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[REDACTED]-Family Motto

**Sapiens dominabitur astris.  
A wise man can rule the stars.**

**OBJECTIVE:** To update the much earlier contour maps including data on the tops, bottoms and thickness of the [REDACTED] formation in [REDACTED] County in the area of 4 and 5- I- 45 [REDACTED] block.

This report will include some 14 wells and associated logs looking at data provided by [REDACTED] and the [REDACTED] Oil Company, LLC and logs available on the [REDACTED] Geological Survey database web pages.

The geologic term [REDACTED] Formation locally referred to by well drillers as the **Corniferous** Formation will be the term used for the formation immediately under the [REDACTED] Shale sometimes referred to as the [REDACTED] Shale.

For the most part the [REDACTED] formation immediately below the [REDACTED] will be the object of this research. A high porosity in the [REDACTED] is not abundantly seen in these logs. For this immediate area it does rarely occur as a possible oil and gas producing formation. When looking at a wider view of this region of [REDACTED], the [REDACTED] can be quite commercial.

One should be careful in drilling any new wells in this area to closely monitor the samples coming from both the [REDACTED] and [REDACTED] formations as the well is being drilled, looking for possible oil and gas bearing samples to see if it has a possibility of being commercial. From the logs for the [REDACTED] one and [REDACTED] three, it is possible these two wells had a productive [REDACTED] pay zone.

See below a contour map of the [redacted] formation top for wells in this regional area.



In addition later there will be contour maps based on the logs provided showing the [redacted] formation bottom where the clear lime

turns to shale, and thickness where the logs were deep enough to indicate relevant information. These maps will come in two formats as picture files (.jpg) and Adobe format (.pdf).

The map was done to see where the highest [REDACTED] Formation wells are in this area and if there is a better candidate for gas injection than the injection well presently used by [REDACTED] Oil Company and where might be a good location for future wells to be drilled in this area. With the log data a location for a water injection also might possibly be found.

As it now appears a new well located north of the [REDACTED] three seems to have a possibility of being fairly high in the [REDACTED] Formation. In addition a new well near the [REDACTED] two and [REDACTED] two do not look bad either. The thickness, deepest, and highest of the Blue formation indicated in logs will determine where the best injection wells are.

In the central core of the wells owned there is very little difference in [REDACTED] Formation tops provided the elevations acquired are accurate. This is not unusual in geology where sometimes the formation is in a basin or on top of a ridge. These wells also may have tagged a flank of an old reef or similar structure.

Of note is the highest [REDACTED] formation well in this area being the [REDACTED] one at 97 feet below sea level. The elevation for this well may be off as much as 34 feet which would put its [REDACTED] formation in the same ball park as the minus 127 feet average depth for these wells. This elevation should be checked in the field on the ground. It would not be a bad idea to check the Logsdon number three elevation as well.

The next highest well is the [REDACTED] three at minus 117 feet. These two wells may not be a good location for gas injection in the future since they are not centrally located among wells owned.

On the other hand these two higher wells might be a good location area for future drilling because the logs show a higher [REDACTED] formation compared to other wells nearby. Neither of these wells was bottom of

the [REDACTED] logged but the nearby [REDACTED] one did have the [REDACTED] logged and it had 23 feet of break which is good.

In the next cluster of wells going down in formation top are five wells with either minus one twenty four or minus one twenty five feet below sea level formation tops. These wells are [REDACTED] one, [REDACTED] one, [REDACTED] two, [REDACTED] two, and [REDACTED] number one.

The [REDACTED] one and [REDACTED] number one are far from the [REDACTED]-[REDACTED] wells with a high formation indicated but too far to be considered.

On the other hand the [REDACTED] one and [REDACTED] two are wells owned and the bottom of the formation is exposed for logging. These wells can be a good indicator of what might be considered as the core of the field looks like. The formation thickness varies between 12 and 20 feet, a respectable thickness.

For the [REDACTED] number two it also was in the same elevation at minus 125 feet, approximately the same as [REDACTED] one, and [REDACTED] two. For the [REDACTED] two the complete bottom of the [REDACTED] formation was not logged but there is clear indication on the bottom of the log there was a possible porosity break that would have been shown if the entire break had been logged.

