



ASX: ADV

**Capital structure:**

Ordinary shares  
433.5m

Options (Unlisted)  
68.5m (various)

**Shareholders:**

Institutional 13%  
Board/Mgt 19%  
Retail 68%

Top 20: 56%

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ASX/Media Announcement

10 August 2015

## GRAPHENE RESEARCH AND COLLABORATION PROJECT WITH LEADING CANADIAN UNIVERSITY

*Ardiden enters into research partnership to focus on graphene extraction and production methods for jumbo flake graphite*

**Key Points:**

- Ardiden has entered into a graphene research partnership contract with University of Waterloo in Ontario (near Toronto), which was voted the most Innovative University in Canada in 2014.
- Beneficiated graphite from Ardiden's Manitouwadge Jumbo Flake Graphite Project in Ontario has been provided to the research team, which will initially focus on the potential extraction of ultra-large graphene. This research team has extensive academic and commercial experience with graphene extraction and applications.
- The further development of Ardiden's graphene strategy as part of its product mix follows recent successful testwork to extract and characterise its graphene and recent purification work where a simple caustic bake process produced graphite with a >99.95% purity level.
- Preliminary discussions and costings have also been undertaken to determine the potential economics of setting up a graphene production laboratory in Ontario. This would allow Ardiden to leverage off nearby university expertise and facilities, potentially access generous local R&D and innovation funding opportunities, and better target the North American market.

Ardiden Limited (ASX: ADV) is pleased to advise that it entered into a research partnership with the University of Waterloo, one of Canada's top research universities, to focus on extraction techniques for graphite sourced from its 100%-owned **Manitouwadge Jumbo Flake Graphite Project** in Ontario, Canada.

One of the key issues at present with graphene production is extracting it at a sufficient scale in order to be utilized in industrial applications. The successful extraction of graphene from naturally occurring graphite with larger scale (e.g. jumbo flakes >300 micron such as that found at Manitouwadge) has the potential to target a broader suite of potential markets compared to smaller scale (e.g. 1 micron) graphene.

The research contract is with University of Waterloo which has been voted the most innovative university in Canada for the 23<sup>rd</sup> consecutive year, according to rankings released by Maclean's magazine. In addition, Waterloo moved up in the 2015 national reputational rankings to become the **Best Overall** university in Canada as well as the one most likely to produce **Leaders of Tomorrow**.

The team to be involved in the Ardiden research project has extensive academic and commercial graphene experience.

The development of graphene as a part of the potential product mix for the Manitouwadge Project follows successful initial graphene characterization and testwork completed in May 2015 (see ASX Announcement –13 May 2015).

The quality of the graphene produced by the most promising methods was described as “outstanding” and comparable with synthetic graphene routes. The most promising fabrication procedures included the thermal method and the electrochemical method, both of which produced high-quality graphene.

These extraction methods are described as rapid and scalable without the need for toxic chemicals, although further testing is required to understand these findings further. The graphite tested showed considerable electrical conductivity, which is important for electrochemical processing. The graphene produced also showed low structural defects, which is important for use in high-quality applications such as super-capacitors and batteries.

Graphene sells for a substantial premium to conventional graphite because of its exceptional properties as the lightest and strongest known material on earth, as well as its ability to conduct heat and electricity better than any other known substance. Graphene has a growing number of high-technology uses and applications worldwide including super-capacitors, conductive inks, paints, plastics, 3D printing inks, alloys, energy storage and concrete/civil materials.

The development of graphene research and the graphene market is being undertaken globally at a rapid pace with substantial investments being made in both commercializing the production of graphene and also the potential applications of graphene.

The lightweight nature, strength and conductivity properties of graphene lend it to being used in a number of multi-billion dollar end markets including composites, automotives and electronics.

Board of Directors  
Ardiden Limited

**ENDS**

### **About the Manitouwadge Project**

Located in an established mining province in Ontario, Canada, the Manitouwadge Jumbo Flake Graphite Project has been confirmed as an attractive near-term development opportunity following a highly successful recent diamond drilling program (see Ardiden ASX Announcement – 14 April 2015, including JORC 2012 Table 1).

Metallurgical testwork has indicated that up to 80% of the graphite is high value jumbo or large flake graphite. Testwork has also indicated that simple, low cost gravity and flotation beneficiation techniques can result in graphite purity levels of up to 95.6% for jumbo flake and 94% for large flake. Testing using the proven caustic bake process was able to produce ultra-high purity (>99.95%) graphite.

### **Forward-Looking Statement**

This announcement may contain some references to forecasts, estimates, assumptions and other forward-looking statements. Although the company believes that its expectations, estimates and forecast outcomes are based on reasonable assumptions, it can give no assurance that they will be achieved. They may be affected by a variety of variables and changes in underlying assumptions that are subject to risk factors associated with the nature of the business, which could cause actual results to differ materially from those expressed herein. All references to dollars (\$) and cents in this presentation are to Australian currency, unless otherwise stated. Investors should make and rely upon their own enquires and assessments before deciding to acquire or deal in the Company's securities.