Nitrogen reduction, collaboration drive Dakota County's ACRE Plan

From left: *Irrigation water management; perennial crop cover such as Kernza, being viewed here during a tour; and cover crops, such as the rye seen here, are examples of the type of practices supported by Dakota County's ACRE Plan.* **Photo Credits:** Dakota County SWCD

Dakota County is taking a water quality-focused, comprehensive approach to addressing groundwater concerns linked to agricultural chemicals.

The Agricultural Chemical Reduction Effort (ACRE) Plan is a collaborative effort involving Dakota County, the Dakota County Soil and Water Conservation District (SWCD), the University of Minnesota Extension — and other agencies, organizations, cooperatives, businesses and producers involved in the ag industry. The Dakota County Board adopted the plan in October 2022.

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>
> — Jill Trescott, recently retired, Dakota County Groundwater Protection Unit

About 60% of Dakota County — roughly 227,000 acres — is farmland.

The ACRE Plan aims to reduce ag-related nitrate contamination in groundwater, and address contaminants such as pesticides and chlorides "where practical to protect human health and the environment," the plan states. Its goal: Reduce agricultural chemicals in groundwater to levels that do not threaten human health or the environment.

Nitrates exceed the 10 milligrams per liter health guidelines in about 25% of the Dakota County households that use private wells for their drinking water supply. Household treatment systems may cost as much as $4,000, the ACRE Plan notes.

Within the Vermillion River watershed, the city of Hastings has spent $3 million on a nitrate removal system.

The Minnesota Department of Health (MDH) has linked nitrates to blue baby syndrome. The sometimes-fatal condition reduces the blood's ability to deliver oxygen. Nitrates carry other human health risks, and are toxic to fish.

Concentrations can be higher in agricultural areas, shallow aquifers and sandier soils; all three exist in Dakota County.

Despite best management practices farmers have adopted since elevated nitrate readings appeared, nitrate levels in groundwater tapped by the city of Hastings have increased over the past 20

years, MDH data show.

The 2020-30 Dakota County Groundwater Plan, adopted in January 2021, identified the need to reduce agricultural chemicals. One of its priorities was to develop a plan of action. The Dakota County ACRE Plan is the result. It goes beyond previous efforts — which have included the Minnesota Department of Agriculture's nitrogen fertilizer management plan — to encompass all of Dakota County, including private and public water supplies. (Earlier efforts focused on the Hastings Drinking Water Supply Management Area [DWSMA].)

Chuck Clanton, who has a background in agricultural engineering, participated in ACRE planning as an educator, researcher and producer. Manure management associated with water quality was a focus of his research at the University of Minnesota, where he was a professor in the Department of Bioproducts and Biosystems Engineering. Now retired, he continues to operate a 150-acre crop and beef farm near Hampton, where past projects have focused on controlling erosion and nutrient loss, eliminating conventional tillage, and reducing herbicide use. Through farm tours, he continues to show students conservation tillage and other practices.

"While my academic work at the University of Minnesota has often involved the theory behind agricultural production, participating in ACRE has helped me stay current with what works in the real world. As a producer, I have been able to contribute my hands-on experiences, while learning from others," Clanton said.

Clanton said his involvement with ACRE complemented his work on the Vermillion River Watershed Planning Commission and the Minnesota Department of Agriculture's local advisory team for the Hastings DWSMA.

A Midwestern Drilling crew used a hollow-stem auger to drill one of Dakota County's ACRE monitoring wells in Hampton Township. Dakota County will use results from the rural monitoring well network and its private well sampling programs to track trends in groundwater and drinking water chemicals to evaluate progress of the ACRE program. **Photo Credit:** Dakota County staff

Measuring ACRE Plan Success

The ACRE Plan states it will define success by the following quantitative measures, which, it notes, it aims to make progress toward — but not fully achieve — within 10 years:

No more than 5% of households in every Dakota County city and township that use private drinking water wells exceed the suggested 10 mg/L guidelines for nitrates

No public water supply well will exceed — or be projected to exceed — the 10 mg/L guidelines in the next 10 years

Median nitrate levels in shallow groundwater in every township or city or smallest practical geographic area will be lower than 10 mg/L

No household with a private drinking water well will have pesticide concentrations exceeding 50% of drinking water guidelines

The contributions of chloride from crop fertilizer sources to groundwater will decrease compared with current baseline conditions

The ACRE Plan's strategies for dealing with agricultural chemicals include data collection, communication and education, technical assistance and financial incentives.

"We really can't do business like we've done in the last four decades," Clanton said. "This is going to be an awareness that things are going to probably have to change in the future."

While nitrogen application rate tables have focused on fertility and economics, Clanton said he believed the next step could be to add a table focused on environmental friendliness.

Education is a primary strategy. The plan provides resources to raise public awareness among farmers and rural residents regarding groundwater conditions, practices to improve water quality, and funding opportunities. This is a key piece for a county with more than 8,000 private wells.

The Dakota County SWCD organized the Agricultural Advisory Group meetings. SWCD and Natural Resources Conservation Service staff provide technical assistance to farmers seeking ways to keep ag chemicals from reaching the groundwater. The ACRE Plan proposes partnering with the University of Minnesota Extension on large-scale plant tissue nitrogen testing, and on trainings such as the Nitrogen Smart program. Through the SWCD, the ACRE Plan proposes finding ways to implement practices on rented farmland.

To encourage participation, the plan identifies financial incentives for farmers who adopt best management practices. Cost-share options include Minnesota Board of Water and Soil Resources grant programs available through local government units for practices such as cover crops, nutrient management and integrated pest management — which reduce the use of ag chemicals and improve soil health and water quality.

"I'm proud that Dakota County is promoting agriculture that feeds the future while repairing the damage done by past and present practices. With the ACRE Plan, the county is continuing its leadership role in addressing this persistent groundwater issue," said Jill Trescott, who recently retired from the Dakota County Groundwater Protection Unit, where she led work related to the ACRE Plan.

"Farmers here have a history of embracing big challenges; (Dakota County) has a history of innovation regarding drinking water issues and diligence in protecting public health. I look forward to seeing the county's continued progress," Trescott said.