Of these two logs only the [REDACTED] one showed a clear indication of a nice porosity streak. It is hoped this porosity would be the same for these owned wells also.

A deepening of these wells and a re-logging of them would be a good idea in the future for a better handle on the formation's actual porosity.

The [REDACTED] number one is high at minus 127 feet but it is way out in nowhere land far from the wells owned.

The next two wells with minus 127 feet [REDACTED] elevations are [REDACTED] two and [REDACTED] number one. These are owned wells and centrally located among other owned wells which makes them maybe good candidates for a water injection disposal well or gas injection. These

two wells above are not among the lowest wells in this small regional area but they are wells owned which makes them available as some possible type injection well.

The last four wells are the deepest wells in the area for the [REDACTED] formation. Unfortunately they are not owned. They range between [REDACTED] two the deepest at minus 137 feet, B [REDACTED] number one at minus 135 feet, [REDACTED] at minus 134 feet, and [REDACTED] at minus 128 feet.

It would be nice to be able to put water into the [REDACTED] one or the two [REDACTED] wells but they are not near the owned wells but for the [REDACTED] top they are considerably deeper.

There is always a problem with having wells in the area with deeper formation levels in they could by being lower take any water injected and give no immediate results. But eventually pushing on this deeper water filled formation it is likely they are nothing but water carriers. The [REDACTED] one and [REDACTED] one completion reports says they found water only in the [REDACTED] formation. The [REDACTED] two apparently did not have enough oil to produce and was called a dry hole.

The higher formation wells when used as a water disposal well would push against this already present formation water squeezing the oil still in the formation above towards the producing oil wells.

This is the objective of water injection and gas injection systems to squeeze the oil to the producing wells, the gas injection well from the top and the water injection well pushing underneath the oil from the bottom. This process has been used for decades in the oil patch quite successfully and is called secondary recovery.

Here now is an explanation of what the contours mean. The yellow contour is the area where there is a higher [REDACTED] formation well, the best well possible for gas injection. But this well is not owned and not centrally located.

The green area has in it the next highest well, the [REDACTED] number three, a good candidate for gas injection but not centrally located. The next owned well in elevation is the [REDACTED] one in the red contoured

area which seems a good location for a gas injection well and centrally located.

Provided the elevations are accurate the [REDACTED] three would be a possibility as a gas injection well hoping that this well would be able to push down on the oil from its higher elevation.

Since there is not a great deal of difference in [REDACTED] Formation top in any of the wells in the cluster of [REDACTED] two, [REDACTED] two, [REDACTED] one, [REDACTED] one, and even the outlying [REDACTED] two, one needs to choose the best well for water disposal and gas injection on additional criteria.

The first criteria is find the thickest clean lime formation available plus the second criteria is the log has a good porosity showing on the right side density part of the log then one has the probable well to use as an injection well.

Strictly looking at lime thickness one sees the following. Eliminated because the bottom was not logged is the [REDACTED] two and the [REDACTED] one. Also eliminated is the [REDACTED] two because it only has 7 feet of clean lime when there are wells nearby that have three times this thickness. The [REDACTED] two does not look much better with only 10 feet of clean lime break. This narrows the list to [REDACTED] one and the [REDACTED] three. Unfortunately the [REDACTED] three is not on the list of wells owned.

Based on [REDACTED] limestone thickness the [REDACTED] one wins this round at 23 feet of clean limestone break.

Now looking at the [REDACTED] clean lime bottom this [REDACTED] one is both centrally located near other owned wells and is one of the deeper clean lime bottoms seen on the log at minus 147 feet. This is one of the few logs that depict clearly porosity worth treating and producing.

