

Backgrounder: Cyclotron Comes to the U of S

The construction of the Saskatchewan Cyclotron Facility at the University of Saskatchewan achieved a significant milestone with the delivery on April 22, 2014 of the facility's heart: a TR-24 cyclotron manufactured by Advanced Cyclotron Systems Inc. of Burnaby, B.C.

The cyclotron is the first in Saskatchewan and only the third of this model in Canada. It is an extremely versatile, high-energy machine capable of producing a wide variety of radioisotopes for use in nuclear medicine and new imaging research in plants, animals and humans. When fully operational in 2015, one of the first radioisotopes produced will be an imaging agent for PET-CT imaging at Saskatoon's Royal University Hospital for the diagnosis of cancer and other diseases.



The Project

Funding for the cyclotron and PET-CT scanner was announced March 4, 2011 by Western Economic Diversification Canada and the Province of Saskatchewan. Construction of the \$25-million project began in June 2013, with renovation of the former Animal Resource Centre on the U of S campus. This included construction of an addition to the existing building to house the state-of-the-art cyclotron, as well as specialized laboratories to handle and process radioisotopes for nuclear medicine and research. Construction is expected to be completed at the end of September 2014, with the facility becoming operational in October 2015.



*The Cyclotron Facility on the U of S campus, April 7, 2014 (top). The TR-24 cyclotron installed at the Cross Cancer Institute in Edmonton (bottom), the same model as that being installed at the U of S.
Image credits: Fedoruk Centre; Advanced Cyclotron Systems Inc.*

The Sylvia Fedoruk Canadian Centre for Nuclear Innovation will operate the facility as a tool for research, innovation and training, as well as producing medical isotopes for clinical use in the PET-CT scanner at the Royal University Hospital.

Cyclotron Installation

The cyclotron was manufactured by Advanced Cyclotron Systems Inc. and shipped from Burnaby to Saskatoon. The cyclotron, a Y-shaped beamline, and support systems will be moved by crane into a specially built concrete vault that has walls 2.5 metres thick. When fully assembled, the cyclotron will weigh 25 tonnes (55,000 pounds). The single largest piece being moved into place is the cyclotron's

magnet, which is the size of a small car. Access to the space is through a portal in the vault's roof, which is closed with three concrete plugs that have a combined weight of 64,400 kg (142,000 pounds).

See *Facts and Figures* for more information or visit <http://www.fedorukcentre.ca/facilities/cyclotron-facility.php>.

Facts and Figures

The Cyclotron	A particle accelerator that produces radioisotopes by bombarding target materials with high-energy protons.
Cyclotron type	Advanced Cyclotron Systems Inc. TR-24 cyclotron
Mass when fully assembled	25 tonnes
Cyclotron magnet dimensions	15 cubic metres (3x2.3x2.2 m)
Beamline	One Y-shaped beamline, accommodating two target end stations for producing radioisotopes
The Cyclotron Vault	The vault is specially designed to ensure that no radiation produced by the cyclotron can exit into the rest of the facility or the environment.
<ul style="list-style-type: none"> • Mass of vault 	2.8 million kg
<ul style="list-style-type: none"> • Roof and wall thickness 	2.5 m
<ul style="list-style-type: none"> • Floor slab thickness 	1 m
<ul style="list-style-type: none"> • Mass of roof slab 	1.4 million kg (3 million pounds)
<ul style="list-style-type: none"> • Number of concrete trucks needed to pour roof 	82, delivering 505 cubic metres of special mix concrete

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