The objective of this document is to provide you with current and helpful information regarding water protection, and the Michigan Agriculture Environmental Assurance Program (MAEAP).

**Heavy spring rains call for adaptive corn nitrogen management programs**

Persistent rainfall across Michigan this spring has delayed planting and challenged nutrient management programs. In some cases, planned pre-plant corn N applications may not have been made, while those that did get applied have may have widely varying current N availabilities. Growers and crop advisors will need to determine existing N levels this year from pre-plant or starter fertilizer applications in order to make informed decisions on N management moving forward for the rest of the season, as well as making plans to ensure crops don’t suffer from nutrient deficiencies resulting from delayed applications.

In heavy rainfall and saturated field conditions, leaching and denitrification losses are both concerns. Nitrate N forms are highly water soluble and are subject to leaching in the soil, potentially moving downward out of the rooting zone. In lighter, sandy soils, nitrates can move as much as a foot with each inch of rain. While heavier soil textures don’t have the same potential for leaching losses, the saturated conditions that can exist on these soils can lead to denitrification, where nitrates are converted to gaseous N₂ that can return to the atmosphere.

The initial forms of N applied have a bearing on the speed and extent of N losses. Urea forms will convert to ammonia, followed by ammonium in the soil. This ammonium form, which is also applied as anhydrous ammonia or urea ammonium nitrate solution (UAN), isn’t particularly susceptible to losses. Nitrification processes will quickly convert ammonium to nitrate in just a few weeks when soil temperatures are above 55°F. This nitrate is then susceptible to multiple loss pathways. Nitrogen that has been applied to fields in nitrate forms are thus at greater risk for loss this spring than N from other sources.

In cases where the bulk of planned N applications have not yet been made, challenges may be encountered applying N and meeting crop demands in a timely fashion. Corn planted during the early planting windows this season is nearing the stage where additional N will be required by the crop. In wet fields, the trafficability of equipment may be an issue, necessitating back-up plans. Injection of sidedress UAN or urea is best, but operation of coulter rigs may not be possible. If broadcasting urea or surface dribbling UAN, including a N inhibitor is advised.

Crop advisors are an excellent resource for growers looking to assess in-field N status and formulate in-season N management plans. Soil nitrate testing is one option for assessment of current N availabilities, but high rates of pre-plant N fertilizer applications can skew results. The extreme rainfall conditions seen in Michigan this spring highlight the need for flexible and adaptable N management systems. Rapid, informed in-season management of N fertility promises to have both economic and environmental benefits in these challenging conditions.