

SiteLine

Joffre Site Community News

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Special Edition: Annual Environment Review

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NOVA Chemicals Community Nature Trail

We estimate more than 600 visitors have enjoyed the trail north of the Joffre Site since it was first opened last October. Many people return time and again to enjoy and appreciate this wonderful natural space. We love reading the comments and suggestions provided on the sign-in sheets. We've captured some of these throughout this issue of *SiteLine*. For trail information please go to www.novachem.com/Pages/joffre/joffre.aspx



Environmental performance and sustainability from many perspectives

This is our **15th annual report to our community** on our environmental performance and goals for continuous improvement at the Joffre Site. NOVA Chemicals has also recently published our **2015 Sustainability Report**.

When I joined NOVA Chemicals many years ago, our operations definitely had a strong Responsible Care® focus. That focus, which now encompasses the principles of sustainability, will continue to serve us well. It helps us to attract and retain outstanding people who share our commitment to **environmentally and socially responsible operations** and continuous improvement. Our values help us to establish and maintain **long-term, cooperative and collaborative relationships** in our community, with our customers and with our many stakeholders. And, without a doubt, this focus influences our **financial performance and viability**.

While this edition of *SiteLine* helps our community to assess our performance in some key areas of interest such as water use, air quality management, greenhouse gas (GHG) emissions intensity reductions and noise management at the Joffre Site, I invite you to review our newly published Sustainability Report for a broader picture of our operations throughout North America.

The ongoing investments into our facilities here at the Joffre Site — more than \$1.3 billion during the past decade — have provided us **an opportunity to proactively incorporate energy efficiency and environmental performance improvements**. In addition to the work

well underway in commissioning of our Polyethylene 1 (PE1) Expansion Project (page 6), we are proceeding with the Ethylene 2 (E2) Furnace Refurbishment Project and installation of a new stormwater retention pond. We are also proposing to install **a second, back-up caustic disposal well** to enhance reliable operations and to provide flexibility for system maintenance (page 8).

Please join us at our **October 12 Community Open House** to hear about the status of our projects and discuss our environmental performance and sustainability goals. Your input into our operations is always encouraged and valued.

A handwritten signature in black ink, appearing to read "Rick Van Hemmen".

Rick Van Hemmen, Joffre Site Leader

NOVA Chemicals' **2015 Sustainability Report** reflects our ongoing commitment to shaping a world where products vital to our health and happiness are even better tomorrow than they are today. We invite you to review the report — both a snapshot of current performance and a commitment toward continual improvement — at www.novachemicals.com.



About our environment report and our approach to Responsible Care

This annual *SiteLine* environment report provides our community and stakeholders with an overview of our performance in the important areas of water, air, GHG emissions and noise management. It also highlights our involvement in various community projects dedicated to making a difference and improving the quality of life in Central Alberta.

NOVA Chemicals continues to play a leadership role in the development of our industry's Responsible Care ethic and its sustainability principles. We continue to work to achieve our purpose: We help to shape a world where products vital to our lives, our health and happiness are even better tomorrow than they are today.

Our Taking Care model, shown to the right, frames our unique approach to Responsible Care and sustainability. It provides the “umbrella” for our corporate-wide 2020 Environmental Plan, and the Joffre Site environmental management system and programs. We remain focused on meeting all regulatory requirements and ensuring emissions are below all regulatory compliance limits. We strive for continuous improvement in our performance.

Looking ahead to expanded polyethylene operations

Our growth strategy also reflects our commitment to continuous improvement. Our current initiatives — the PE1 Expansion Project (now being commissioned), the associated rail yard expansion, the E2 Furnace Refurbishment Project and the new stormwater retention pond — provide opportunities for updating of equipment and other improvements that align with our Taking Care model.

As we have done during the past few years, this report includes a performance forecast in many of our charts related to our expanded polyethylene operations. The forecast, based on modeling conducted for this project's environmental studies, helps to show the modest change to our industrial footprint. (Actual data will be collected next year for our report to you in 2018.)

Taking Care

Our work at NOVA Chemicals results in plastic products that take care of food, water and other goods vital to life. To enable these products, we must first take care of the people, places, materials and processes that make them possible. We take care with respect to our operations, communities, products and the environment. Taking Care is a way to think and a way to work. It's our particular approach for putting Responsible Care® into practice.



