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The Verdant Element

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ALBERTA ADVANTAGE?

Recently I had a chance to chair the Alberta Beef Producers zone 8 meeting in Goodridge. I was interested in the comments and concerns raised at the meeting as well some of the issues brought forward which highlighted for me how fortunate people are to make a living and farm here in the province. There was some concern over the Codes of Practice for the Care and Handling of Beef Cattle, as the code was updated in 2013. According to the National Farm Animal Care Council the Code is not mandatory or audited, but if the animals are in distress then the Code can be used as a tool enforcement officers can use to measure the owner's level of care. Producers and industry can use the Code as a guideline and baseline for animal care, education (for the public and livestock producers), and resource for recommended practices. All producers should read through the Codes to find what is relevant for their operation.

Alberta and Canada's agricultural industry is comparatively non-regulated compared to other countries. While I worked in Denmark, I was astounded by how much government influence affected the operation. The dairy and grain operation that I worked on milked just over 300 cows, and was restricted to the number of head we milked by how much land the operation held. When we placed the heifers on rented pasture, we sold the herd to a different herd number to increase the amount of fertilizer we could purchase. Chemical fertilizers available to purchase was limited by the amount of manure produced by the operation. Detailed calving records needed to be submitted to the government within a week of birth, as well as any herd documentation such as perished animals. Any treatment of cattle had to be done by a veterinarian which was recorded and reported to the government, also in a timely manner. This took some adjustment from my Canadian mentality of on farm treatment. Even immunizations/vaccinations such as blue-tongue had to be done by the veterinarian.

Having lived and worked over there, as well as anyone from the European Union that now farms in Canada can truly appreciate the freedoms that we have here. And yes, there may be some regulations here, but there will be regulations in every industry and I believe that there needs to be some standards of practice as well as a way to prove to the world that we are operating with best practices first and foremost.

A Picture Says A Thousand Words



Photo above: Jersey calves, double tagged and registered within a week of birth. Photo top right: hand weeding wild sugar beets from fields of sugar beets. No GMOs allowed so there are no sprays available for this crop. Photo right: the veterinarian administering drugs prior to dehorning. Photo bottom right, left: girls starting carrying water from as early as the age of four over several miles from the water source to their homes. Water is considered women's work so it is their job to collect it for their families. In Malawi, one of the poorest nations in Africa, non-government organizations have gone and dug wells for the majority of villages such as the one below. The people in this country are better off than those of more affluent stature such as Kenya, where there are no wells and people are suffering from dehydration, having no access to clean water.



Agricultural Carbon Offsets

INFORMATION FOR ALBERTA'S OFFSET MARKET

Nitrous
Oxide
Emission
Reduction

NITROUS OXIDE EMISSION REDUCTION PROTOCOL (NERP) FOR CARBON OFFSETS

ALBERTA FARMERS CAN FOLLOW THIS PROTOCOL TO QUALIFY FOR CARBON OFFSETS UNDER THE ALBERTA OFFSET SYSTEM.

Alberta has introduced first-of-its-kind legislation in North America that gives agricultural producers new ways to benefit from helping to reduce greenhouse gas emissions. The result is the Alberta Offset System, which includes a number of protocols producers can follow in order to earn carbon offsets from documented improvements to practice changes. These may be sold in the carbon offset market.

Alberta Agriculture and Rural Development (ARD) has developed a series of Protocol Summary documents to provide producers with a brief introduction to each of the protocols related to agriculture – including the one you are reading here on the protocol related to nitrous oxide emission reduction. Producers interested in pursuing projects that meet the requirements of these protocols can get more information through the website links and contact information provided at the end of this document.

Record keeping is critical. To qualify for offsets, producers need to document practices for the periods both before and after they adopt emissions-reducing practice changes. This is critical not only to earn offsets, but to protect producers from liability if there is any challenge to the carbon offset credits they are claiming.

THE OPPORTUNITY FOR PRODUCERS

The opportunity for generating carbon offsets with a Nitrous Oxide Emission Reduction Protocol (NERP) arises from the direct and indirect reductions of nitrous oxide (N₂O) emissions achieved through the implementation of a 4-R (Right Source@ Right Rate, Right Time and Right Place™) Nitrogen (N) Stewardship Plan for agricultural lands. This protocol is designed for incremental improvements in nitrogen management.

