

Amur Minerals

In from the cold

Initiation of coverage

Metals & mining

22 July 2015

Price **22.5p**

Market cap **£98m**

US\$1.5557/£

Net cash (US\$m) as at 31 December 2014 1.4

Shares in issue 434.2m

Free float 80%

Code AMC

Primary exchange AIM

Secondary exchange N/A

Share price performance



%	1m	3m	12m
Abs	149.0	276.5	838.5
Rel (local)	153.7	266.4	818.7
52-week high/low	31p	2.74p	

Business description

Amur Minerals is an exploration and development company focused on base metal projects located in Russia's Far East. The company's principal asset is the Kun-Manie nickel sulphide deposit in the Amur Oblast, containing more than half a million tonnes of contained nickel in at least five deposits.

Next events

Award of independent study audit	Aug 2015
Interim results	Sept 2015
AGM	Nov 2015
Drilling updates	Variously

Analysts

Charles Gibson	+44 (0)20 3077 5724
Tom Hayes	+44 (0)20 3077 5725

mining@edisongroup.com

[Edison profile page](#)

Kun-Manie is among the 20 largest nickel sulphide deposits in the world and the award of a production licence this year (until 2035) allows Amur Minerals (AMC) to shift its strategy from one of exploration to one of pre-production. A pre-feasibility study on the project was completed by SRK in 2007 and envisaged a 4.0Mtpa operation. However, this has now been superseded by subsequent technical work, with the result that Amur now envisages a 6.0Mtpa operation producing over 15 years, together with an owner-operated smelter in lieu of the earlier toll smelting strategy.

Year end	Revenue (US\$m)	PBT* (US\$m)	EPS* (c)	DPS (c)	P/E (x)	Yield (%)
12/13	0.0	(3.7)	(1.0)	0.0	N/A	N/A
12/14	0.0	(2.5)	(0.6)	0.0	N/A	N/A
12/15e	0.0	(2.3)	(0.5)	0.0	N/A	N/A
12/16e	0.0	(2.3)	(0.5)	0.0	N/A	N/A

Note: *PBT and EPS are normalised, excluding intangible amortisation and exceptional items.

Production licence awarded; blue-sky upside remains

All drilled mineralisation lies within the limits of the production licence. Amur is nevertheless taking advantage of the current field season to expand reserves by around 70%. To date, nearly 80% of the measured and indicated resource is defined as being mineable. Moreover, as the deposits are all near surface, it could be expected that a high rate of conversion from mineral resource to mineable reserve will be achieved.

Four smelting options being assessed

Depending on the owner-operated smelter assessment, the Kun-Manie project can be designed to produce either concentrate for third-party toll smelting (the original concept), a low-grade matte, a high-grade matte or refined metal. Initial capex for each of these four options is US\$702m, US\$851m, US\$1,041m and US\$1,381m, respectively. At our long-term nickel price of US\$10.14/lb (US\$22,355/t) and a long-term copper price of US\$2.75/lb (US\$6,064/t), we calculate project net present values for each of these four options of US\$525m, US\$828m, US\$761m and US\$1,213m respectively, discounted at a rate of 10% pa back to 2015.

Valuation: 56-73c post-dilution at 10% discount rate

After accounting for likely future dilution to meet the equity funding requirements of the projects, the respective values per share for the concentrate, low-grade matte, high-grade matte and refined metal options are 56 US cents, 72c, 61c and 73c, respectively. Of note is the fact that the concentrate option captures 77% of the maximum potential value of the project (as represented by the refinery option), but that the low-grade matte option captures 99%. By contrast, the additional 'value' associated with the high-grade matte and refinery options is largely dissipated by the extra dilution associated with the larger equity funding required to achieve them. In the meantime, Amur's resource multiple of US\$231 per tonne of contained nickel equates to 2.0% of the current nickel spot price.