Operations

In our operations, we take care to attract and develop talented people committed to the safety and well-being of themselves and others. We foster relationships that promote community safety and other social and environmental values.



Communities

In our communities, we take care to be a neighbor that promotes conversation, understanding and involvement. We contribute positively to community development, public policy and reporting.



Products

In our products and those we enable, we innovate to improve people's lives. We take care to promote the safety, security and value of products throughout their life cycle.



Environment

In our environment, we take care to conserve, protect and enhance natural resources. Through innovation, operational excellence and environmental stewardship, we seek to protect life and to continuously improve our environmental performance.

Annual August event draws good crowd

More than 80 neighbours came out for our annual Emergency Preparedness Awareness BBQ on August 18. Tours of our emergency equipment, information booths, kids events and an opportunity to validate emergency response contact information were part of the evening.



Visitors to NOVA Chemicals Community Nature Trail tell us:

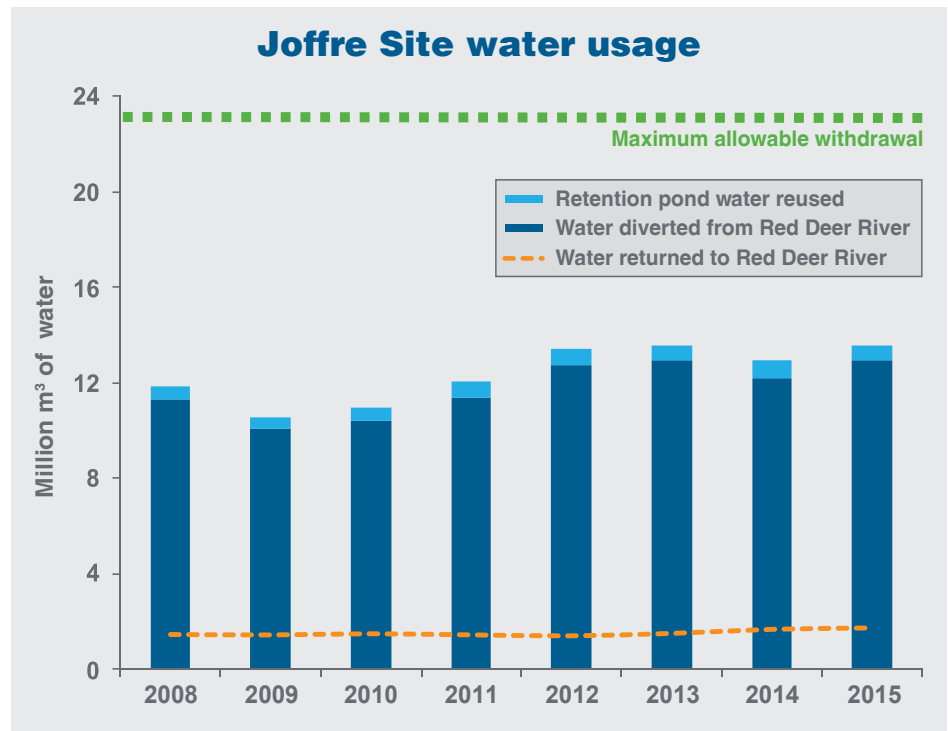
Wildlife sightings are plentiful and include coyotes, moose, mule and whitetail deer, rabbits, beaver, muskrats, weasels and ermine.

Minimizing our impact on water resources

Water is critical to Joffre Site operations, and our management programs focus on minimizing our impact on this valuable resource.

The Red Deer River has an annual flow of roughly two billion cubic metres (m³). NOVA Chemicals has water licences for approximately 23 million m³ per year, which is just over 1% of the annual flow in the river. In 2015, we withdrew almost 12.9 million m³ or 56% of our allotment from the river. We also collected and used 0.60 million m³ from surface runoff. The predicted usage from the PE1 Expansion once in operation in 2017 is an approximate increase of 10%.

The majority of water used in our manufacturing facilities is returned to the environment through evaporation in cooling tower plumes. The amount of water vapour released back to the ecosystem is about 80% of our intake. Water returned to the river goes through extensive testing to meet regulatory requirements and strict environmental standards before discharge.



This graph shows the amount of water used at the Joffre Site. The greater the production rate, the greater the water usage.

