

Neves-Corvo

# Neves-Corvo Mine

## Portugal

### Key Facts

- Underground mine
- Copper and zinc
- 2012 estimate 52,500-57,000 tonnes copper and 30,000-65,000 tonnes zinc contained in concentrate
- Cash costs \$1.80 per lb copper
- Ownership 100%

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### Project Description and Location

The Neves-Corvo mine, operated by the local Portuguese company Somincor, is situated approximately 220 km southeast of Lisbon in the Alentejo district of southern Portugal. The mine site lies some 15 km southeast of the town of Castro Verde and exploits five major orebodies from an underground mine. The ore is processed on-site and tailings are disposed of in the Cerro de Lobo impoundment some 3 km from the plant. Concentrates are dispatched by rail and road for onward shipping to customers.

The mining operations are contained within a mining concession contract between the State and Somincor covering 13.5 km<sup>2</sup>, located in the parishes of Santa Bárbara de Padrões and Senhora da Graça de Padrões, counties of Castro Verde and Almodôvar, district of Beja. The concession provides the rights to exploit the Neves-Corvo deposits for copper, zinc, lead, silver, gold, tin and cobalt for an initial period of fifty years (from November 24, 1994) with two further extensions of twenty years each.

This mining concession is in turn surrounded by an exploration concession, signed in 2006, covering an area of 549 km<sup>2</sup>. Somincor also holds one further neighbouring exploration concession with an area of approximately 808 km<sup>2</sup>.

The mine is operated under an Integrated Pollution Prevention and Control Licence (IPPC) granted by the Portuguese Environmental Agency in 2008.

### Accessibility, Climate, Local Resource, Infrastructure and Physiography

Neves-Corvo has good connections to the national road network which links with Faro to the south and Lisbon to the north. The mine has a dedicated rail link into the Portuguese rail network and on to the port of Setúbal.

There are no major centres of population close to the mine, although a number of small villages with populations numbered in the hundreds do lie within the mining concession. Most employees travel to the mine by Company-provided buses or private cars.

The climate of the region is semi-arid with an average July temperature of 23°C (maximum 40°C) and an average minimum temperature in winter of 3.8°C. Rainfall averages 426 mm, falling mainly in the winter months.

The topography around the mine is relatively subdued, comprising low hills with minimal rock outcrop. The mine collar is 210 m above sea level. The area supports low intensity agriculture confined to stock rearing and the production of cork and olives.

Fresh water is supplied to the mine via a 400 mm diameter pipeline from the Santa Clara reservoir, approximately 40 km west of the mine. The mine is connected to the national grid by a single 150 kV, 50 MVA rated, overhead power line 22.5 km long.

The mining concession provides sufficient surface rights to accommodate the existing mine infrastructure and allow for expansion if required.



## Neves-Corvo at-a-Glance

Neves-Corvo Mine	
Location	100 km north of Faro, Portugal, in the western part of the Iberian Pyrite Belt
Ownership	100%
Type of ore body	Volcanogenic massive sulfide (VMS)
Primary metal	Copper
Secondary metal	Zinc
<b>2P Reserves</b>	
Copper-rich ores	27.7 mt @ 3.0% Cu, 0.9% Zn, 0.3% Pb, 44 g/t Ag
Zinc-rich ores	23.1 mt @ 7.3% Zn, 0.4% Cu, 1.7% Pb, 66 g/t Ag
Type of mine	Underground
Mine facilities and method	4.6 mtpa shaft with separate ramp access. Mining based on mechanized stoping using primarily bench & fill and drift & fill methods with sand and paste backfill.
Processing facilities	A copper plant (2.5 mtpa capacity); a zinc plant (1 mtpa capacity); tailings impoundment; and backfill plants
End product	Copper in concentrate (grading approx. 25%); Zinc in concentrate (grading approx. 50%)
Expected mine life	10+ years
Employees	910 full-time employee equivalents
Potential growth	Neves-Corvo is considered to remain under-explored. An initial inferred resource estimate for Semblana deposit is 6.58 mmt @ 3.0% copper +24 g/t silver. Potential for width, strike and depth extensions of this initial resource is considered excellent. A study looking at development of the Lombador zinc/lead/copper deposit as well as the Semblana copper deposit is well advanced.
2012-2014 Targets	
Production Copper	52,500-57,000 tonnes in 2012; 50,000-57,000 tonnes in 2013; 50,000-57,000 tonnes in 2014
Zinc	30,000-40,000 tonnes in 2012; 50,000-55,000 tonnes in 2013; 60,000-65,000 tonnes in 2014
Cash costs US\$/lb	180c/lb Cu



## History

The Neves-Corvo orebodies were discovered in 1977. The Portuguese company Somincor was established to exploit the deposit and by 1983, the Corvo, Graça, Neves and Zambujal sulphide deposits had been partially outlined, covering an area of some 1.5 km x 2 km. The Rio Tinto Group ("Rio Tinto") became involved in the project in 1985, effectively forming a 49%:51% joint venture with the Portuguese government (EDM). The project was reappraised with eventual first production commencing from the Upper Corvo and Graça orebodies in January 1989.

