

# Cardero's Sheini Ironstone Produces Pig Iron Grading 93.2% from Highly Metallized DRI Product

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VANCOUVER, BRITISH COLUMBIA--(Marketwired - Sep 17, 2013) - **Cardero Resource Corp.** ("Cardero" or the "Company") (TSX:CDU)(NYSE MKT:CDY)(FRANKFURT:CR5) is pleased to announce that metallurgical test work has progressed to successful production of pig iron. Test work at Cardero Materials Testing Laboratory ("CMTL"), a wholly owned subsidiary of the Company, previously demonstrated that a highly metallized Direct Reduced Iron ("DRI") product could be produced from Sheini Ironstone. Recent work has utilized highly metallized DRI product (+95% metallic iron) to produce a pig iron grading 93.2% iron. The results from the described metallurgical tests strongly suggest that a finely disseminated iron resource, such as Sheini Ironstone, can be successfully utilized as feedstock to a process whereby a value added iron product can be produced at low cost using inexpensive raw materials.

## Successful Pig Iron Production

Sheini DRI produced by CMTL was used as feed material to conduct a smelting test in the electric arc furnace ("EAF"). Sheini DRI was briquetted with thermal coal (high silica ash containing), and a small quantity of binder for the smelting demonstration. Hot metal was generated from cold Sheini DRI containing briquettes at 1475° Celsius with minimal production of slag. The EAF was tapped after 85 minutes and the hot metal poured into a variety of casts and buttons (Plate 1). The lab EAF trial produced 12.70 kilograms of pig iron from 16.2 kilograms of Sheini DRI, with only 0.88 kilograms of slag generated. A cast was sent to McCreath & Son, Inc. for a certified pig iron analysis.

## Plate 1: Hot metal products after pouring at CMTL.

The results of the certified pig iron analysis are presented in Table 1.

Table 1: Pig iron analysis.

	Sheini Pig Iron
Phosphorus %	0.2
Silicon %	3.89
Manganese %	0.05
Carbon %	2.55
Sulfur %	0.13
Assumed Fe %	93.18
Fe-Unit % Recovery	95.9

A short video of the pig iron production process is available for viewing on the Company website at: [http://www.cardero.com/s/sheini\\_iron.asp](http://www.cardero.com/s/sheini_iron.asp).

## Large-Scale Magnetizing Reduction Roast

Results of bench-scale magnetizing reduction roast were previously released (see NR13-13, May 13, 2013). Larger scale testing of the magnetizing reduction roast process was subsequently undertaken and served several purposes: 1) to demonstrate a commercially viable process that could efficiently roast large volumes of raw Sheini Ironstone; 2) to roast sufficient raw Sheini Ironstone to investigate various beneficiation techniques and develop a processing flow sheet; and 3) to roast, beneficiate, and generate sufficient Sheini DRI product to conduct a bench-scale smelting test.

Large-scale roasting investigations were conducted with a rotary kiln. Testing involved first establishing the

capabilities with regards to the roasting process of the rotary kiln ("Rotary Kiln Tests"), and then conducting focused magnetizing reduction roast tests with the rotary kiln ("Roasting Tests"). The Rotary Kiln Tests helped to establish basic kiln parameters including: raw material feed techniques and rates, positive air flow through the kiln, establishing an inert atmosphere within the kiln, roasting temperature, and residence time of material within the kiln. The Roasting Tests were focused more specifically on the raw-ironstone top-size.

In the large scale tests with the rotary kiln, raw Ironstone was mixed together with the thermal coal reductant and fed into the furnace retort with the expectation that the free material rotating in the kiln pipe would produce maximum reduction benefits.

The roasted products from both Rotary Kiln Tests and Roasting Tests were used to investigate several beneficiation and liberation techniques. Processes investigated included: pre- and post-grind screening, pre- and post-grind Dry Low Intensity Magnetic Separation, a hydro-cyclone, and Wet Low Intensity Magnetic Separation. A commercially viable processing flow sheet was developed from these investigations, which was employed to beneficiate the roasted material generated in large- scale rotary kiln "Production Roasts."

Fifty-eight kilograms of raw Sheini Ironstone were roasted during three Production Roasts. Raw ironstone was prepared for the roasts by crushing to 100% minus 1 mm in a roll crusher, splitting into 58 one-kilogram charges, and then adding appropriate amounts of thermal coal and lime. The rotary kiln roasts were conducted at a temperature of 1150°C over a six day period. After processing, the highly-metallized DRI product (+95% metallic iron) was homogenized and a representative split was collected for certified analysis at several independent laboratories. The results of these analyses are presented in Table 2. The large-scale magnetizing reduction roasts with the rotary kiln ultimately produced a composited DRI sample weighing 21.3 kilograms at approximately 76% iron-grade and approximately 60% iron-unit recovery from 58 kilograms of raw Sheini Ironstone.

