



Agrium®



# Carseland

Nitrogen Operations



*Thanks in part to the dedication of our employees worldwide, Agrium continues to nourish our growing world as one of the leading providers of inputs for plant growth; in turn, creating value for each of our stakeholders.*



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## Agrium Wholesale

Agrium Wholesale produces, markets and distributes nitrogen, phosphate, potash and sulphate-based products for agricultural and industrial customers around the world. We have production and distribution facilities in North America, South America and Egypt, with additional distribution in Europe.

We have a production capacity of approximately 10 million product tonnes of the major crop nutrients: 6 million tonnes of nitrogen, 3 million tonnes of potash, and 1 million tonnes of phosphate. We also produce approximately 0.3 million tonnes of ammonium sulphate. These crop nutrients are produced at 12 major production facilities, 2 mines and a number of smaller regional upgrade facilities.

### Manufacturing Excellence

Agrium Manufacturing is committed to operating at a standard of excellence, enabling us to produce quality nutrients for Agrium to help feed the world. Our mission: "Engaged employees driving safe, reliable production at a competitive cost."

In order to safely, effectively and efficiently produce quality nutrients, there are six key focus areas that drive how we operate and achieve our goals – Environment, Health, Safety and Security (EHS&S), Process Safety, Reliability, People, Projects and Cost. By excelling in these six areas, we are operating safely, reliably, and competitively, and with that, production comes naturally. We are continually looking for ways to optimize our production to ensure sales and marketing can get the right amount of nutrients where it needs to go, when it needs to get there.

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## Fertilizer Products

Carseland Nitrogen Operations produce 523,000 tonnes of ammonia and 717,000 tonnes of urea annually. All but 125,000 tonnes of the ammonia is used to manufacture urea. Included in 717,000 tonnes of urea production is 235,000 tonnes of controlled release urea ESN® and Duration®. These products are sold mainly in Western Canada and the United States.

Farmers inject gaseous ammonia into the soil as a fertilizer. Ammonia is a nutrient supplement for most crops and is used for industrial purposes including promoting bacterial growth in waste treatment plants and as an efficient refrigerant. Although primarily used as a fertilizer, urea can also be used as a raw material in the production of some glues and resins, as a protein supplement in animal food, and to melt ice on airport runways.

Agrium also produces controlled release urea products at the Carseland Site, including 35,000 tonnes/year of Duration® and 200,000 tonnes/year of ESN®. These two products have a flexible, micro-thin polymer coating surrounding the nitrogen granule. This technology provides for a better matching of nutrient availability in the soil with plant nutrient requirements.

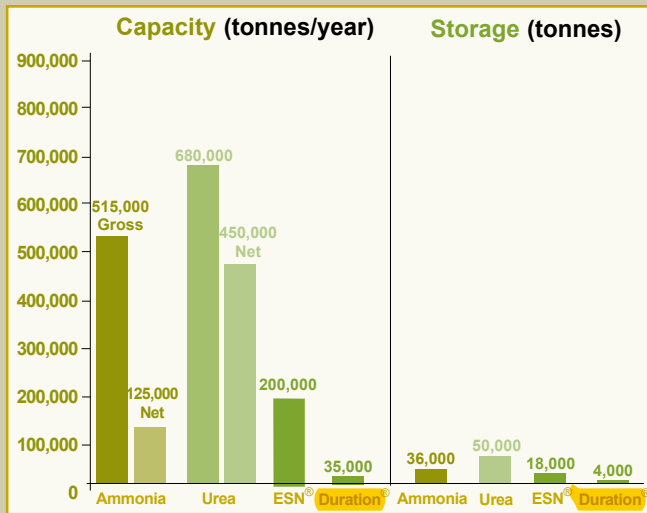
Innovation and modern technology have been implemented in the development of the Carseland plant. The process is computer controlled to maximize production, minimize energy use, and to improve operating reliability. Carseland was the first fertilizer production facility to have zero water discharge and its urea plant was the first in the world to use all centrifugal pumps and compressors in the high pressure section of the plant.

### Carseland Nitrogen Operations



The Carseland Plant is located on 650 hectares about 50 kilometres east of Calgary. The plant site occupies less than 1/5 of the land area, the remainder being used for farmland. The agricultural productivity of this land is enhanced by Agrium through an irrigation and fertilization program. The plant employs approximately 165 people.