During the development of the mine, high-grade tin ores were discovered, associated with the copper mineralization, which led to the rapid construction of a tin plant that was commissioned in 1990.

The railway link through to Setúbal was constructed between 1990-1992 to allow shipment of concentrates and the back-haul of sand for backfill. This was followed between 1992-1994 by a major mine deepening exercise to access the Lower Corvo orebody through the installation of an inclined conveyor ramp linking the 700 and 550 levels.

In June 2004, EuroZinc acquired a 100% interest in Somincor for consideration of €128 million. In October 2006, EuroZinc merged with Lundin Mining and the Lundin Mining name was retained.

In 2006, zinc production was commenced at Neves-Corvo with processing through the modified tin plant. In June 2007, Silver Wheaton (formerly Silverstone) agreed to acquire 100% of the life-of-mine payable silver production from the mine, as the mine produces around 0.5 million ounces per year in copper concentrate. Zinc production was suspended in November 2008 due to the low prevailing zinc price. In September 2009, the decision was made to expand the zinc plant at an estimated cost of €43 million, to a design capacity of 50,000 tpa zinc in concentrate with first production expected in the second half of 2011.

In mid-2009, a copper tailings retreatment circuit was commissioned to recover both copper and zinc, and in late 2010, tailings disposal changed from subaqueous to paste methods at the Cerro do Lobo facility.

In October 2010, surface exploration drilling focusing on a prospective area close to the Neves-Corvo mine discovered a new high-grade, copper-rich massive sulphide deposit, "Semblana," 1 km to the northeast of the Zambujal copper-zinc orebody.

In 2011, drilling further delineated the new Semblana deposit. An initial inferred resource was estimated to be 6.58 mmt at 3.0% copper and 24 g/t silver. Expansion potential is considered excellent.

The Neves-Corvo Zinc Expansion Project was completed. First ore was milled in early July 2011. The circuit is designed for 1.0 million tpa ore throughput enabling 50,000 tpa zinc metal production in concentrate. A further expansion of the existing zinc capacity to 2.5 mtpa ore feed capacity is being considered pending finalization of a strategic study for future underground access at Neves-Corvo.

Lombador Zinc/Copper/Lead Project: The Lombador Phase 1 Feasibility Study was completed. The study shows that Lombador Phase 1 can be developed as a profitable and value accretive extension to the Neves-Corvo mine. Lombador Phase 1 underground development is progressing to enable ramp up of zinc production to in excess of 60,000 tpa by 2014.

A conceptual level study identified and evaluated the underground materials handling and access options necessary to pursue the exploitation of the deeper Lombador copper/zinc resources (Phase 2) as well as the Semblana copper deposit which are adjacent to the Company's Neves-Corvo mine.

## Geological Setting

Neves-Corvo is located in the western part of the Iberian Pyrite Belt which stretches through southern Spain into Portugal and which has historically hosted numerous major stratiform volcano-sedimentary massive sulphide deposits.

The Neves-Corvo deposits occur within the Volcanic Sedimentary Complex which consists of acid volcanics separated by shale units, with a discontinuous black shale horizon immediately below the lenses. Above the mineralization, there is a thrust-faulted repetition of volcano-sedimentary and flysch units. The whole assemblage has been folded into a gentle anticline oriented NW-SE which plunges to the southeast, resulting in orebodies distributed on both limbs of the fold. All the deposits have been affected by both sub-vertical and low angle thrust faults, causing repetition in some areas.





## Exploration

Exploration work within the mining concession has concentrated primarily on the extension of known orebodies by both underground and surface drilling. Some of the Neves-Corvo orebodies remain open. Drilling from both surface and underground in the last few years has identified significant new zinc and copper mineralization within the Lombador massive sulphide lens and associated stockworks, as well as important bridge fissural copper mineralization between the Lower Corvo, Neves and Lombador orebodies.

In 2010, a new massive sulphide deposit, containing a zone of copper-rich sulphide mineralization, was discovered by surface drilling. The new deposit, named Semblana, lies 1.3 km northeast of the Zambujal orebody and is located in the exploration concession that surrounds the mine. Exploration drilling is ongoing.