## ABOUT THE SHEINI HILLS IRON DEPOSIT

The Sheini Hills iron deposit is located in northeastern Ghana. A maiden Mineral Resource Estimate was completed for the deposit by SRK Consulting (UK) Limited ("SRK") for Cardero, in which SRK reported a total Inferred Mineral Resource of 1.312 billion tonnes with mean grade of 33.8% iron. The resource at Sheini consists of two types of ore: 1. Ironstone (1.045 billion tonnes @ 35.2% iron), and 2. Detrital (266.9 million tonnes @ 28.2% iron). The inferred mineral resource was largely calculated from the 11,400 metre diamond drill core and reverse circulation drilling program completed over a strike length of approximately 9 kilometres.

For details with respect to the work done to date and the assumptions underlying the current resource estimates, see the technical report entitled "Mineral Resource Estimate for the Sheini Hills Iron Project, Ghana, January 2013" dated January 14, 2013 with an effective date of January 7, 2013 and available under the Company's profile at [www.sedar.com](http://www.sedar.com).

*Table 2: Summary of certified assays and titrations performed on representative splits of the composited DRI concentrate produced during large-scale production roasts in the rotary kiln.*

	CC#GHSTO-DRI Composite Certified Lab Results
Fe <sub>total</sub> %	>74.80
Fe <sub>metallic</sub> %	76.19
Fe Recovery %	59.72
Al <sub>2</sub> O <sub>3</sub> %	1.57
C %	0.97
CaO %	1
K <sub>2</sub> O %	0.083
MgO %	0.13
Mn %	0.061
Na <sub>2</sub> O %	0.061
P %	0.151
S %	0.19
SiO <sub>2</sub> %	12.25
TiO <sub>2</sub> %	0.14
V %	0.008

## QUALIFIED PERSON

Mr. Glenn Hoffman, MMSA QP, the President and CEO of Cardero Iron Ore Company Ltd. and a qualified person as defined by National Instrument 43-101, has reviewed the scientific and technical information that forms the basis for this news release. Mr. Hoffman is not independent of the Company as he is an officer of a subsidiary and holds common shares and incentive stock options in Cardero.

The metallurgical test work is designed and directly observed on site by Mr. Hoffman, who is responsible for all metallurgical testing and the quality control/quality assurance.

#### **QA/QC**

The work program at CMTL is supervised by Glenn Hoffman, who is responsible for all aspects of the work, including the quality assurance/quality control program. On-site personnel at the CMTL laboratory perform testing to strict protocol, rigorously collecting and tracking samples which are prepared, security sealed, and shipped to a variety of accredited and ISO certified laboratories for additional sample preparation and analysis. Quality control is assured by the use of international and in-house standards. The specific laboratories used for the analyses reported in this news release are ALS Global in Reno, Nevada, and Andrew S. McCreath & Son, Inc. in Harrisburg, Pennsylvania. ALS's quality system complies with the requirements for the International Standards ISO 9001:2000 and ISO 17025: 1999. Andrew S. McCreath & Son, Inc. is accredited to ISO 17025 by the American Association of Laboratory Accreditation (A2LA) as a commercial chemical laboratory. Total iron was measured by ALS Global through x-ray fluorescence (XRF) analysis. In XRF analysis a material is bombarded with gamma rays causing inner orbital electrons of an atom to be expelled and outer orbital electrons to fill, or fall into the empty spaces. As this happens energy is released and can be measured to determine the elemental make-up of the material. Metallic iron was measured by Andrew S. McCreath & Son, Inc. through metallic iron titration. In a titration a reagent or "titrant" is prepared in solution and reacted with a solution of the "titrand," or analyte in question to determine the concentration of the analyte.

#### **ABOUT CARDERO RESOURCE CORP.**

The common shares of the Company are currently listed on the Toronto Stock Exchange (symbol CDU), the NYSE MKT (symbol CDY) and the Frankfurt Stock Exchange (symbol CR5). For further details on the Company readers are referred to the Company's web site ([www.cardero.com](http://www.cardero.com)), Canadian regulatory filings on SEDAR at [www.sedar.com](http://www.sedar.com) and United States regulatory filings on EDGAR at [www.sec.gov](http://www.sec.gov).

On Behalf of the Board of Directors of **Cardero Resource Corp.**

Henk van Alphen, CEO and President

The Cautionary Statements are available at following address:  
<http://media3.marketwire.com/docs/cardero-cautionary-statements.pdf>

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