Stormwater retention pond

Construction of the new stormwater retention pond located just east of the existing pond has been impacted by weather conditions and may not be completed this year. The new pond incorporates best practices, and will help the site more effectively capture run-off from major storm events. This water, once it is softened and clarified, is normally re-used in our operations.

Once the new pond is operational, we will be able to remediate the existing pond using a staged 'in-situ' approach to reduce the potential for issues like odour. The existing pond has been in operation for many years and there is some contamination contained within the sediment from historical spills dating back to the early 1980s.



Helping to bring a better-performing product to market

NOVA Chemicals' Surpass[®] polyethylene resin can now be found in the Tetra Evero[®] Aseptic, the world's first aseptic carton bottle. Aseptic processing is a type of sterilization that kills bacteria found in food and packaging products. It can greatly extend shelf life.

Experts from our Centre for Performance Applications and Centre for Applied Research in Calgary worked closely with the Tetra Pak team helping to bring product innovation to market.



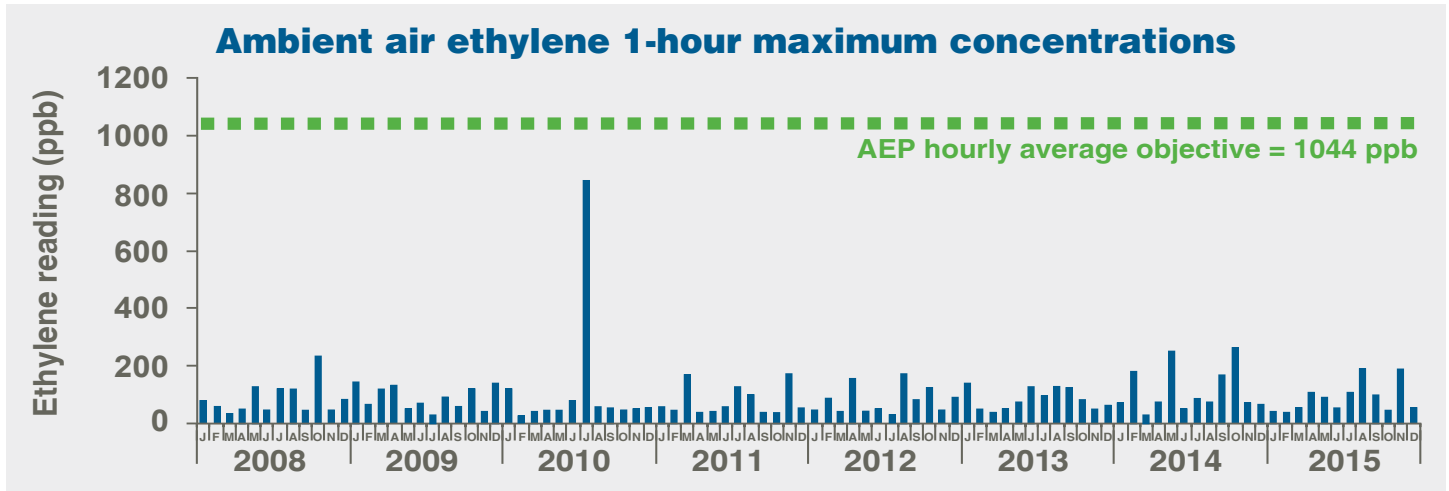
Visitors to NOVA Chemicals Community Nature Trail tell us:

I've been here seven days in a row. Thank you for making this trail for us.