## Mineralization

Six massive sulphide lenses have been defined at Neves-Corvo comprising Neves (divided into North and South), Corvo, Graça, Zambujal, Lombador (divided North, South and East), and Semblana. The base metal grades are segregated by the strong metal zoning into copper, tin and zinc zones, as well as barren massive pyrite. The massive sulphide deposits are typically underlain by stockwork sulphide zones which form an important part of the copper orebodies.

## Drilling

Surface and underground exploration drilling is an ongoing operation at the mine with the work undertaken by both contractors and in-house drill rigs. Typically, underground fan drilling will produce intersections on either 17.5 or 35 m spacing, with surface drilling on a spacing of 75 to 100 m. As a standard procedure, drill holes, which are all NQ size, are surveyed with an Eastman Single Shot or Reflex EZ-Shot tool at 30 m intervals, which provides an accurate location of the drill intersections.

## Mining Operations

Neves-Corvo is a major underground mine. The mine access is provided by one vertical 5 m diameter shaft, hoisting ore from the 700 m level (mine datum is 1,000 m below sea level), and a ramp from surface. A conveyor decline descends from the 700 m level to the 550 m level and provides ore hoisting from the deeper levels of the mine. The mine is highly mechanized and a number of different stoping methods are employed but the most prominent are bench-and-fill and drift-and-fill. Backfill is provided by hydraulically placed sand, paste tailings and internally generated waste rock.

Two processing plants are established at Neves-Corvo. The copper plant treats copper ores and has a maximum capacity of approximately 2.4 mtpa and the zinc plant (former tin plant) which treats zinc. The zinc plant was expanded to 1.0 mtpa capacity in 2011. A further expansion of the existing capacity to 2.5 mtpa ore feed capacity is being considered pending finalization of a strategic study for future underground access at Neves-Corvo. Both processing plants comprise secondary crushing, rod and ball mill grinding circuits, flotation cells and concentrate thickening and dewatering. In mid-2009, modifications to the copper plant were completed to regrind and recover additional copper and zinc concentrate from the copper tailings stream.

Concentrates are transported by road to a Spanish smelter or by rail to a dedicated port facility at Setúbal from where they are shipped to smelter customers.

Tailings disposal was changed from subaqueous to paste techniques during 2010 following approval by the Portuguese authorities. Tailings are thickened and pumped from a new facility located at the Cerro de Lobo tailings impoundment, 3 km from the mine site.

Copper and zinc concentrates from the mine are sold to a variety of smelter customers that are primarily European based. Multi-year sales contracts are normally agreed with customers and treatment, refining and penalty charges are typical of those for copper and zinc sulphide concentrates.





The mine operates under an IPPC licence (No. 18/2008) granted by the Portuguese Environmental Agency in 2008. The licence includes conditions covering Environmental Management Systems, tailings and waste rock disposal, water and energy consumption, emissions to atmosphere, emissions to water courses and water treatment, noise, industrial waste disposal, emergency and closure planning. Key environmental issues include the acid-generating potential of the ore and waste rocks; the close proximity of the Oeiras river to the mine site; the groundwater is a significant aquifer and connects to local water supplies and the Oeiras river; and the dispersal of dust and noise from the mine site. The mine permit requires that closure plans for the mine are updated every 5 years, and an accumulating closure fund is in place to cover final closure costs.

The corporation tax rate in Portugal is 27.5%, and a local tax of 1.5% is also payable. Royalties are either a profit-related royalty of 10%, or a revenue-based royalty of 1% (at the State's discretion). The payment may be reduced by 0.25% of the revenue-based royalty provided that the corresponding amount of such percentage is spent on mining development investment.

The current copper reserves at Neves-Corvo will support a mine life of around 10 years with copper production, based on currently known reserves, gradually decreasing, and planned zinc production increasing. Exploration efforts will continue to be focused on discovering new high-grade copper resources. The mine is able to fund all currently planned capital programmes through cash flow.

### Sampling and Analysis

Industry standard exploration drill core splitting, sampling and density measurement protocols and procedures are in place at Neves-Corvo. In addition to drill core sampling, underground grade control sampling is carried out using face sampling in the drift-and-fill mined areas and short diamond drill holes in the bench-and-fill areas. Samples are prepared on-site and analyzed at the mine's fully accredited assay laboratory facility.

### Security of Samples

Data and sample security procedures that conform to industry standards are in place at Neves-Corvo. All drill cores are logged and photographed, and the cores and sampling splits are stored on-site. Traceability records prevent errors of identification and ensure sample history can be followed.



