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Review and Analysis of Magnolia #1 and #2
Sec. 14, T21S-R27E, Eddy County New Mexico

Review

The Magnolia State #1, 30-015-01082, is charged as expelling live heavy crude onto the surface of the ground as a result of water disposal into the Mesquite #8 Exxon State located slightly over one-half mile southwest of the Magnolia State #1. Previous analysis of the problem demonstrated that the injection horizons of the Exxon State #8 are below and isolated by cemented casing from the unplugged horizons in the Magnolia State #1. It was further demonstrated that the hydraulics of the disposal system will not allow a head development from the Exxon State #8 to lift or even contribute to lift of fluids in the Magnolia State #1 (disregarding their demonstrated lack of stratigraphic and physical connection).

The main disposal zone in the Exxon State #8 is in the "vuggy dolo" from 684' to 694'. There are lower porosity zones beneath the cemented casing at 587', above that main horizon, which also accept about 13.5% of the disposal water when active disposal is occurring. The important hydrodynamic fact is that the main disposal zone takes *all* its water on vacuum. No significant lateral injection above the main zone is possible because there is no head retained on injected waters. It is not feasible to suggest that water into the Exxon State #8 can exert and maintain *any* upward driving force on the Magnolia State wells #1 or #2 locate updip - or at worst along structural strike.

Magnolia State #1

Records for the Magnolia State #1 available on line were compared with the actual paper copies in the Artesia District's original file. They were identical. Correspondence from the Special Assistant Attorney General, Oil Conservation Commission (OCD), Santa Fe, dated October 21, 1964, to Fireman's Fund American Insurance Companies, Albuquerque, advised them that the OCD could not release the plugging bond on this well because they have no reports filed of plugging, nor did the OCD witness the plugging. Reports by the Operator were never filed.

The next report in the file, twenty-four years later, is a field trip report filed by Mike Stubblefield on September 14, 1989 where between 8:00 AM and 3:30 PM he visited three locations in the field. The first location was the Magnolia State #1. The purpose was "checked status of well." The conclusion was "Well is Plug & Abadoned"(SIC). It must be assumed that

Mr. Stubblefield went to the old site, saw a well marker, probably checked the marker's welded name and location, and accepted the well was abandoned. It is not possible to conclude from this that the *hole* was proper plugged by 1989 standards - or at all.

The records indicate the Operator had about 40' of 10" pipe, then ran 80' of 8" pipe to stop caving. No cementing was done on those strings. Caving was not stopped and the Operator ran 212' of 7" casing and reported ". . . but was not cemented, but it did stop the caving of surface." As this operation was a clean-out the hole was taken to TD of 536'. Water encountered at TD led to packing the bottom of the hole with 2 sq ft of oakgum and 100 lbs of lead wool "to attempt to shut off water" (C-103 dtd 1/31/1955). The Operator later reported (C-103 dtd 1/24/1958) that the well had been cleaned-out and shot to a depth of 533' and his "intentions are to clean this well out or drill deeper but not to exceed 540'" The permit was approved to clean out but not to drill deeper. There are no reports indicating further work of any nature, including plugging, of this well.

One C-103 report filed January 17, 1955 (strike-over on last digit) stated that "the 212' of 7" pipe that was already in the well was cemented with 15 sacks of cement." My experience on cable tool holes leads me to suspect that the 10" and the 8" pipe, previously discussed, was pulled and the surface portion of the 7" was cemented with 15 sacks. The 7" then is probably holding the marker that Mr. Stubblefield probably observed and reported.

Magnolia State #2

Robert W. Atha, the original operator and driller of the Magnolia State #1 also drilled the Magnolia State #2, 30-015-01083, at a location approximately 1,900' northeast of the first well. This second well was drilled to TD of 563'. The #2 well is structurally on-strike or slightly up-dip on the Yates Formation and is approximately 3/8ths mile northeast of the #1.

The Operator's driller log filed September 30, 1953 reflects this well was drilled to 553', plugged back to 525', and turned-over to the local rancher to be used as a stock well. 10" casing was set at 31' and 7" casing was set to 452'; no cement is reported. The scout report also indicates the 7" casing was "set" and no cementing was reported.