BENEFITS OF IMPROVED NITROGEN STEWARDSHIP

There are many other benefits from using improved nitrogen stewardship in addition to those acknowledged in the protocols.

- **Improves nitrogen use efficiency.** Reducing nitrogen fertilizer application to achieve current crop yields or increases crop yields with current nitrogen fertilizer rates.

- **Reduces nitrogen losses (leaching and/or denitrification).** Prevents over application of nitrogen fertilizer by monitoring soil test nitrogen levels.
- **Improves productivity.** Crop yields improve over time, through improved water use and nutrient cycling.
- **Precision farming.** Variable rate nitrogen fertilizer application targets field areas that will best balance crop nitrogen demands and fertilizer application.
- **Farm data systems.** Sets up producers for other emerging environmental market opportunities that require documentation

KEY DETAILS

The key details of this protocol fall into several categories.

Main requirements

- For most protocols, earning carbon offsets is based on showing “before” and “after” practice change that results in lowering of GHG emissions. This protocol provides you with options for implementation of best management practices (BMPs) in the context of a comprehensive 4-R (Right Source @, Right Rate, Right Time and Right Place™) Nitrogen Stewardship Plan. The implementation of a comprehensive 4-R Nitrogen Stewardship Plan reduces the amount of nitrous oxide emitted, through the improved utilization of the 4-Rs.
- The protocol recognizes three categories: Basic, Intermediate and Advanced. As you move from Basic to Advanced there is a greater reduction occurring.
- The scope of this protocol is limited to on-farm reductions of nitrogen sources such as fertilizer, manure and crop residues from crop events. However, the reduction coefficients used in this protocol assume that when comparing the project and baseline scenarios for all other aspects of crop production management, the GHG impacts are negligible.
- To use this protocol, producers must provide evidence that a 4-R Nitrogen Stewardship Plan has been implemented. Three years of historical operations data prior to implementation of the 4-R Nitrogen Stewardship Plan, for each crop event (i.e. area under a particular crop for a given year) are also required for each participating farm. The crop event is the operational unit for which

Agricultural Carbon Offsets | INFORMATION FOR ALBERTA'S OFFSET MARKET

Nitrous Oxide Emission Reduction

N_2O emissions intensity (N_2O per kg crop) is calculated for Baseline and Project. The crop event has three elements—crop type, crop year, and management zone. The crop type is the annual or perennial crop. For annuals, the crop year is accounted from harvest of previous crop to harvest of current crop. For perennials (baled or grazed forages and silages), the crop year is accounted from last harvest of previous year to last harvest of current year. The management zone varies with the selected performance level for which the 4-R Plan is designed, and thus will vary between baseline and project. Farming operations that include pulse crops are eligible to use this protocol. Farms that utilize manure are also included in this protocol.

- This protocol does not address changes in manure management practices, but manure nitrogen sources must be accounted for in the plan. Other soil management protocols (i.e. Tillage Management) can be used in conjunction with this protocol.
- To be eligible, producers need to produce annual crops and have dated farm records that show where nitrogen fertilizer management has occurred during the protocol application period (e.g. field records, field investigations, farm implement measures, machinery receipts). Farmers also need records that show ownership and any contracts related to the land being claimed for carbon offsets. A data management system, to support the date that the records were created, improves ease of use for 3rd party verifiers.
- The farmer must also affirm with a signature that the records provided are accurate and true.

Capturing Credits Back to 2002. Producers may claim carbon offsets based on eligible practices adopted at any time between 2002 and the current year, as long as requirements such as having necessary records are met. However, this option will not be available after January 1, 2012 due to increased verification requirements.