## Reserves and Resources – June 30, 2011

Mineral Reserves									Contained Metal 000's (Ounces millions)						
Category		000's Tonnes	Cu %	Zn %	Pb %	Ag g/t	Ni %	Co %	Cu T	Zn T	Pb T	Ag Oz	Ni T	Co T	Lundin Interest
<b>Copper</b>															
Neves-Corvo	Proven	23,235	3.6	1.0	0.3	44			737	230	75	33			100%
	Probable	4,508	2.3	0.5	0.4	45			105	25	17	7			100%
	<b>Total</b>	<b>27,744</b>	<b>3.0</b>	<b>0.9</b>	<b>0.3</b>	<b>44</b>			<b>842</b>	<b>254</b>	<b>92</b>	<b>39</b>			<b>100%</b>
Zinkgruvan	Proven	2,768	2.6	0.4		32			72	11		3			100%
	Probable	78	2.4	0.4		29			2	-		-			100%
	<b>Total</b>	<b>2,846</b>	<b>2.6</b>	<b>0.4</b>		<b>32</b>			<b>74</b>	<b>11</b>		<b>3</b>			<b>100%</b>
Tenke	Proven	54,142	3.3						1,763					193	24%
Fungurume (as of Dec 31, 2011)	Proven (Stockpiles)	14,480	1.1						160					58	24%
	Probable	87,038	2.8						2,471					257	24%
	<b>Total</b>	<b>155,660</b>	<b>2.8</b>						<b>4,393</b>					<b>509</b>	<b>24%</b>
Lundin's share									1,054						
<b>Zinc</b>															
Neves-Corvo	Proven	19,361	0.4	7.1	1.6	67			70	1,380	316	42			100%
	Probable	3,769	0.4	8.0	12.1	64			14	301	80	8			100%
	<b>Total</b>	<b>23,130</b>	<b>0.4</b>	<b>7.3</b>	<b>1.7</b>	<b>66</b>			<b>84</b>	<b>1,680</b>	<b>396</b>	<b>49</b>			<b>100%</b>
Zinkgruvan	Proven	8,212		9.3	4.8	103				764	394	27			100%
	Probable	2,442		9.0	2.9	60				220	71	5			100%
	<b>Total</b>	<b>10,654</b>		<b>9.2</b>	<b>4.4</b>	<b>93</b>			<b>983</b>	<b>465</b>	<b>32</b>				<b>100%</b>
Galmoy	Proven	201		16.5	6.2	56				33	12	0			100%
	Probable	3		11.0	1.2	10				-	-	-			100%
	<b>Total</b>	<b>204</b>		<b>16.4</b>	<b>6.1</b>	<b>55</b>			<b>33</b>	<b>12</b>	<b>0</b>				<b>100%</b>
<b>Nickel</b>															
Aguablanca	Proven	6,214	0.4				0.6		25				37		100%
	Probable	332	0.2				0.3		1				2		100%
	<b>Total</b>	<b>6,546</b>	<b>0.4</b>				<b>0.6</b>		<b>26</b>				<b>38</b>		<b>100%</b>
Lundin's share									2,980 2,963 966 124 38 122						
<b>Mineral Resources – inclusive of resources</b>									<b>Contained Metal 000's (Ounces millions)</b>						
Category		000's Tonnes	Cu %	Zn %	Pb %	Ag g/t	Ni %	Co %	Cu T	Zn T	Pb T	Ag Oz	Ni T	Co T	Lundin Interest
<b>Copper</b>															
Neves-Corvo	Measured	37,621	3.2	1.2	0.4	49			1,193	451	147	59			100%
	Indicated	7,688	2.3	0.9	0.5	49			175	68	36	12			100%
	Inferred	28,490	1.8	0.9	0.4	40			524	259	100	37			100%
Zinkgruvan	Measured	5,304	2.2	0.5		29			117	27		5			100%
	Indicated	172	2.5	0.3		35			4	1		-			100%
	Inferred	772	2.2	0.2		36			17	2		1			100%
Tenke	Measured	117,974	3.0						3,496					370	24%
Fungurume (as of Dec 31, 2011)	Indicated	378,457	2.5						9,393					927	24%
	<b>M&amp;I</b>	<b>496,431</b>	<b>2.6</b>						<b>12,889</b>					<b>1,298</b>	<b>24%</b>
	Inferred	246,599	2.0						4,809					594	24%
Lundin's share not including Inferred Resources									3,093						
<b>Zinc</b>															
Neves-Corvo	Measured	61,252	0.4	6.1	1.4	59			221	3,724	833	117			100%
	Indicated	18,094	0.4	6.5	1.7	53			63	1,172	300	31			100%
	Inferred	32,985	0.4	4.9	1.2	55			119	1,610	386	58			100%
Zinkgruvan	Measured	8,464		11.0	5.5	119				931	466	32			100%
	Indicated	5,494		10.4	4.6	93				571	253	16			100%
	Inferred	5,572		9.6	3.2	69				535	178	12			100%
Galmoy	Measured	689		15.6	3.1	26				107	21	1			100%
	Indicated	131		10.5	0.8	7				14	1	-			100%
	Inferred	7		9.2	0.4	8				1	-	-			100%
<b>Nickel</b>															
Aguablanca	Measured	11,320	0.5				0.6		55				65		100%
	Indicated	1,210	0.2				0.3		2				4		100%
	Inferred	442	0.1				0.3		1				3		100%
Lundin's share not including Inferred Resources									5,584 7,066 2,057 273 69 311						

