM WAIDS database. This data is primarily produced water samples from wells that were sampled in the mid-1950’s to 1960’s.

Efforts have also been underway to begin redeployment of the online GIS mapping service to both oil and gas production wells and produced water sample data. Initial work using one particular software solution did not work well on the large production well dataset so we are now focusing on using Google Maps as a programming interface. A beta product is now available but will require some modification before it can be useful to a general audience.

#### Remaining Work:

The major project objective is almost complete except for website deployment. Task 2, analysis of data to identify gaps, will be started during the second quarter of the new project year. The online GIS maps, Task 3, will require a significant amount of attention and may not be completed by the end of the year; however the data can be made available as GIS shapefiles for user download.

One additional process that has begun is cleaning of data. Although efforts were made to properly identify all samples in the original database, researching problem wells was quite difficult and time-consuming. Since that time, almost fifteen years ago, the NM OCD has published a great deal of information on their own web site, including images of the paperwork associated with every well they have records for. These records have been invaluable in helping to clean up some of the wells that were never properly identified. Table 1 shows examples of some of the problems that have been cleared up. Issues include everything from incorrect well names and no API numbers to wells having been identified as in the wrong county or state on the original analysis forms. There are a significant number of these wells to work through and efforts will be first concentrated on southeastern New Mexico.

	Old	Cleaned	Old	Cleaned	Old	Cleaned
Sample ID	1832	1832	7496	7496	182	182
Well Name	Deluna fed # 1	CACTUS QUEEN UNIT	EDDY D STATE	CONNIE C STATE	EP #8	EP USA
Well ID #	1	10	2	17	8	8
API		3000520880		3001502302		3001525023

Latitude		33.2319641	32.63713	32.63730941		32.01061618
Longitude		-103.8160172	-	-		-103.9572215
			104.13609	104.1368043		
Section		34	25	25		26
Township		12	19	19		26
TWP Direction		S	S	S		S
Range		31	2	28		29
Range Direction		E	E	E		E
Footing N/S		1980	660	660		1980
N/S Direction		S	N	N		S
Footing E/W		660	660	660		1980
E/W Direction		W	W	W		W
Unit Letter		L	D	D		K
County	Chaves	Chaves	Eddy	Eddy	Eddy	Eddy
State	NM	NM	NM	NM	NM	NM
Company	Yates Drilling Corp.	Yates Drilling Corp.			Yates Petroleum Corp.	Yates Petroleum Corp.
Field	caprock queen	CHAVES;QUEEN, GAS AREA SE (ASSOC)	453PNRS	SCANLON DRAW	Stonewall	BRUSHY DRAW
Formation		QUEEN		QUEEN		DELAWARE
Depth		2900	2100	2100		
Lab ID			MH02302	MH02302		
Lab Sample ID			343	343		
Sample Source	wellhead	wellhead	Wellhead	Wellhead		
Water Type	produced	produced				

Student Participants:

Graduate Students:

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