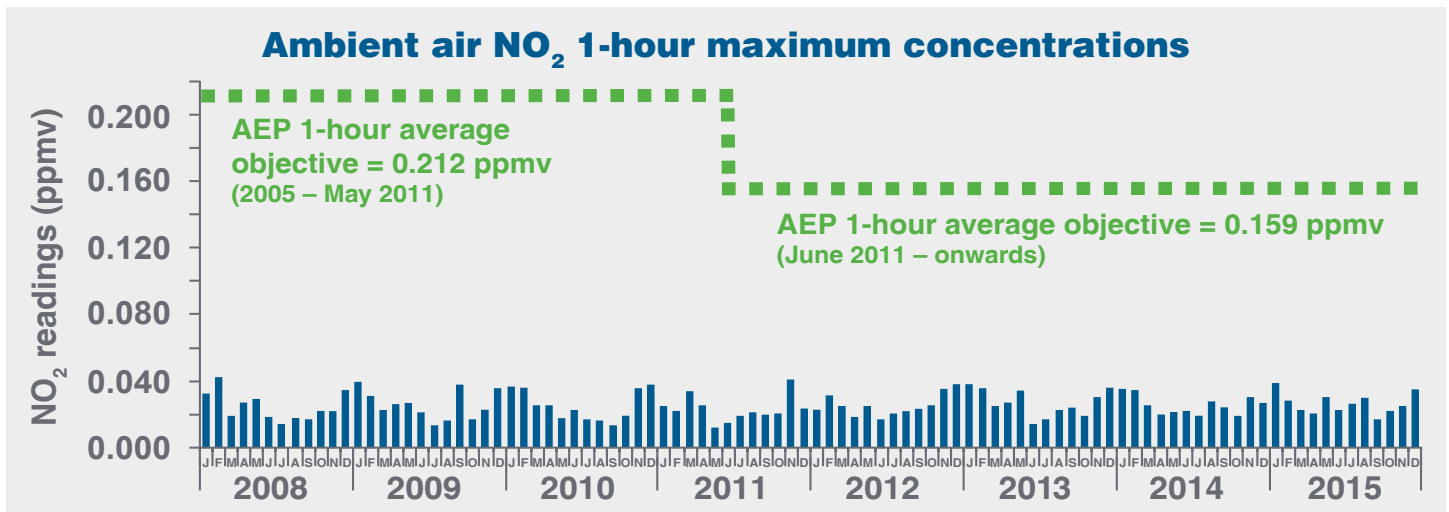
Ensuring air emissions meet Alberta quality objectives

Air quality management is a priority for NOVA Chemicals. Through the Joffre Site Air Emissions Management Program we strive to reduce emissions, monitor impacts and continuously review our performance. We remain focused on ensuring air emissions are below all regulatory compliance limits and air quality objectives set out by Alberta Environment and Parks (AEP).

Data related to a variety of air quality parameters, as shown in the graphs below and on page 5, indicates our concentrations and readings are consistently below established guidelines. The PE1 Expansion is not yet in operation, however predictions show an increase in ambient ethylene concentrations by 0.5% and ambient oxides of nitrogen (NO₂) concentrations by 0.4% at the fenceline. We expect the E2 Furnace Refurbishment Project (see page 5) to help offset NO₂ emissions as a result of furnace design improvements.



Ambient ethylene (1-hour maximum) concentrations are well below the AEP Hourly Average Objective of 1,044 parts per billion (ppb). (The spike in 2010 was the result of a leak in an INEOS LAO facility exchanger, which was promptly repaired with no adverse environmental impacts indicated through ongoing atmospheric monitoring.)



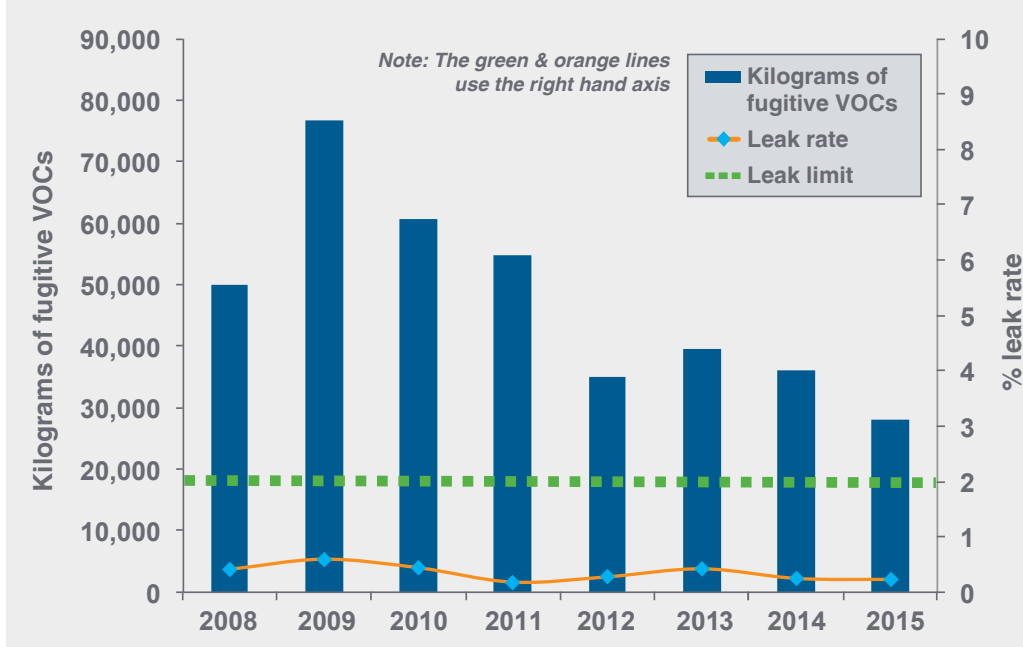
Concentrations of oxides of nitrogen, specifically NO₂, are consistently below regulatory limits. We have a committee focusing on a site NO_x strategy, and our 2020 Environment Plan also has goals for NO_x emissions reductions.