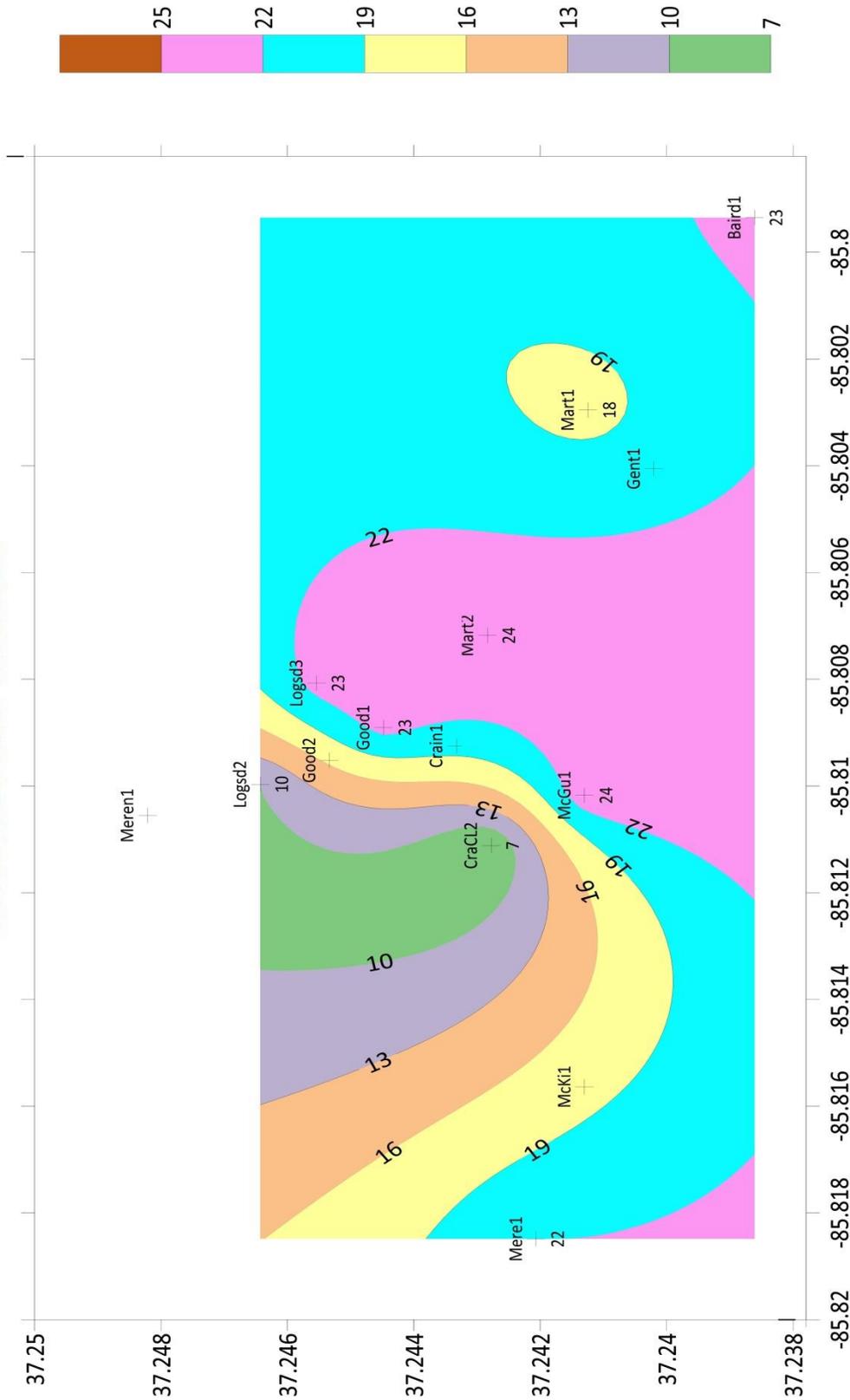
Below are contour maps of the clean lime thickness and wells with a logged [REDACTED] Formation bottom visible.

**FUTURE DRILLING POSSIBLE LOCATIONS:**

The area between [REDACTED] one and [REDACTED] three looks promising because of the 23 feet of clean lime depicted by the logs. There are certainly higher wells in the area but they often show thinner clean lime breaks such as the [REDACTED] two and [REDACTED] two.

