

# Nitrous Oxide Emissions Reductions Protocol (NERP) Fertoz is now helping producers accumulate carbon credits through the NERP protocol, which has been approved and registered through CSA in May, 2022.

Application of nitrogen from synthetic and organic fertilizer, biological fixation, manure fertilizer and crop residues is an important part of agricultural production. Nitrogen in the soil is subject to emission as N<sub>2</sub>O either from nitrification/denitrification pathways in the soil, losses through leaching of nitrate, and/or volatilization and redeposition of ammonia gas. Management practices which synchronize the availability of nitrogen with the requirements of the crop, minimize the emissions of N<sub>2</sub>O per unit of crop mass. This can include tillage practices and or the use of organic, sustainable and or slow-release N fertilizers.

**NERP minimizes these N2O emission pathways by managing on-farm applied nitrogen sources through the implementation of the best management practices described by the 4R Plan.**

Source	Rate	Time	Placement
Ammonium-based formulation and/or any of the following enhanced efficiency sources: <ul style="list-style-type: none"> <li>• Slow / controlled release fertilizers</li> <li>• Inhibitors; or</li> <li>• Stabilized N</li> </ul>	Apply nitrogen according to qualitative estimates of field variability (landscape position, soil variability) using annual soil testing and recommendations developed within the 4R Plan OR Apply nitrogen according to quantified field variability (e.g., digitized soil maps, grid sampling, satellite imagery, real time crop sensors) using annual soil testing and recommendations developed within the 4R Plan	Apply in spring; or  Split apply; or  Apply after soil cools to 100C	Apply in bands / Injection

This 4R Plan is a risk-based approach, informed by over 40 years of peer-reviewed research on the effect specific management practices have on the biological processes that lead to nitrogen losses in North American cropping systems. The 4R Plan is designed to address the risk of nitrogen losses by promoting comprehensive nitrogen management across the 4Rs.



- Optimization of the crop response per unit of added nitrogen; and,
- Minimization of the risk for nitrate-N to accumulate or persist in the soil where it is potentially denitrified and/or emitted directly or indirectly as N<sub>2</sub>O or lost from the system through leaching and runoff.

## PROGRAM REQUIREMENTS

### Implement farm management practices that increase nitrogen use efficiency (NUE) using the 4R strategy.

*These practices can be adopted in varying capacities depending on the % increase in NUE.*

**Basic (+15%):** By simply adopting a 4R nitrogen management strategy.

**Intermediate (+25%):** Including nitrogen inhibitors and/or slow-release fertilizers.

**Advanced (+35%):** Precision agriculture (variable rate) in combination with nitrogen inhibitors and/or slow-release fertilizers.



The greater the NUE increase, the more offsets that are generated. Furthermore, NERP can be combined with other programs such as no-till to increase the amount of carbon offsets generated.

**Let Fertoz be your carbon specialist.** *We provide agronomic services, sustainable crop solutions, carbon credit advisory and trading. Our carbon programs can be stacked to maximize returns on your farms' carbon offset initiatives. We currently offer NERP and Conservation Cropping (No-Till) programs, but are working to provide a host of other carbon programs in the near future including cover cropping, canola strategies, methane reductions in cattle, and sustainable fertilizer programs.*

## CARBON CREDIT QUANTIFICATION

- 1) First, a baseline is determined which quantifies the emissions that likely would have occurred in the project year, had the 4R Plan not been implemented. The baseline is recalculated each year using the estimated project emissions and the conservative reduction modifier as inputs.
- 2) Fields must be soil sampled annually and nitrogen recommendations made to fit under the 4R management strategy by an accredited agronomist. Samples are taken in the spring or fall prior to nitrogen application. Eco-zone (Parkland or Dry Prairie) of a particular field as well as crop type will affect the coefficient used in the calculation to estimate carbon offsets.
- 3) The data from annual soil samples and geo-referenced yields are used to calculate NUE. The difference between NUE and the established baseline NUE determine the amount of carbon credits generated.
- 4) Post-Harvest Report is Prepared by Agri-Coach

## PRODUCER DOCUMENTATION

<b>Emission Offset Sales Agreement</b>	To be completed once. A new agreement would only be required if there is a name change on the file.
<b>Annual Field Information Sheet</b>	<ul style="list-style-type: none"> <li>• Land Location of each field enrolled in the program (preferably shape files).</li> <li>• Crop type and seeding rate</li> <li>• Proof of irrigation (if applicable)</li> </ul>
<b>Equipment Declaration</b>	<ul style="list-style-type: none"> <li>• Photos showing width of openers and shank spacing (a measuring device should be clearly shown in the photos); or</li> <li>• Invoices or a letter from custom fertilizer application that indicates the width of opener and shank spacing for each field.</li> </ul>
<b>4R Farm Plan approved by APA with BMPs applied to each field/subfield enrolled in the Project.</b>	<ul style="list-style-type: none"> <li>• Fertilizer Source recommendation by management zone, including the composition of fertilizers applied (type of Nutrien product);</li> <li>• Fertilizer Placement recommendation by management zone, including band concentration calculations;</li> <li>• Fertilizer Time recommendation by management zone, including fertilizer application dates; and</li> <li>• Fertilizer Rate BMP by management zone, based on annual soil testing and nutrient application recommendations.</li> </ul>
<b>N rate recommendations for each field/subfield</b>	<p>N rate recommendations showing how they were derived, either by:</p> <ul style="list-style-type: none"> <li>• Annual soil testing, outlining soil sampling methodology, sampling dates, sample handling, and location from which samples were collected for each field/subfield; or,</li> <li>• Annual nitrogen balance calculation on each 4R management zone.</li> </ul>
<b>Mass and date of N applied for each field in the project</b>	<p>The following data are required to establish the mass and date of N applied for each crop:</p> <ul style="list-style-type: none"> <li>• Receipts indicating the type and mass of fertilizer purchased for the farm for the crop year; and</li> <li>• Farm log or as-applied data of fertilizer mass and date applied by management zone; or</li> <li>• Custom application receipts indicating mass of fertilizer applied by field (if applicable)</li> </ul>
<b>Rate of N applied for each crop in year prior to project implementation</b>	<p>NOTE: This data is required only for the year prior to project implementation.</p> <p>Data to calculate N-rate for each crop for the year prior to project implementation, including both:</p> <ul style="list-style-type: none"> <li>• Receipts indicating the quantity of fertilizer purchased for the farm for the year prior to project implementation.</li> <li>• Land areas for each crop for the year prior to project implementation</li> </ul>