Our NO_x Emissions Reduction Steering Team was formed last year to determine strategies for Joffre Site NO_x emissions reductions activities. The team meets on a quarterly basis and includes representatives from both NOVA Chemicals and AEP, as well as site leaders, technical experts and Responsible Care environmental specialists. Some of the focus areas of the team include tracking NO_x emissions performance, reviewing impacts and opportunities of site projects, and interfacing with regional groups such as the Parkland Airshed Management Zone.



Visitors to NOVA Chemicals Community Nature Trail tell us:
Beautiful place to take wildlife photos.

Petrochemical facility fugitive VOCs



Volatile organic compounds (VOCs) emissions are hydrocarbons that can affect air quality. Our site's comprehensive Leak Detection and Repair (LDAR) program is fully implemented according to the Canadian Council of Ministers of the Environment Code of Practice. While the Code states that leaks over 10,000 ppm must be repaired, we schedule prompt maintenance for any leak over 1,000 ppm.

Continued reduction in GHG emissions intensity

In 2015, we continued to reduce our greenhouse gas (GHG) gas footprint. NOVA Chemicals has achieved nearly an 8% reduction in our GHG emissions intensity as compared to the average emissions intensity established during the baseline period of 2003 - 2005.

Our NOVA 2020 Environment Plan sets a corporate GHG intensity reduction target of 10% by 2020 based on 2010 performance. We are committed to continuously improve our manufacturing, energy and fuel efficiency in order to reduce the intensity of GHGs per tonne of product produced.

As of January 1, 2016, there is an Alberta regulatory requirement for large industrial facilities to reduce their emissions by 15% when compared against the three-year baseline period. When facilities are not able to achieve the provincial compliance obligation, GHG offset markets, as well as technology funds that contribute to research and development opportunities, are critical tools to help meet compliance.

Offsets are based on reductions of GHG emissions by parties who are not regulated, such as agricultural producers. The offsets we have purchased for our Joffre Site support the building of organic carbon in soil through low and zero-tillage practices and assist the agricultural community in advancing sustainable practices. In 2015, we also purchased compliance units from the Climate Change Emissions Management Fund (CCEMF) to meet the obligations for the Joffre Site. These funds are invested into Alberta projects that will help to reduce GHG emissions.



Second refurbished furnace expected to be on-line this Fall

We expect the second of five furnaces that are part of the first phase of the E2 Furnace Refurbishment Project to be operational this Fall. A second phase of the project to refurbish additional furnaces is being considered once phase one is complete.

The work will enable E2 to operate at full design capacity. We also expect greenhouse gas and NO_x emissions improvements and noise benefits. The first-phase, more than \$250-million, project involves about 100 trade workers on-site.



Visitors to NOVA Chemicals Community Nature Trail tell us:
Enjoyed the different grasses and plants.

PE1 Expansion Project commissioning update

First batch of test product expected in Fall

By the end of September, most of the construction workforce will have left the Joffre Site. The PE1 Expansion Project achieved mechanical completion on August 31 with all systems turned over to the Commissioning Team.