Amur Minerals is a research client of Edison Investment Research Limited

Investment summary

Company description: Far East Russian nickel developer

Amur Minerals' principal asset is the Kun-Manie nickel sulphide deposit in the Amur Oblast, containing 120.8Mt of ore at a grade of 0.54% nickel. In 2008, Kun-Manie was designated a Federally Strategic Project and the initial phase of exploration was confirmed to have been completed by Amurnedra (see below) in June 2014, which subsequently allowed Amur to return all but 36.2km² of ground of economic interest. Once this was defined, Amur was awarded a production licence, allowing it to shift its strategy from exploration to pre-production. A pre-feasibility study on a 4.0Mtpa operation at the Kun-Manie project was completed by SRK in 2007. However, subsequent work has now largely superseded this concept, while the changes to the design along with inflation and the recent devaluation of the Rouble also necessitated a comprehensive review of estimated operating costs. As a result, earlier this year, Amur announced a conceptual open pit study, based on a modified design operating at 6.0Mtpa over 15 years, together with an initial assessment of the viability of developing an owner-operated smelter (cf toll smelting in the PFS). This was followed, in June, by an operational blueprint, including, *inter alia*, the potential for underground mining in order to optimise profits and returns.

Valuation: 56-73cps at 10% discount rate

The owner-operated smelter assessment considers four options, each with different economic parameters, initial capex requirements and valuations, which are summarised below:

Exhibit 1: Amur Minerals valuations by development scenario (at US\$10.14/lb Ni & US\$2.75/lb Cu)

US cents per share	Initial capex (US\$m)	Estimated required equity funding (US\$m)	Project DCF* (US\$m)	Post-dilution valuation (US cents per share)
Toll smelting	702	312	525	56
Low-grade matte	851	385	828	72
High-grade matte	1,041	479	761	61
Refinery	1,381	647	1,213	73

Source: Edison Investment Research. Note: *From 2015, at 10% discount rate, including head office costs.

Sensitivities: High margins protect value of project

The valuations above were conducted at a long-term nickel price of US\$10.14/lb (US\$22,355/t) and a long-term copper price of US\$2.75/lb (US\$6,064/t), compared to current spot prices of US\$5.20/lb (US\$11,470/t) Ni and US\$2.46/lb (US\$5,425/t) Cu. In all four options considered above, each incremental 10% change in metals prices results in a 14-17c change in the post-dilution valuation, whereas each incremental 10% change in costs results in a 3-5c change. Risks include geological, engineering, metallurgical, logistical and management risks, as well as Russian sovereign risk (potentially affecting companies' abilities to import capital goods at the current time). In terms of its development, the updated mining evaluation (including open pit and underground production) is effectively at the preliminary economic assessment (PEA) stage of development, although upgrading it to pre-feasibility standard should be a relatively simple matter. In due course, this will need to be upgraded to bankable status. Once this is achieved, the project will then need to be either financed and developed or sold (eg to Norilsk) as a relatively de-risked development project.

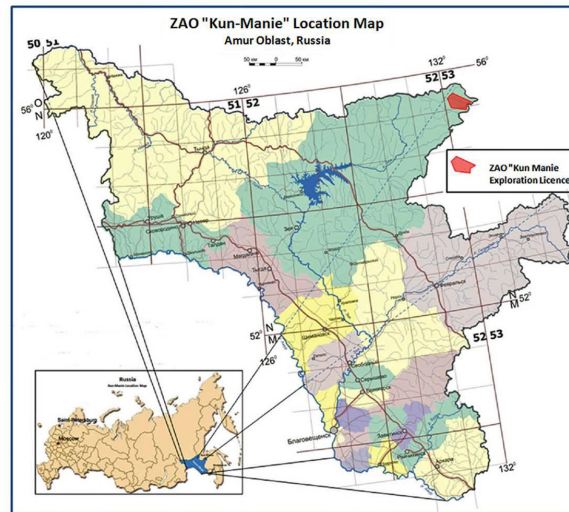
Financials: Comfortable for immediate requirements

Amur had US\$1.4m of net cash as at 31 December 2014, with a further US\$7.381m available via Lanstead Capital LLP (at the then share price of 10.5p). Since the end of FY14, there have been additional "substantial inflows" from Lanstead, such that the unaudited cash position of the group as at 17 June 2015 was reported to be US\$6.0m (cf 12-month cash burn rates of US\$3.9m in FY13 and US\$2.7m in FY14).