## Production and Storage Capacities



## Production Processes

### AMMONIA — $\text{NH}_3$

Natural gas reacts with steam over a catalyst to form hydrogen and carbon dioxide. Hydrogen and nitrogen from the air react over another catalyst at high temperature and pressure to produce gaseous ammonia. The gaseous ammonia is then condensed, cooled, and stored as a liquid at atmospheric pressure.

Liquid anhydrous ammonia is colorless and characterized by its pungent odor. At atmospheric pressure it is a liquid at  $-33^\circ\text{C}$ . Ammonia contains 82% nitrogen.

### UREA — $\text{CO}(\text{NH}_2)_2$

Waste carbon dioxide from the ammonia process is reacted with ammonia at high pressure and temperatures to produce urea in a water solution. Process evaporators remove the water and the remaining urea is granulated in a process developed by Agrium in the 1960's. Free flowing white granules are made in a variety of sizes for different uses. Urea contains 46% nitrogen.

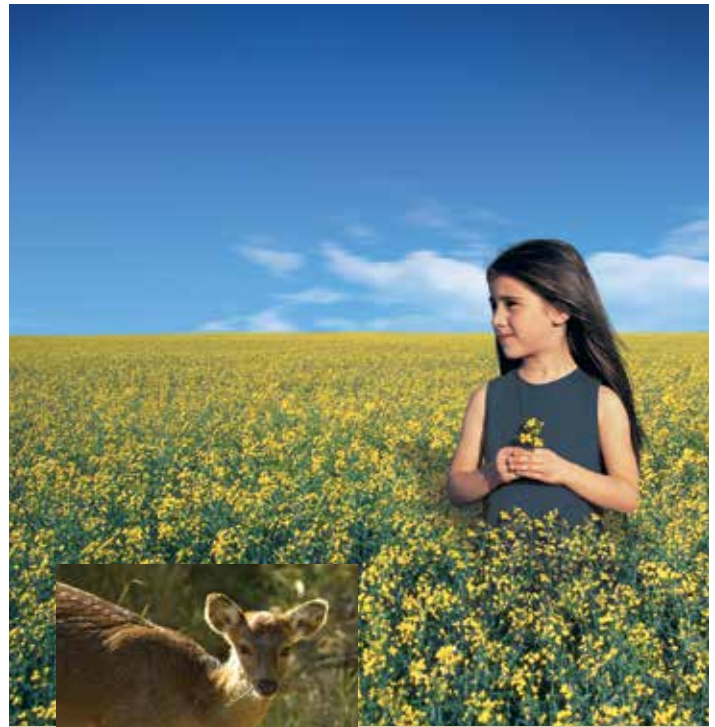
### CONTROLLED-RELEASE UREA (ESN® & Duration®)

Granulated urea is screened, heated and then coated in a coating drum to apply the patent protected flexible micro-thin polymer layer. The product is cooled and then rescreened before it goes to bulk storage for railcar and truck shipment or to be bagged for smaller, custom shipments.

## Storage and Distribution

The plant has a dry storage building which houses both urea and ESN®, with a combined capacity of 72,000 tonnes. The 400 meter long facility uses a high capacity reclaim system to recover urea and/or ESN® from anywhere in the building. Agrium rescreens the products before loading into trucks or rail cars.

Carseland ships 20,000 orders each year by truck and in unit trains of up to 80 rail cars.



## Environmental Stewardship

The Carseland Plant uses modern pollution control methods. Plant changes have enabled Carseland to meet Agrium's high environmental standards and to comply with government regulations. The plant is equipped with scrubbers, desorbers, strippers, and a flare system to suppress or eliminate emissions of atmospheric pollutants.

The plant does not discharge waste water. Industrial process water is recycled when possible. Carseland stores blowdown water from the cooling system in a large pond and irrigates Agrium farmland around the plant with this water. Surface water drained from the plant site is collected in a storm water pond and later used for irrigation. Water not suitable for irrigation is stored in another pond and evaporated by sunlight, waste heat from the plant and a system of sprays. There is no liquid effluent discharged from the plant.

