Increased oil and gas drilling demands more land-applied fluid disposal

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AgriLife Extension expert offers landowners pros and cons

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COLLEGE STATION – Drilling fluids, including muds and liquids, can be applied to surrounding land, but landowners need to know what to do before and after the application to prevent major land damage, according to a Texas A&M AgriLife Extension Service expert.

Due to the increase in drilling in Texas from the different oil shale formations, the need to recycle drilling fluids through land application has increased, said Sam Feagley, AgriLife Extension state soil environmental specialist in College Station.

“There are numerous potential issues associated with land application of these materials,” Feagley said. “If done properly on soils that can accept these types of materials, no detrimental effects should occur, however, if not applied properly, then numerous detrimental effects can occur that can take many years to remediate.

“I know money talks, and I’ve been told they will offer anywhere from $10,000 to $30,000 per acre to land-apply these materials in Texas,” he said. “But we have a legacy and responsibility for our soils.”

Land application can provide a beneficial use of the materials and not be detrimental to the soil, if done properly, Feagley said.

Drilling fluids and muds come from oil and gas exploration, and it is recycled until it cannot be used anymore, he said. But then it needs to be disposed of, and operators turn to landowners who will allow the “sludge” to be spread across their acreage.

No two muds are the same, as each operator has a “recipe” for each hole, Feagley said. But most muds will contain bentonite clay, barium sulfate, lime, soda ash, lignite and loss of circulation materials, which can be ground peanut shells, mica, cellophane, walnut shells, cottonseed hulls – things they can add to the sealing ability of the material.

Feagley outlined the pros and cons of land-applying the drilling fluids and muds.

The benefits of adding these materials can include: reduced compaction in pastures due to tilling will help renovate them; the addition of clay to sandy soils increases nutrient and water retention; and reusing a waste reduces the amount of materials going into landfills, which is beneficial from a global standpoint.

The negatives would be the addition of salts to the soil, the addition of clay to clay soils, any more than 3 inches applied will kill grass and the mixture contains very few plant nutrients, he said. It is better to apply only 1 inch to prevent plant kill.

“It can take years to regenerate an area if the material is applied improperly,” Feagley said. “Remediation takes time; it’s not a quick fix to get salts in the soils out.”

When considering the possibility of contracting for this service, he said landowners need to evaluate their soils and the drilling fluids – "before you ever say to put it out there." Drilling companies have analyses, but their analyses are designed only to meet the regulations. Landowners will need more information.

"In Texas, sodium is the key," Feagley said. "You need to determine if the soil will be changed due to salts and clays in a detrimental way."

There are two types of oilfield materials: water-based and oil-based. Most of the time it is water-based that would be applied to the land, he said, and it will have dissolved solids and sodium in it.

"Sodium is the major problem we have with using this water," Feagley said. "When we get a certain amount of sodium in the soil, it has a tendency to disperse the clay and organic particles then seal the pore space in the soil. Instead of having the ability to get water into and through the soil, that first increment of precipitation seals all the pore space and the water doesn't have any place to go, so we get runoff and eventually erosion."

Another concern is the chloride, which some plants can be sensitive to, he said. Also, the bentonite doesn't have a lot of nutrients in it, but it adds clay to the soil, "which is good in a sandy soil, but not so much in a clay soil, where you don't need any more clay."

The typical contents of the oil-based materials are more petroleum hydrocarbons, not as many dissolved solids as the water-based, calcium carbonate equivalents, which means it has a limiting capability, Feagley said.

"So if you have acid soils and you need some limestone, this can help raise your pH a little bit," he said.

The material also can be rich in calcium, magnesium and potassium, depending on the geologic material it is coming from and whatever soil/substrate is being drilled through, Feagley said.

If excess sodium and poor drainage are a problem, he said, one of the things to treat with is gypsum.

"Once you get the gypsum or calcium sulfate mixed in, it replaces the sodium and reopens the pore space, allowing water to move through and the salts are pushed out," Feagley said. "But you have to do the gypsum first before you add the water."

Slope, buffer zones, soil texture, electrical conductivity, exchangeable sodium percentage, depth to bedrock, water table and frequency of application are all parts of the rules and regulations which govern the application of both water-based and oil-based materials.

Feagley said "Land Application of Drilling Fluids: Landowner Considerations" is a publication that gives more details on regulations and considerations and can be found at http://bit.ly/19klUnA .

Before considering any commitments, whether they are by handshake or contract, or on a single property or multiple properties, Feagley advised landowners to get a lawyer and make sure they know the contents of the material and their soil.

"And be sure to check out the company, because there are some that do a good job and some, not so good," he said. "Good contractors will work with you from the beginning to the end – that's from application to three or four years down the road when you can see how the crop responds. And ask questions, always ask questions."

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