

### Special Edition: Annual Environment Review

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We are proud of our start in Alberta. Four decades ago in 1979, our first ethylene plant at the Joffre Site was commissioned and on August 4 that year the first molecule of ethylene was delivered through the pipeline to our customers.



# **New Joffre Site Leader, Mark Hodson excited to carry on the site's traditions**



It's exciting to be back home in Alberta after a few years abroad! My whole family and I are avid downhill skiers and we are looking forward to enjoying the many options available within easy access to Central Alberta.

I'm equally excited to be starting my role as site leader just as the Joffre Site celebrates its 40th milestone anniversary. I am happy to introduce myself in this publication for the surrounding neighbours and Central Alberta community. After graduating from the University of Alberta with an electrical engineering focus, a 15-year stint in the Canadian Oil Sands (Suncor Energy) provided me valuable experience in the areas of maintenance and facility turnarounds. I'm joining the Joffre Site and Central Alberta community from Shell International Exploration and Production, based in the Netherlands, where I was Global Discipline Head for Maintenance, Reliability and Turnarounds.

On a more personal note, I believe in a "three-pillar" lifestyle...family/friends, work, and community/social responsibility. This philosophy, coupled with my previous community leadership like engagement with CAREERS: The Next Generation, and having a chance to serve in the rebuild of the Fort MacMurray community post the 2016 wildfire will be an asset and help me as I get grounded here in the Central Alberta community. I am looking forward to getting engaged and learning more about this region's challenges and opportunities.

NOVA Chemicals' recently published 2018 Sustainability Report outlines the long-term vision for sustainability, our approach to engaging in global challenges and commitment to responsible business practices. I understand this community has experienced four decades of collaboration and partnership, as well as a strong tradition of environmental leadership from the Joffre Site. I'm committed to ensuring the established relationships throughout the community will continue to strengthen as we collaborate on important local matters. I believe my keen awareness, knowledge of and commitment to sustainability issues and community engagement will help us support that tradition.

As part of my onboarding I was pleased to hear from past leadership who have appreciated the community's engagement, patience and ongoing input into site operations and growth, including the changes and potential impacts that come along with it. You have my assurance the site will continue to manage our business reflecting on our long-standing commitment to sustainability, Responsible Care® and taking care in the community.

I look forward to assuming the key role as your community liaison for our leadership team and getting to know and work collaboratively with this community who have shaped the site's development and its daily operations. While I missed the Joffre Site August 15 Community Awareness Emergency Response Preparedness BBQ, I enjoyed meeting our Joffre Community Advisory Panel members on September 4 and look forward to further introducing myself at the October 9 Open House.

A. Hoel -

Mark Hodson, Joffre Site Leader

# **About our environment report and our approach to Responsible Care**

We are committed to minimizing our impact on the environment because it is the right thing to do and is key to the sustainability of our business

As we provide you this 18th annual report on the Joffre Site's environmental performance, we are also pleased to introduce NOVA Chemicals' enhanced long-term sustainability commitments, furthering our mission to be the leader in innovation that enables our customers to deliver plastic products that make everyday life healthier, easier and safer.

At the Joffre Site 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.

As a company we recently announced a long-term vision for sustainability with six strategic aspirational commitments (outlined in the chart). Our recently released 2018 Sustainability Report includes company-wide performance and offers expanded information on our sustainability commitments, programs and activities. As a founding member of Responsible Care in 1985, we have a long-standing commitment to sustainability and looking forward we believe that companies like ours are a positive catalyst for change as part of a global community.

Sustainability has become an important element of how all employees carry out their roles in the company. It is a specific focus of many functions, including Environment; Human Resources; Health and Safety; Product Stewardship; and Community Relations among others.

Meeting our commitments to Sustainability and Responsible Care go hand-in-hand with continuing to engage with our community and stakeholders and to taking care in the community. In this our site's 40th year we welcome your input on our site and company performance and our aspirational commitments.