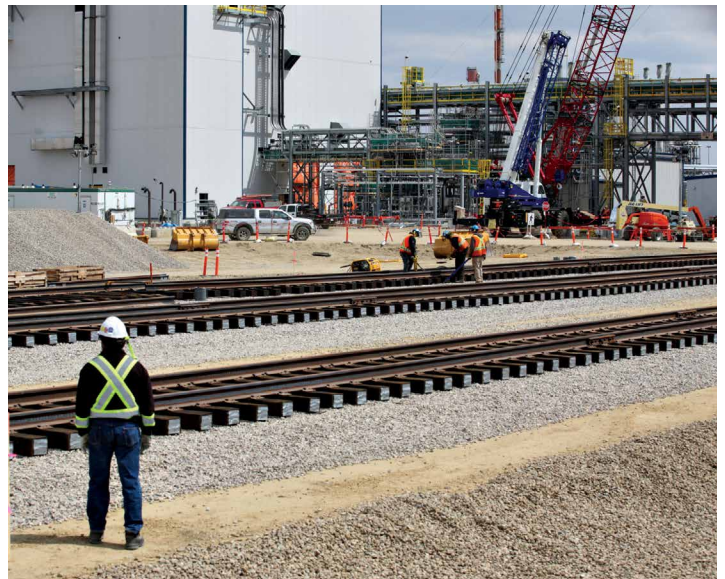
We are still anticipating start-up of the expansion by year-end. Part of the commissioning process is the introduction of ethylene and catalyst into the new third reactor, and then testing of the polyethylene product against criteria such as quality. We expect the first batch of test polyethylene sometime in late October or November. The polyethylene manufactured at PE1 is used by our customers to make products such as food packaging, collation shrink, heavy duty sacks, trash bags and liners, and stretch film.

There has been a significant economic contribution to the province and locally from this \$1-billion expansion project and the associated commissioning work. The 280-tonne reactor — key to the expanded facility — was manufactured at KNM

Process Equipment in Tofield, AB. Locally, more than \$32 million has been spent on items such as concrete, building supplies, equipment rentals, electrical and concrete accessories, fuel and site services. Ledcor Projects Inc. has paid more than \$160 million in salaries since the project got underway in 2013 and maintained an average local workforce of about 35%.

The project workforce donated funds to local agencies through a variety of initiatives including the project recycling program. More than \$45,000 was donated to Central Alberta agencies including Ronald McDonald House, the United Way, the Red Deer and District Food Bank and the Women's Emergency Shelter.

As part of our waste management and recycling programs which aim to reduce landfill disposal, surplus materials and equipment from the project were donated to Habitat Re-Store and the Alix Archery Club.



Commissioning continues, carefully testing all equipment prior to start-up when feedstock and additives are introduced into systems. The west gate access onto Freedom Road is expected to be closed in mid-November.

Versatile performance packaging now recyclable

NOVA Chemicals has developed a versatile all-polyethylene multilayer film structure design for use in the popular stand-up pouch package format. The structure is compatible with #2 HDPE recycling streams, while retaining the performance, processability and cost-competitiveness of existing mixed-material structures.

The stand-up pouch is a very popular and fast growing package type. It is used for a wide variety of applications including dry foods, frozen foods, liquids, confectionery, pet foods and non-food items.



Visitors to NOVA Chemicals Community Nature Trail tell us:

Wonderful signs (the five-kilometre trail system has interpretive signs highlighting the wildlife and habitat of the area).

Enhanced monitoring now part of Noise Management Strategy

Our noise management strategy is constantly being updated and adapted to reflect site changes. The overall goal, however remains the same: to mitigate site operating noise impacts on our neighbours.

We recently enhanced our noise monitoring system with an online service for data collection, storage and processing. It has increased the performance, reliability and accessibility to data for our noise monitoring system.

Current mitigation projects are also underway and encompass site growth:

- The E2 Furnace Refurbishment Project (update page 5) is using silencers on the new induced and forced draft furnace fans.
- Our North Rail Yard Noise Abatement Strategy is in place to meet commitments made to the community at a stakeholder workshop in 2013. The strategy will be regularly assessed to ensure its effectiveness especially as increased shipments begin late in 2016.



Enhanced noise monitoring helps us assess site operating noise and the effectiveness of various mitigation projects.

- Noise sources from the PE1 Expansion Project will be validated once construction is complete in 2016.

Our annual community noise survey will be completed this Fall at five residences near the Joffre Site.

Quick facts from the 2016 Red Deer River Clean-Up

- 594 kilograms or 1,310 pounds of trash collected
- 168 volunteer participants from the community
- 29 NOVA Chemicals representatives

Way to go, volunteers!



Buffer zone update

Plans for second phase of former greenhouse property

Since demolition of the above-ground portion of the former greenhouse (located just south of the Joffre Site) was completed earlier this year, the area is being used as a temporary laydown site for the E2 Furnace Refurbishment Project (see story on page 5).