Protocol Approach

- Producers must implement a specific set of best management practices (BMPs), as per the general guidance included in the protocol. In order to determine the emissions reduction modifier associated with their project condition, the required BMPs described in TABLE 1 of the protocol must be implemented. This 4-R Nitrogen Stewardship Plan must then be signed-off by an Approved Professional Advisor (APA) to ensure its eligibility for the use of this protocol. The Approved Professional Advisor is an individual who has the Proof of professional accreditation (such as a qualified P.Ag.) and the Proof of successful completion of the Canadian Fertilizer Institute's 4-R Training Course. The signed-off 4-R Stewardship Plan is not the Offset Project Plan, but it must be in place before the project can be implemented, and the Offset Project Plan must refer to it.
- This graded approach, which moves to more comprehensive and efficient levels of nitrogen management, results in greater N_2O emissions reductions. The protocol does this by requiring

more comprehensive data for N recommendations, more extensive monitoring procedures in the 4-R N Stewardship Plan, and more sophisticated BMPs. The baseline management for the producer is determined by the APA, in cases where the management is already at the basic level of 4-R N Stewardship Plan this will be the new baseline to compare against - resulting in only a 10% modification or reduction as the producer moves to intermediate or advanced performance levels.

- Emission reductions are quantified based on the difference between baseline and project for each crop event (i.e. area under a particular crop in the baseline, and area under a particular crop in the project – under the 4-R N Stewardship Plan) and quantified by comparing the N_2O emissions between the baseline and project and applying the emission reduction modifier in order to determine the amount of reductions resulting from the farm's implementation of the 4-R N Stewardship Plan.
- Baseline emissions are determined based on three years of data, for the crop event prior to the implementation of the 4-R N Stewardship Plan. In cases where three years of historical data on crop events are not available, a flexibility mechanism allows Producer's to utilize a standardized baseline.
- The quantification of direct and indirect N_2O emissions from more sophisticated use of fertilizer in this protocol is based on published emission factors from Canada's National Inventory Report and is calculated as a proportion of the amount of fertilizer nitrogen applied. This quantification is performed on an eco-district basis, which accounts for variables associated with soil type, texture, topography, and climate.
- In order to ensure functional equivalence when comparing the baseline and project calculations, the emission reductions are expressed on a per unit mass of crop produced per unit area basis.
- As research advances and more BMPs are developed these will be added to NERP to achieve greater N_2O emission reductions.

Additional important considerations

- **Aggregators can help.** The majority of farmers will not earn enough carbon offsets to enter the marketplace individually, as buyers are typically seeking offsets that represent carbon dioxide emission equivalents in the thousands of tonnes. That's where "aggregators" come in.
- These service providers seek to pull together offsets from many different farmers, to produce a much larger project/ package of offsets that is easier to manage (reduced verification costs and reporting requirements) and easier to sell.
- They also typically handle for farmers many of the requirements of dealing in the Alberta Offset System, such as identifying and registering the specific acres for which emission reductions will be calculated.
- There are a growing number of aggregators in Alberta and a list of these is available on the Carbon Offset Solutions website, at www.carbonoffsetsolutions.ca/eot/resources/marketservice.html.

Growing Forward 2 provides programs and services to achieve a profitable, sustainable, competitive and innovative agriculture, agri-food and agri-products industry that is market-responsive, and that anticipates and adapts to changing circumstances and is a major contributor to the well-being of Canadians.

Growing Forward 2 is now accepting applications for the following programs:

- [Agri Processing Automation and Efficiency - Livestock](#)
- [Agri Processing Product and Market Development - Crop](#)
- [Agri Processing Product and Market Development - Livestock](#)
- [Animal Health Biosecurity Producer](#)
- [Business Management Skills Development](#)
- [Business Opportunity](#)
- [Confined Feeding Operation Stewardship](#)
- [Food Safety Systems Delivery Agent](#)
- [Food Safety Systems Producer](#)
- [Irrigation Efficiency](#)
- [On-Farm Energy Management](#)
- [On-Farm Stewardship](#)
- [On-Farm Water Management](#)
- [Traceability Pilot](#)
- [Traceability Technology Adoption](#)

GROWING FORWARD

Growing Forward Stewardship Programs

Grant funding cost share of 30%-70% of eligible expenses to complete the project (\$50,000.00 funding maximum)

The On-Farm Stewardship Program supports the implementation of beneficial management practices (BMPs) that reduce the risk of agricultural contaminants entering water supplies. The purpose of the On-Farm Stewardship Program is to provide financial support for active producers to implement approved projects which reduce agriculture's impact on water quality.