Company description: Low-cost nickel discovery

Amur Minerals has a 100% interest in the Kun-Manie project in the north-east corner of the Amur Oblast in Russia's Far East. The Kun-Manie project encompasses a 36.2km² area within the 950km² Kun-Manie exploration licence area and is located 700km north-east of the capital city of Blagoveshchensk on the Chinese border.

Exhibit 2: Kun-Manie location



Source: Amur Minerals

History

In April 2004 ZAO Kun-Manie, a wholly owned subsidiary of Amur, was granted an exploration licence to explore for nickel and related metals, including copper, cobalt, palladium and platinum, in the Kun-Manie licence area. Amur commenced seasonal field work (running from June to October) on the licence in 2004 and issued a JORC-compliant statement in 2007 covering three deposits located on the 40km-long Kurumkon trend, namely Maly Kurumkon, Vodorazdelny and Ikenskoe.

In November 2007, consultants SRK completed a pre-feasibility study (PFS, see below) for Amur concluding that a project designed to produce a nickel concentrate had a net present value of US\$89m at a discount rate of 10% and nickel and copper prices of US\$7.50/lb and US\$1.50/lb respectively.

Since 2007, exploration and drilling has been conducted on an ongoing basis and an updated resource estimate was compiled in late 2013 (and subsequently upgraded in April 2015), which included two additional deposits on the trend – Kubuk and Gorny.

In 2008, Kun-Manie was designated a Federally Strategic Project according to the 2008 amendment of Russia's subsoil law, the practical relevance of which is that 'strategic' projects must complete exploration activities before a production licence can be granted. To this end, a new protocol established that this exploration phase had now been completed.

In June 2014, Amurnedra (a sub-agency and regional representative of Rosnedra, the state licensing agency) completed its review of Amur's exploration activities and subsequently issued a protocol confirming that the initial exploration phase of the Kun-Manie project had indeed been completed and that the company had met its obligations in the 950km² licence area under the terms of its original exploration licence – a key precursor in the conversion of a Federally Strategic Project held as an exploration licence to that of a production licence. In particular, the protocol confirmed that Amur had completed sufficient and substantial work to identify a 36.2km² area of economic

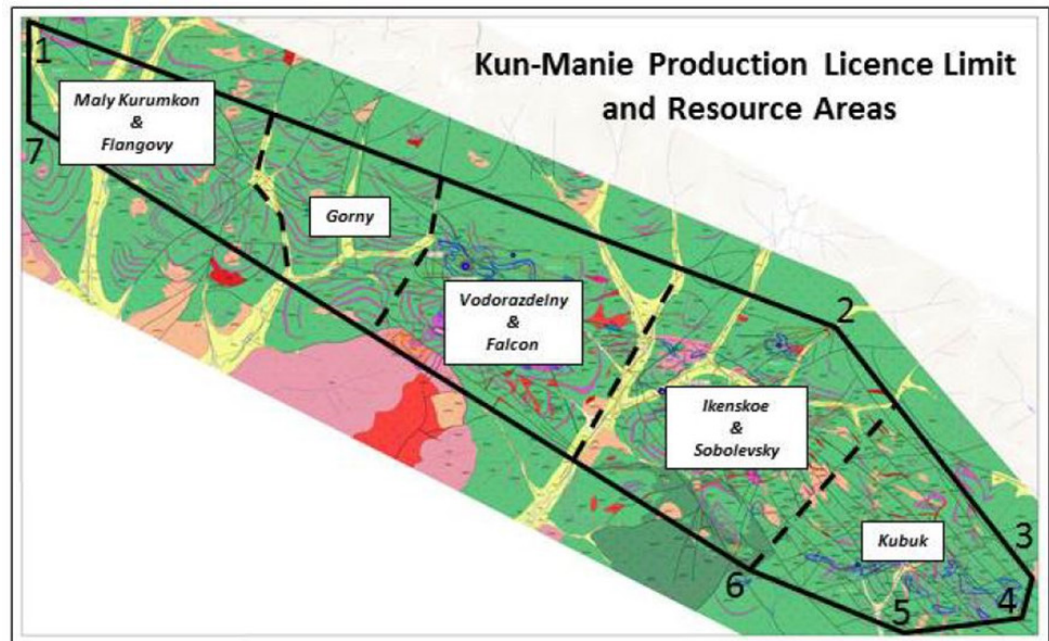
interest, which supported the boundary limits for the mining application. In addition, it confirmed that the area located outside the area of mining interest had also been sufficiently explored, which allowed Amur to return 913.8km² of unwanted territory, which no longer warranted any further expenditure, to the Russian government.