Note: totals may not summate correctly due to rounding

## Notes on Mineral Reserves and Resources Table

Mineral Reserves and Resources are shown on a 100 percent basis for each mine. Mineral Resources for all operations are inclusive of Reserves and all estimates, with the exception of Tenke Fungurume, are prepared as at June 30, 2011. The Tenke Fungurume estimate is dated December 31, 2011.

Estimates for all 100% owned operations are prepared by or under the supervision of a Qualified Person as defined in National Instrument 43-101. Tenke Proven and Probable Mineral Reserves are estimated by the operator Freeport-McMoRan Copper & Gold Inc. ("Freeport"), and are prepared to SEC standards and are reviewed by Lundin Mining's independent Qualified Persons.

Except as noted below, Mineral Reserves have been calculated using assumed long-term average prices of US\$2.50/lb copper, US\$1.00/lb zinc, US\$0.90/lb lead, US\$8.50/lb nickel and exchange rates of EUR/USD 1.35 and USD/SEK 7.50. Reserves at Tenke Fungurume have been calculated using assumed long-term average prices of US\$2.00/lb copper and US\$10.00/lb cobalt. (*See news release dated February 28, 2012.*)

### Neves-Corvo

The Mineral Resources are reported above cut-off grades of 1.0% for copper and 3.0% for zinc. The copper Mineral Reserves are reported above a cut-off of 1.4% while for zinc Mineral Reserves a cut-off of 5.0% is used for orebodies other than Lombador. For the Lombador Phase 1 a zinc cut-off of 6.0% was applied for Mineral Reserve reporting. Mineral Reserves and Resources for Neves-Corvo were estimated by the mine's geology and mine engineering departments under the guidance of Nelson Pacheco, Chief Geologist and Fernando Cartaxo, Chief Mine Planning Engineer. Qualified Persons are Graham Greenway, Group Resource Geologist and Stephen Gatley, Director Technical Services, both employed by Lundin Mining.

### About the Semblana Initial Resource Estimate

The Semblana deposit occurs between 810 m and 900 m below surface. The geological model was created using drill core lithology and assay data with the mineralisation envelopes being defined using a 0.7% copper cut-off and a minimum drillhole intersection thickness of 4 m. Metal grades were interpolated into 3D blocks using Ordinary Kriging or Inverse Power Distance Weighting. The Mineral Resource was reported above a cut-off of 1.0% copper, as applied at the Neves-Corvo mine. The effective date of the Semblana resource estimate is November 30, 2011.

### Qualified Persons

Jose Mario Castello Branco, EurGeol, General Manager of Exploration, Iberia, for Lundin Mining Exploration is a Qualified Person as defined by National Instrument 43-101 and has reviewed and approved the technical information contained in this release regarding the near-mine resource exploration drilling, including the Semblana delineation drilling, at the Neves Corvo mine in Southern Portugal.

Paul Gordon, PGeo (IGI), EurGeol (EFG), Manager, Geology (Ireland) for Lundin Mining Exploration is a Qualified Person as defined by National Instrument 43-101 and has reviewed and approved the technical information contained in this release regarding the Clare and Lakelands Projects in Ireland.

The mineral resource estimates for the Semblana Project were prepared by Graham Greenway, Pr.Sci. Nat., Group Resource Geologist, Lundin Mining, in November 2011. Mr Greenway is a Qualified Person as defined by National Instrument 43-101 and has reviewed and approved the technical information contained in this release concerning the Semblana Mineral Resource.

Further information on the Neves-Corvo mine can be obtained by referencing the following technical reports filed on SEDAR:

1. Reserves and Resource Update, Neves-Corvo, Portugal dated May 2008 and prepared by Neil Burns.
2. Technical Report on the Neves-Corvo Mine, Southern Portugal dated October 2007 and prepared by Mark Owen and Owen Mihalop of Wardell Armstrong International Ltd.

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