Atha's driller's log reports "fresh" water was encounter in a sand from 220' to 230'. The sand is sandwiched between a 40' gypsum bed overlaying the sand and a 5' gypsum bed underlying. The term "fresh" is probably used because most of the deeper water encountered in the Magruder area is sulphur water. A 25' sand lime horizon yielded water from 433' to 438'. Sand from 560' to 563' (TD) yielded sulphur water. No water levels were reported..

The driller's log shows lithologies to a depth of 563'. The front page of the C-105 also shows a TD of 563'. The C-103 filed the notarized the same day indicates the well was drilled to 553' and plugged back to 525' for turning-over to the rancher. A second C-103 filed the same day indicated plugging off water with 20 lbs oakgum and 100 lbs of lead wool, followed by a 5 sack cement plug 548' to 538'. The cement plug would come about 3' above a lime with a show of oil.

Two water yielding strata are open in the hole from 438' to 433' and 230' to 220', both from the Yates Formation. There are no water levels available. The well was turned-over to R. O. Dinwiddle of Carlsbad, the rancher, and is now C-0507 under the Office of the State Engineer. The Waters database has no information other than the location and designation as a domestic well.

While the drillers log in the Magnolia State #1 is poor quality, there is a good correlation of a driller described "sandy shale" from 420' to 430' with the Magnolia State #2 "sandy lime" 425' to 450' that reported an increase in water from 433' to 438'. The interesting wording here is "increase in water." That statement suggests the hole is filling from the 220' depth above.

Significance of Magnolia State #1 and #2

Heavy crude oil was reported to have seeped onto the surface from the Magnolia State #1. The involved regulators somehow concluded that water disposal into the Mesquite Exxon State #8 may have generated the water drive to cause the seepage. The facts illustrate that 1) there is no evidence that the Magnolia State #1 was ever plugged and except for an observed surface marker, 2) because the Exxon State #8 takes *all* injected water on vacuum there is no hydrologic head to lift water and oil to the surface in the Magnolia State #1, and 3) the Exxon State #8 is cased and cemented to a deeper stratigraphic depth than the bottom of the Magnolia State #1.

In this current re-examination of the Magnolia State #1 it was decided to look at the original Operator's northwest offset, the Magnolia State #2. The offset was a dry hole for oil/gas. However, the driller's log and subsequent events shed important light on a probable exacerbation source of the crude leakage from the Magnolia State #1.

The good quality driller's log from the Magnolia State #2 shows an important difference in drilling conditions not reflected in other parts of the Magruder field: the 220' to 230' and 433' to 438' water zones, discussed above. These two wells are about 1,900' apart, both are unplugged across the lower sand that is correlatable between the two holes, and the Magnolia State #2 has water being supplied from 220' to provide hydraulic head.

The Office of the State Engineer issued a permit for the Magnolia State #2 to be converted to a domestic supply well, C- 0507, and classified it as an artesian well. If this was actually an artesian well the water level would be above the 220' level reported for the top of the sand zone and could thereby provide ample hydraulic head to drive Magnolia State #1 naturally seeping lower density crude oil from its lower pay in the unplugged hole and toward the surface in the Magnolia State #1.

At my request Mr. Clay Wilson, a Mesquite principal, went to locate the site of the Magnolia State #2 on the afternoon of October 9, 2008. He traversed the area while being assisted, via telephone, by directions, facilities, and topographical features being observed on satellite imagery and coordinated USGS topographic map. Mr. Wilson arrived, on foot, at the location, identified timbers and drill cable commonly used in cable tool drilling. The site was extensively overgrown and the sand-blown. The actual drill hole could not be located.

Satellite imagery shows old disturbances by vehicles around the location site, but also suggests no extended or recent vehicle access to the site - which is about 250' west of an actively used north-south dirt access road. Except for drilling trash at the well site it is apparent that no utilization has ever been made of C-0507. The previously described quality of the "fresh water" described above is confirmed by it not ever having been developed. The probability is high that the 7" casing (452') was pulled and a steel cap was tacked over the 10" casing at surface level. After 55 years of blowing sand and vegetal growth it would require a metal detector to locate the hole itself.

Conclusions

The Magnolia State #1 is a capped well that has never been plugged. The Magnolia State #2 is a confirmed, documented unplugged well. The geological and hydrological relationships of these two holes permits a viable and logical explanation of surface contamination at the Magnolia State #1. This problem, completely unrelated to Mesquite's operations, will only be remedied by proper plugging of both holes by the responsible parties.