Below is a list of approved projects under the On-Farm Stewardship Program. Please refer to the following pages for additional information, cost shares and funding maximums for each project.

Activity Code	Project
Category A	
101	Riparian Area Fencing and Management
102	Year-Round/Summer Watering Systems
103	Portable Shelters and Windbreaks
104	Wetland Restoration
Category B	
201	Improved Manure Storage Facilities
202	Livestock Facility Runoff Control
203	Livestock Facility and Permanent Wintering Site Relocation
Category C	
301	Improved Pesticide Management
Category D	
302	Fuel Storage
303	Used Oil Storage
Category E	
100	Innovative Stewardship Solutions

The environment is becoming a more prominent issue. It is a large factor in marketing agriculture and food products in today's global markets. Consumers are demanding more transparency and are demanding high quality and safe products. Reputation of food safety is critical to retain and gain access to domestic and international markets.

Environmental Farm Plans (EFP) provide a tool for producers to self analyze their operation and identify environmental risks, current standards, areas for improvement and also highlight what they are doing well.

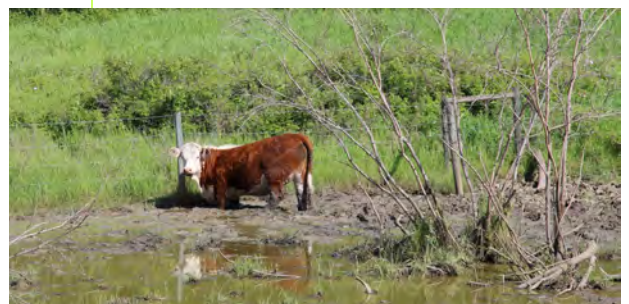
Having a completed EFP allows producers to access different funding opportunities, such as the Growing Forward Stewardship Program. It is also useful in product branding that demonstrates specific environmental standards.

The EFP Process

An EFP can be completed through workshops or one-on-one session(s). The EFP first identifies the soil and farm site characteristics. Following this, the producer completes only the relevant chapters that apply to their operation; such as wintering sites, fertilizer, pesticides, crop management etc. Upon completion the EFP is submitted to a Technical Assistant for review. Once reviewed the EFP will be returned along with a letter of completion.

The EFP is a living document and should be reviewed and updated periodically.

If you wish to complete an EFP or have any questions regarding EFP please contact the LARA office at 780-826-7260



Stuck in the mud? Consider an offsite watering system.

ENVIRONMENTAL FARM PLANS

If you are having your well tested for arsenic, it may also be a good time to test your water for routing chemical and bacteria. Annual testing is important to demonstrate water quality changes and monitor if your well is in proper working order.

GROUND WATER

Water is such an important resource that so many of us take for granted. What would you do if you did not have access to water? Billions of people globally do not have access to clean water resources. In India thousands of wells were drilled due to the population having no access to safe surface waters sources. However it was not until much later that thousands and thousands of people were dying or had severe symptoms of arsenic poisoning did they realize that the groundwater contained a great concentration of heavy metals, in fact it is one of the worst cases on record today.

Ground water is a dependable source of clean water, however it is vulnerable to contamination from a variety of sources such as septic, manure, petroleum products, fertilizers and chemicals. Having a well that is poorly sited, improperly installed, faulty annular seal, having a well pit, or is subjected to flooding all can lead to unusable water.

Prevention, maintenance and monitoring are key to having a well that is sustainable and safe.



Well Owner Responsibilities

A private water well can provide a reliable, safe source of drinking water but ownership comes with responsibility.

Private wells can provide a clean, safe source of water if they are properly located, built and maintained. If you use a private well, it is your responsibility to properly operate and maintain it to ensure it remains a reliable, safe source of drinking water.

The *Water Act* is the legislation which outlines the regulations, codes of practice, and standards and guidelines for managing and protecting Alberta's water.

Under the *Water Act*, the *Water (Ministerial) Regulation* establishes standards for water well construction and outlines the responsibilities of well owners to protect their water wells and help to keep ground water resources healthy and clean for future generations.