<b>Taking</b>	Care

Our Sustainability Strategy		
Focus Area	Our Aspiration	
A Plastic Circular Economy	We recognize the value in post-use plastics and work to extend the lifecycle of plastics to reach established plastics industry goals to recycle or recover 100 percent of plastic packaging by 2040. Working together with a wide variety of stakeholders, we strive to create a world free of plastic pollution.	
Climate Care	NOVA Chemicals is committed to responsibly managing our greenhouse gas emissions and promoting and maintaining sustainability throughout our operational facilities.	
Sustainability Citizenship	As a responsible global citizen, NOVA Chemicals will collaborate and provide leadership to select challenges and opportunities that promote natural resource conservation and in particular ocean health.	
Sustainability Collaborator	We are actively pursuing collaboration partners to develop a portfolio of new and emerging sustainability technologies and innovations to more quickly and effectively achieve our sustainability goals.	
Sustainability In Operations	We are committed to promoting and maintaining sustainability in operations. We will proactively and responsibly manage the water, land, air and biodiversity impacted by our operational facilities.	
Sustainability Design & Integration	Sustainability will be implemented through organizational design and leadership, strategy, management systems and business processes. All employees will be engaged to help drive sustainability performance and engage with our various stakeholders.	

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.

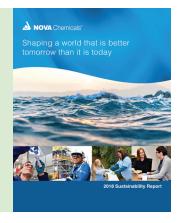
### Now available:

### **NOVA Chemicals' 2018 Sustainability Report**

Our 2018 report is our way of sharing our progress over the past year, our aspirations for the future, and an opportunity to reflect on the challenges that we see. It provides information on the topics that are most relevant to our stakeholders and that can impact the success of our business.

As global citizens, we also want to direct our efforts towards solutions for global challenges. After careful consideration and analysis, we have prioritized three global challenges: plastics circular economy, plastics in the ocean and climate change.

We invite you to review this year's report at www.novachemicals.com.



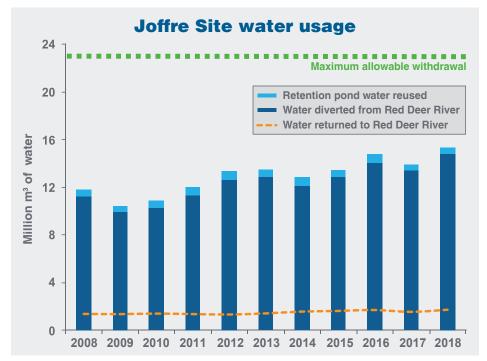
#### **Monitoring our impact on water resources**

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 2018, we withdrew 14.8 million m<sup>3</sup> or 65% of our allotment from the river. We also collected and used 0.45 million m<sup>3</sup> from surface runoff

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 our water use at the Joffre Site. Generally, the greater the production rate, the greater our water use. Water use also fluctuates with other site activities such as turnarounds and weather conditions.



In 2013, we announced an environmental legacy project to mark a significant growth milestone — NOVA Chemicals' Polyethylene 1 Expansion Project at the Joffre Site. The NOVA Chemicals Community Nature Trail was officially opened in 2016 and is now being enjoyed by the community and our employees.

To commemorate our site's 40th anniversary, we are naturalizing the pond area of the trail. This includes the addition of shrubs and trees native to the area for people's enjoyment and another way to connect with nature and learn about local wildlife and plants.



Interpretive signage will be included as part of the pond area improvements.

# **Completion of Phase 1 of naturalization of pond area**



Phase 1 which included the planting of shrubs and trees at the pond area of the NOVA Chemicals Community Nature Trail is now complete.

### **Regulatory Update**

Early in 2018 we submitted applications for Renewal of the site's 10-year Operating and Waterworks System Approvals. This Spring we received a one-year extension of both applications. Application extensions are not unusual when Alberta Environment (AEP) is dealing with a backlog of applications. We have not received any concerns or items for clarification from AEP.

# **Ensuring air emissions meet Alberta Ambient Air 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 objectives.



Ambient ethylene (1-hour maximum) concentrations are well below the AEP Hourly Average Objective of 1,050 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. The upwards trend seen in 2017 and early 2018 has been corrected through our Leak Detection and Repair Program.