The timing for a second phase of work is being influenced by the temporary laydown use as well as seasonal considerations

for soil work. The second phase will involve the removal of below-ground concrete footings, pads and some foundations, various underground piping and an underground storage tank. Recovery of useful gravel and reclamation of topsoil are included in the work plan.

Once the area is reclaimed and we assess soil quality in the area, we will be able to determine final end use(s) for the land.



Visitors to NOVA Chemicals Community Nature Trail tell us:
Very peaceful walk.

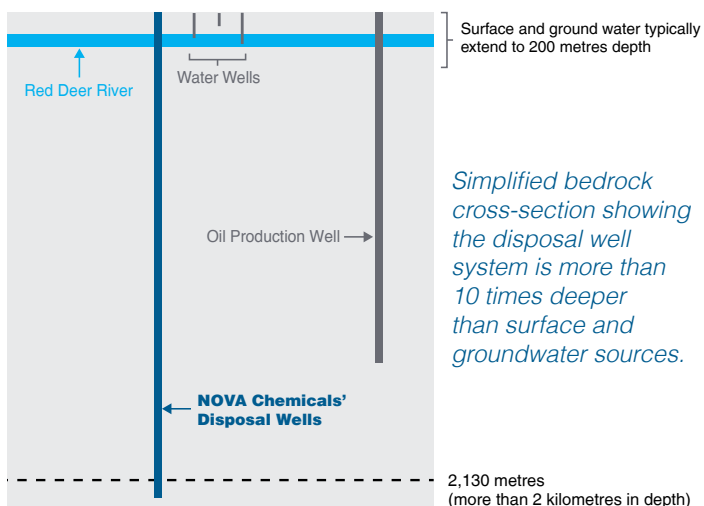
Regulatory update

Proposed back-up well for Joffre Site caustic disposal system

Several years ago, we advised the community about the potential for installing a second, back-up waste caustic disposal well on the site to enhance reliable operations and to provide flexibility for system maintenance. We are proceeding with a regulatory application to the Alberta Energy Regulator (AER) with the intent to drill the new disposal well later this year. After the well is drilled and tested to confirm its suitability, we will apply for an amendment to our existing well disposal approval.

NOVA Chemicals has safely used a caustic disposal well system at the Joffre Site since 1979. The system is used for the disposal of waste caustic generated as part of the ethylene manufacturing process. The current disposal system is operated, maintained and monitored to strict AER requirements, which will also apply to the new disposal well.

The new disposal well will not change the source, characteristics or quantity of fluids being injected into the disposal system. For facilities like the Joffre Site, disposal of spent caustic in a deep well is a responsible choice when compared to other disposal





options such as incineration or truck transportation to offsite disposal facilities.

The new disposal well will be located in close proximity (about 70 metres [m]) to the existing well which is near the Cogeneration facility and contained within a small building. The current and proposed disposal wells are 2,130 m below the surface in the Leduc Zone, as shown in the illustration below.

More information on the proposed new disposal well and an opportunity to discuss the plans with the project team will be available at the Community Open House on October 12. Please see our fact sheet at www.novachem.com/pages/joffre/joffre.aspx

We value your input and suggestions at any phase of this proposed project.



Community Open House

Date: Wednesday, October 12, 2016
Time: 5:30 to 6:30 p.m. "Drop in to Chat"
6:30 to 7:30 p.m. Presentation/Discussion
Place: Haynes Hall (Travelling east on Highway 11, turn north (left) on Range Road 244 for 3.3 km to Township Road 390. Cross over 390 and take first left into parking lot of Haynes Hall.)

Refreshments will be served

Agenda:

- Get business and facility operations updates
- Review 15th Annual Environment Report to our community
- Discuss any topic of interest
- Provide your input and suggestions

We hope to see you there!



Visitors to NOVA Chemicals Community Nature Trail tell us:

Among the bird sightings are Great Blue Heron, Cormorant, Pelican, American Bittern, geese and goslings, cranes, owls, hawks, and numerous song birds.

SiteLine is published by NOVA Chemicals Corporation

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For more information, please see these websites:

- www.novachemicals.com | www.novachemicals.com/Joffre
- Chemistry Industry Association of Canada: www.canadianchemistry.ca
- American Chemistry Council: www.americanchemistry.com