Under the Regulation, well owners must:

Plug old or abandoned wells

You are responsible for having any abandoned wells on your property properly decommissioned or plugged. See the *Plugging Your Well* fact sheet for more information.

Abandoned wells pose one of the biggest risks to our groundwater resources because they provide a direct pathway for surface contamination to reach groundwater aquifers. In the case of larger diameter wells, they also pose a serious safety hazard to animals and small people.

Ensure all wells are securely capped and kept clean

Any wells on your property (including those that are not being used, but are intended for future use) should be properly capped, regularly inspected and disinfected.

A vermin-proof cap with a shielded and screened vent will prevent debris, vermin and insects from entering your well. Well casing should extend above ground surface by at least 20 cm and the area around the well should always be kept in a sanitary condition.

What else should I do to take proper care of my well?

In addition to the requirements under the Regulation, here are a few more beneficial management practices that will help you take care of your well and protect our groundwater.

Keep your well clean

Annually disinfect your well to keep bacteria growth in check. Iron and sulphate-reducing bacteria commonly thrive in water wells and are not harmful to your health but can cause problems with well productivity and water quality. See the fact sheet *Shock Chlorinating Your Well* for more information. Preventative maintenance is also less costly in the long run.

Test your well water

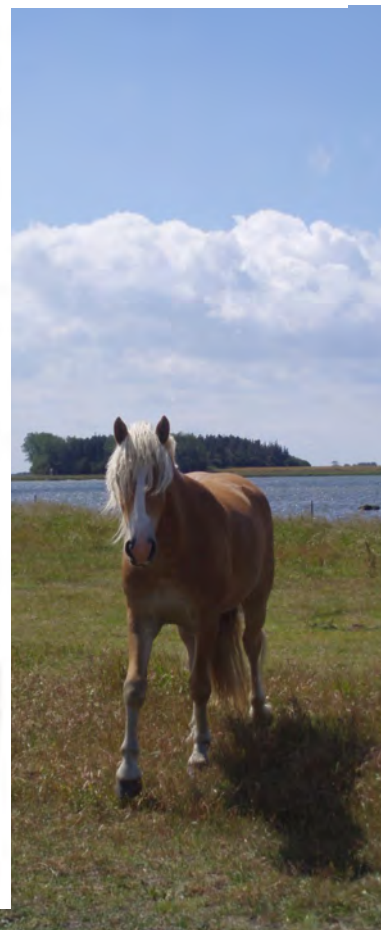
You should test your water for coliform bacteria twice a year (or more often if your well is less than 50 feet deep). Contact your local Public Health Office (<http://www.albertahealthservices.ca/facilities.asp?pid-ftype&type=4>) for sample bottles and information on how to collect a water sample and transport it to the laboratory.

You should also test for routine chemistry every few years to identify any changes that may be occurring. Always have your test results interpreted by a Public Health Inspector.

Don't over-pump your well

Never pump your well at a higher rate than is recommended on the drilling report by your licensed water well contractor or you risk damaging both your well and the aquifer.

If you do not have a drilling report for your well you should hire a licensed water well contractor to perform a yield test on your well to establish a recommended pumping rate.



Arsenic in Your Drinking Water

Arsenic is a prominent issue in northeastern Alberta. Many of the wells being tested in the area are positive for this heavy metal. Arsenic has two forms, organic (arsenic five [As(v)]) which is found in plants, animals and some foods or an inorganic form (arsenic three [As(III)]) that is found in water, soil or the air. Arsenic in drinking water can be attributed to both natural sources and human activity. Northeastern Alberta has high arsenic levels in the groundwater, which may be due to the type of bedrock found here containing pyrites which are enriched with arsenic.

Arsenite (As(III)) is more toxic than organic arsenic (As(v)) and is more prevalent in groundwater due to the low oxygen concentrations. In the Beaver River area As(III) is approximately ten times more prevalent than As(v).

Generally we are exposed to low levels of organic arsenic through our food; this form of arsenic we can metabolize and excrete in our urine. The arsenic found in the groundwater is more toxic and can affect our gastrointestinal system, cardiovascular system and our nervous system. The maximum acceptable concentration (MAC) is 0.01mg/litre.