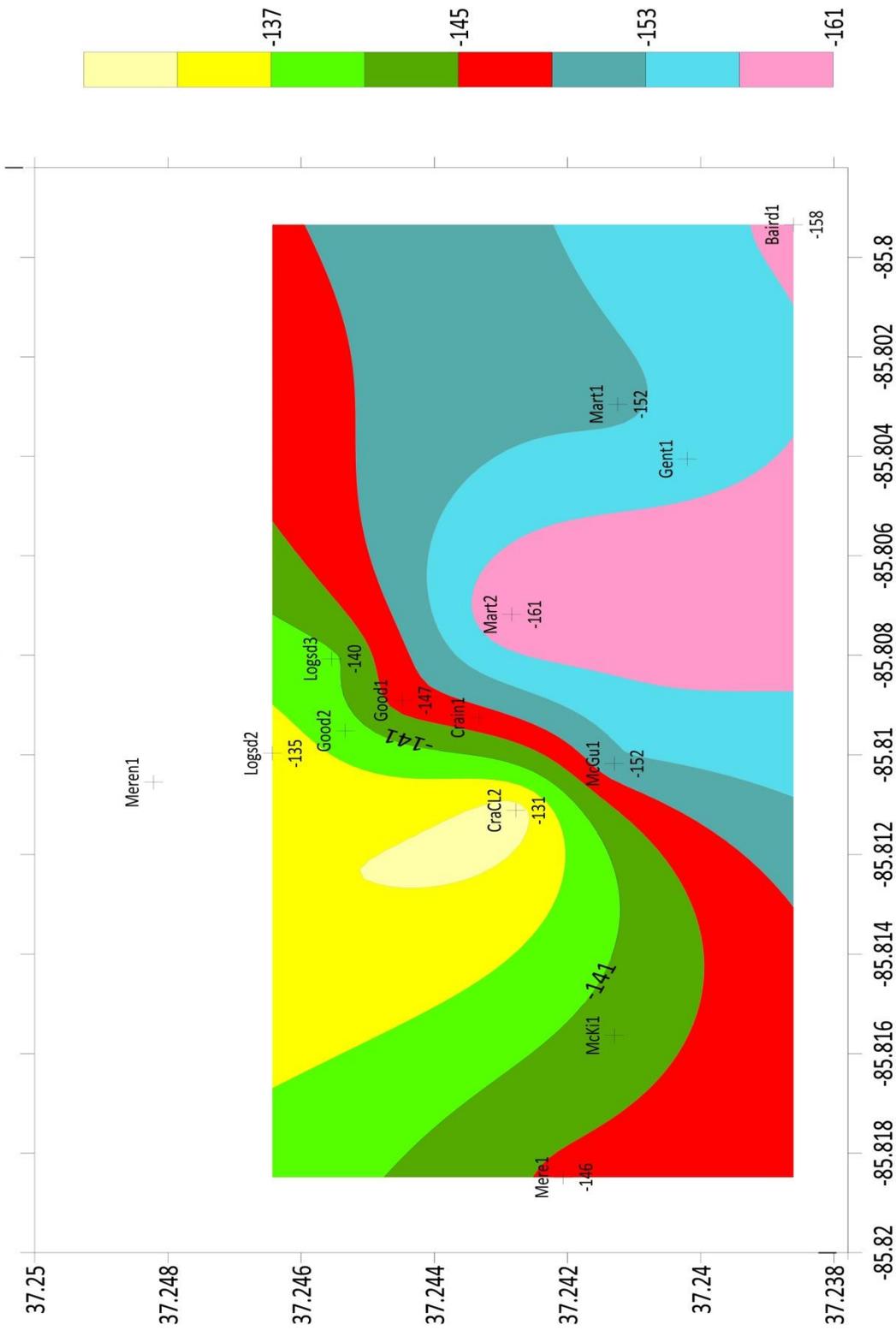
Of the wells that are still open and owned this [REDACTED] one is the best option for a disposal well because of formation depth and porosity.

# CLEAN BLUE LIME THICKNESS



MAP SHOWS ONLY WELL LOG DATA AVAILABLE

# WELLS WITH BLUE BOTTOM SHOWING



MAP SHOWS ONLY WELL LOG DATA AVAILABLE

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