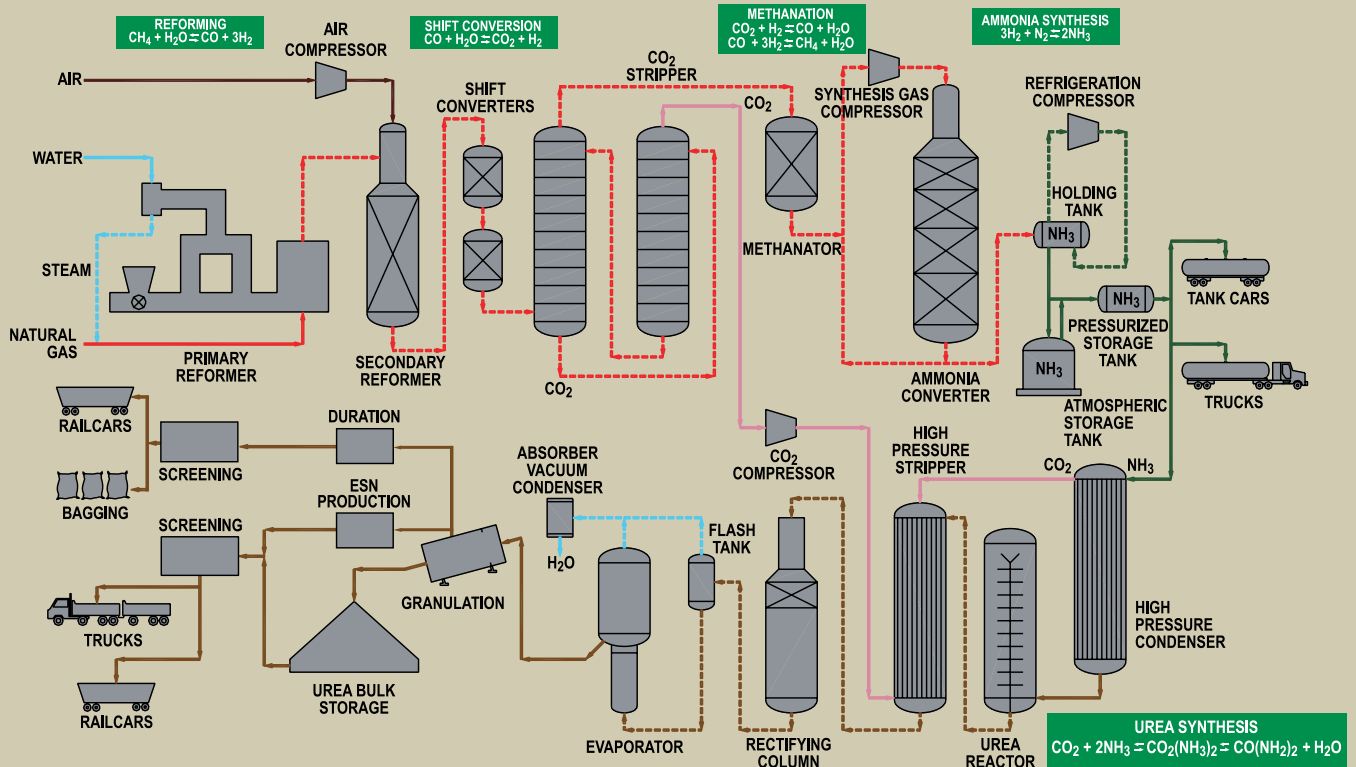
The groundwater and soil throughout the plant and the surrounding farm land is regularly monitored.

## Safety

Safety isn't just a priority at Agrium, it is a core value. We care about the personal health and safety of our employees and our customers and our impact on the environment. Our commitment to Environment, Health, Safety and Security is in everything that we do and is a fundamental driver in helping us achieve our mission to help *Feed the World*.



# Our Production Process



## Impact on Local Economy

The Carseland Nitrogen Operations pays \$2.2 million in taxes and approximately 39% of their 165 employees live in the immediate surrounding communities. The annual payroll for the site is approximately \$19 million plus approximately \$3.5 million per year in payroll for contractors. Annually, they spend \$250 million in Alberta on raw materials, goods & services, and equipment.



Carseland  
 Nitrogen Operations

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