It is important to test your well water on a regular basis as levels can fluctuate. Water treatments are available to reduce the amount of arsenic or change As(III) into As(v) through oxidation. Reverse osmosis combined with a pre-treatment can remove the majority (roughly 85%) of arsenic from your water. Distillation is an effective method however you must maintain and clean your distiller and replace the carbon filter within the recommended time. Make sure that your treatment systems meet the NSF/ANSI standards. Conducting a pre-treatment and post-treatment analysis is the only way to prove the effectiveness of your system.

Because this is a recognized area of concern regarding arsenic, the testing for this heavy metal is substantially subsidized. If you would like your well tested please contact your local Alberta Health Services office and request that they come out and test your water. They will only test untreated water as they will not be testing for the effectiveness of your treatment system.



Conduct regular inspections

You should regularly inspect your well and surrounding area looking for cracks or holes in the well cap and casing and any gap between the well casing and the ground around it. This area should always be properly sealed to prevent potential surface contaminants from draining into your aquifer. Consider building a protective structure around your well to protect it from any physical damage caused by lawn mowers, snow ploughs or other equipment.

Monitor your well

Monitoring your well's productivity over time ensures you have enough data to identify when the well needs servicing. Monitor both the non-pumping and pumping water levels and periodically hire a licensed water well contractor to conduct a flow test. They will be able to assess the cause of any declined productivity and how to rehabilitate the well, if possible. See the fact sheet *Measuring Well Water Levels* for more information.

Keep good records

Keeping a record of all water quality testing, water flow testing, well maintenance and repair helps you build history on your well. This information is valuable in identifying any changes in water quality or your well's ability to produce water.

Protect your well from contamination

The most common contamination threats are often close to home. Our land-use activities can have a negative impact on groundwater quality, particularly on shallower aquifers that are closer to ground surface. Fertilizers, pesticides, fuel storage tanks, landfills, animal waste and septic systems are examples of potential contamination sources. Be sure to keep

these contamination sources as far away as possible and down slope of your well. Always observe regulated minimum setback distances from contamination sources.

Use water wisely

Sometimes when landowners share the same aquifer for their water supply there is insufficient water to meet everyone's demand. Multiple withdrawals of groundwater from a single aquifer have a cumulative effect. So, when pumping in the area collectively exceeds the natural recharge rate to the aquifer, each well owner may experience a decline in the non-pumping water level in their well and the amount of water they can extract.

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In Alberta, if the water is to be used for household (domestic) purpose, you do not need permission or a license to use your well. Household purpose is defined in the Water Act as "the use of up to 1250 cubic metres of water per year per household for the purposes of human consumption, sanitation, fire prevention and watering animals, gardens, lawns and trees."

If you intend on using more water than that, or if you want to divert the water for purposes other than household use, it is your responsibility to contact the nearest Alberta Environment regional office at <http://environment.alberta.ca/contact.html> and inquire about obtaining a diversion license (or a licensed allocation).

Copies of the Water Act and the Water (Ministerial) Regulation are available through the Queen's Printer Bookstore at 780-427-4952 (Edmonton) or 403-297-6251 (Calgary) or online at <http://www.qp.alberta.ca/index.cfm>

FOR MORE INFORMATION:

Water Wells That Last for Generations
[www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/wwg404](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wwg404)

For a free copy of this comprehensive water well management guide, contact Alberta Agriculture and Rural Development Publications Office at 1-800-292-5697

Well Aware Booklet and Video
www.wellaware.ca

Canadian Ground Water Association
www.cgwa.org

Alberta Water Well Drilling Association
www.awwda.com

For a list of reputable, licensed water well contractors in your area, contact the Association at 780-386-2335

CONTACT US:

General Questions?
 Alberta Environment Information Centre
 780-427-2700
 (toll-free, dial 310-0000)

Technical Questions?
 Ag-Info Centre
 310-farm (3276) toll free

The Working Well partners are not responsible for any loss, damage or injury resulting from the reader's use of or reliance on the information and methods contained in this document.

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Sustainable farming encompasses a wide range of practices and principles; combining environmental stewardship with profitability and ensuring that the family farm will be there for generations to



**Wishing You and Your Family a Merry
Christmas and a Happy New Year!**