Concentrations of oxides of nitrogen ( $NO_x$ ), specifically  $NO_{2'}$  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. The Ethylene 2 (E2) Furnace Refurbishment Project has reduced emissions as a result of furnace design improvements including new burners.

Our  $NO_\chi$  Emissions Reduction Steering Team determines strategies for Joffre Site  $NO_\chi$  emissions reductions activities. The team includes site leaders, technical experts and Responsible Care environmental specialists. Some of the focus areas include tracking  $NO_\chi$  emissions performance, reviewing impacts and opportunities of site projects, and interfacing with regional groups such as the Parkland Airshed Management Zone (PAMZ) and the Red Deer Air Quality Advisory Committee.

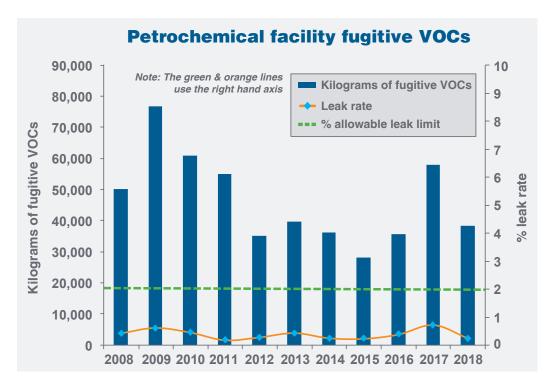
# Reaping benefits from E2 Refurbishment Project

Phase two began in late 2018 and the first of four furnaces was completed mid-year, 2019. The refurbishment of the three remaining furnaces is scheduled for completion in Q4 2020 with a total capital investment of \$270 million.

The E2 Furnace Refurbishment Project which began in 2014 includes upgrading and modernizing nine of the 11 furnaces. Phase one of this multi-year project was completed in Q2 2018 and included five furnaces with a capital investment of \$350 million. Between 250 – 300 trade workers are on site as the \$620-million project continues.



The project is utilizing the best available technology low nitrogen oxide burners. Phase One demonstrated a reduction in  $NO_{\chi}$  (due to design improvements) and reduced GHG emissions due to convection section refurbishment.



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.

#### Noise management update

Monitoring, modeling and mitigation are key components of our ongoing noise management strategy

Noise management is important to the community and has long been a key consideration at the Joffre Site. We have been conducting community noise surveys since 1998 to measure our performance during normal operations. Our ongoing focus is to mitigate operational noise impact including rail operations on the community and to reduce the number and impact of site event-based noise situations.

Data from our 2018 community noise monitoring indicate two of the five residences monitored were above the target (based on a historical Alberta Energy Regulator Directive) sound levels for the night-time multi-day isolated target. Subsequently a noise control study was updated to revisit potential noise control measures for the site. The reassessment should help identify new practical, costeffective noise control options to mitigate industrial noise from the site at residences in the surrounding community.



We have noise monitoring in each direction: north, south, east and west.

The North Rail Noise Abatement

Strategy 2018 performance results indicate that sound levels remain below the Alberta Energy Regulator Noise Directive. No formal complaints were received regarding rail activities in the north yards, however, we did exceed our curfew target. After investigation, the Rail Operations Curfew Guideline was refreshed with clear reporting expectations and accountabilities. This has significantly improved our performance in this important noise management area. Rail Operations continue to engage with the rail service provider to increase rail delivery reliability as this is an important factor in meeting our commitments.



### **GHG** compliance

In 2018, Alberta made the transition to an Output-Based Allocation (OBA) approach for large industrial emitters. The new regulation moved away from a facility baseline intensity-based calculation and instead focused on emissions related to each product produced. The provincial government also set limits on the quantity of offsets a facility can use to meet its compliance obligation (40%). Federal and Provincial governments are continuing to change regulations related to GHG emissions and further changes are expected in 2020.

Five products are produced at the Joffre Site that have emission targets; high value chemicals (includes ethylene and co-products), polyethylene, hydrogen, electricity and industrial heat. The Joffre Site is able to exceed the "best in class" emission targets for some products and still has opportunity to improve on other products. In 2018, NOVA Chemicals was not able to achieve the emission targets under the new GHG regulation for all products.

When facilities are not able to achieve the emission targets, GHG offset markets, as well as technology funds that contribute to research and development opportunities, are critical tools used to meet compliance. The offsets 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. For 2018 compliance, the maximum percent (40) of offset credits was used to meet the obligations for the site.

We are committed to continuously improving our manufacturing, energy and fuel efficiency to reduce the quantity of GHGs per tonne of product produced.

# Manufacturing West Taking Care In Action

#### **2019 Team Activities**

The Joffre Site Taking Care In Action (TCIA) team has been busy organizing many community events with positive environmental impacts. The infographic below gives an overview of activities so far and those still to come.



#### **Spring Roadway Clean-Ups**

28 KM OF DITCHES CLEANED on HWY #11, #815 & Freedom Rd SUPPORTED 6 YOUTH GROUPS Raised \$1,000 each



### **Red Deer River Clean-Up**

19 EMPLOYEES & FAMILIES joined 70+community volunteers to pick up 45 BAGS of garbage

SPONSOR OF PRIZES AND FREE BBQ FOR ALL PARTICIPANTS

22 years of participation

Supports Red

Forestry Project

Deer Urban

"Thank you so much for your continuing support of our Spring and Fall river clean-ups. Your presence and contributions make the events." ~Tanya Wells, KWNC



### **Tree Planting**

>1,100 SEEDLINGS planted by ~20 EMPLOYEES/FAMILIES

>14.000 SEEDLINGS PLANTED IN 22 YEARS

**TCIA** — A group of employees who are passionate about sustainability and act on initiatives that reduce environmental impact and/or raise awareness to influence positive personal behaviours.



#### **Carpool Initiative**

**39%** of **E2 TURNAROUND** contractors participated\*

\*doesn't include bused workers

LAUNCHING NEW APP FOR EMPLOYEE USE

#### **Recent Fall Activities:**

(see articles below for more info)

RiverWatch educational field day on Red Deer River Great Canadian ShoreLine Clean-Up

#### **Still to Come:**

**Pilot Recycling Program** 

**Adopt-A-Highway (35 KM)** Existing 28 KM of ditches plus the addition of Twp 39-0



### Supporting youth water education

In celebration of our partnership with RiverWatch since 2010, this August Joffre Site employees and their families were treated to a free field day on the Red Deer River on the eco-float. The eco-float was an enjoyable learning experience for everyone.

RiverWatch is a provincial environmental / science educational program offering local high school students an opportunity for a field day on Red Deer River testing and monitoring. Our sponsorship helps subsidize student fees and grow program participation.

# **Great Canadian Shoreline Clean-up**

In the Spring and Fall annually, our volunteers join hundreds of community participants to help clean up the banks of the Red Deer River. The Fall event — the Great Canadian Shoreline Clean-up (GCSC) is a national initiative engaging many communities in doing their part to clean up the river banks and pathways across Canada. So far in 2019, GCSC volunteers have coordinated 1,746 clean-ups and collected 92,671 kg of litter on 3.123 km of Canadian shoreline.



On September 8, 43 employees and their families joined other Central Alberta volunteers and netted 37 bags of garbage, 9 bags of recyclables, over 500 cigarette butts and 40 syringes. A few unusual items were found like a board game, a lamp, iPhone, mini speaker and an air mattress.

Approximately 50 participants helped themselves to a BBQ lunch we sponsored.

# **Riparian Health Assessment** at Community Nature Trail

The Alberta Riparian Management Society (Cows & Fish) conducted a Riparian Health Assessment workshop at Jones Creek located on the NOVA Chemicals Community Nature Trail (situated just north of Joffre Site on Twp 39-0). The workshop consisted of learning how to identify a variety of common riparian plant species and how to complete a riparian health assessment for the area surrounding Jones Creek.

These assessments are based on observations of primarily vegetation health, but also consider natural and human disturbance in the area. They are used to make management recommendations to improve vegetation health and functional uses of riparian areas for landowners.

Riparian zones are ecologically important and provide a variety of important functions such as erosion reduction, water storage and water filtration. They're also important for biodiversity by providing habitat for fish, wildlife, invertebrates and plants.



A workshop attendee and Tonya Lwiwski (of the Alberta Riparian Management Society/ Cows & Fish) observe and discuss the key characteristics used to identify native riparian plants during the Riparian Health Assessment Workshop.

### **Lacombe County officials annual Joffre Site visit**

We were pleased to host elected officials and staff from Lacombe County at the Joffre Site to meet with our leaders and staff. These annual visits give us the opportunity to discuss areas of interest related to our site operations and plans, as well as collect input or concerns from the community.

This year we were excited to visit the NOVA Chemicals Community Nature Trail and provide details about the 2019 enhancements to commemorate the site's 40th anniversary.





On the occasion of our 40th anniversary, here are a few Joffre Site milestones from the 1990s:

- **1990** Introduction of hexene linear low density polyethylene (LLDPE) resins.
- **1991** AGEC was amalgamated with Novacor Chemicals Ltd. Started up second polyethylene pelletizer unit.
- **1992** PE1 increased nameplate capacity to one billion pounds per year.
- **1993** Debottlenecked Ethylene 1 (E1) to increase capacity to more than 1.5 billion pounds / year, to meet or exceed new nameplate.
- **1994** PE1 increased nameplate capacity to 1.2 billion pounds / year.
- Novacor, as a member of the Canadian Chemical Producers' Association (CCPA now the Chemistry Industry Association of Canada) and a Responsible Care company, completed a successful verification of the six Codes of Practice, allowing us to remain an industry leader in safety, health, environment and risk management.
- 1996 Novacor changed name to NOVA Chemicals.
  Announced expansion of the site including a third ethylene plant (E3) and a second polyethylene plant (PE2).
- 1997 Construction of Joffre 2000 began with E3 in midyear. Investigated feasibility and economics of a cogeneration facility (COGEN) to supply the site's electrical and steam / heat needs. Developed commercial agreements with BP Amoco for a new Linear Alpha Olefins (LAO) plant for the Joffre Site. NOVA Chemicals is a major supplier and customer.
- 1998 Following the July 2 merger with TransCanada Pipelines Limited and the spin-off of NOVA Chemicals, NOVA Chemicals Corporation became a focused commodity chemicals company.

  COGEN (a joint venture of ATCO Power, EPCOR and NOVA Chemicals) construction commenced.
- years of success at the Joffre
  Site and surpasses the 50%
  complete milestone on Joffre
  2000 projects. First company in
  Canada to receive CCPA Round
  2 Verification. BP's LAO plant
  (now INEOS) construction commences.









#### **Record attendance at** annual BBQ

Approximately 85 guests (adults and children) from our five km zone joined us for our annual Emergency Preparedness Awareness BBQ on August 15. Attendees took part in tours of our emergency equipment, visited information booths and validated emergency response contact information. Kids enjoyed Bronto lift rides and genScience experiments including "magic milk", slime and a mechanical distillation demonstration.



### INEOS

#### **Community Open House**

Date: Wednesday, October 9, 2019 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 18th Annual Environment Report to our community
  - Learn about our sustainability journey
  - Provide your input and suggestions
  - Fun science experiments for kids

We hope to see you there!



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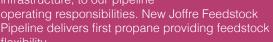
Cogeneration facility synchronized to Provincial power grid and official opening. E3 start of initial

**2001** PE2 start-up.

Altagas Liquids Inc. / Taylor operations start-up the 2002 Joffre Ethane Extraction Plant (JEEP) increasing Joffre Site's ethane supply.

**2004** Site 25th anniversary celebrations.

2005 Added the 1,300-km Alberta Ethane Gathering System, a key component of Alberta's energy infrastructure, to our pipeline



2006 Delivery of carbon dioxide to Glencoe Resources for use in enhanced oil recovery. A \$1-million investment in Red Deer College expansion helps address demand for skilled trades.

2007 E2 successfully extends major turnaround (maintenance and renewal) to a five-year run cycle.

2008 Commissioned a new packaging line with the capacity to process 2,000 bags per hour of polyethylene pellets.

2009 NOVA Chemicals now 100% owned by the International Petroleum Investment Company (IPIC). Site celebrates 30th anniversarv.





#### 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

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