As the initial exploration phase of the project had now been completed, the way was paved to progress to the next phase of development under the Russian system – a detailed Exploration & Production assessment of the project, conducted under the terms of a new production licence (see Permitting section, below). Note that, although the Russian licensing process is lengthy, Amur reports that it has found it to be explicit and, moreover, navigable.

Geology

By expanding its short-term exploration strategy while pursuing its mining licence, Amur has greatly improved its understanding of the geological controls on Kun-Manie's mineralisation. The five resource deposits currently comprising the Kun-Manie project are Maly Kurumkon-Flangovy, Vodorazdelny, Ikenskoe-Sobolevsky, Gorny and Kubuk. The locations of all these deposits (all within the area that is the subject of Amur's mining licence), as well as the other soil anomalies identified since field seasons started in 2004, are shown in Exhibit 3 below.

Exhibit 3: The five currently defined exploration areas at Kun-Manie



Source: Amur Minerals

Amur has undertaken an extensive soil geochemical survey covering two areas of its Kun-Manie lease, totalling 57.5km². The first (and largest) area is 15km long and 2.5km wide and is known as the Kurumkon Trend, which is 40km long and was the primary exploration target in the original licence area, containing the Maly Kurumkon-Flangovy, Gorny, Vodorazdelny, Ikenskoe-Sobolevsky and Kubuk deposits, which are located within a 20km segment of the 40km trend and are the subject of Amur's mining licence (and SRK's 2007 Kun-Manie PFS). The second area, which has not yet been drill tested, contains the Falcon deposit. Exploration activities in this area to date have included grab sampling, geological mapping, geophysical surveys and trenching as a precursor to drilling aimed at defining the potential for economically viable deposits to be delineated. Note that a

detailed discussion of each of the deposits from a geological perspective is available in Edison's last Outlook note on Amur, published in October 2013.

Reserves and resources

To date, Amur has delineated five specific resource deposits of nickel sulphide mineralisation to JORC resource standard at an estimated average cost of 1.3c/lb (cf a nickel price of US\$5.20/lb at the time of writing):

Exhibit 4: SRK calculated JORC mineral resource for Kun-Manie, April 2015

Orebody (resource category)	Tonnage (Mt)	Ni (%)	Ni (t)	Cu (%)	Cu (t)	Pt (g/t)	Pt (t)	Pd (g/t)	Pd (t)
Kubuk									
Measured	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Indicated	3.5	0.68	23,400	0.18	6,100	0.1	0.5	0.1	0.4
Subtotal	3.5	0.67	23,400	0.17	6,100	0.1	0.5	0.1	0.4
Inferred	17.1	0.56	95,500	0.16	26,800	0.1	2.5	0.1	2.0
Total	20.6	0.58	118,900	0.16	32,900	0.1	3.0	0.1	2.4
Gorny									
Measured	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Indicated	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Subtotal	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Inferred	7.6	0.31	23,900	0.09	7,000	0.2	1.6	0.2	1.9
Total	7.6	0.31	23,900	0.09	7,000	0.2	1.6	0.2	1.9
Ikenskoie									
Measured	14.9	0.52	77,100	0.13	19,700	0.20	2.7	0.20	3.0
Indicated	7.7	0.39	29,800	0.10	7,800	0.10	1.1	0.20	1.3
Subtotal	22.6	0.47	106,900	0.12	27,500	0.20	3.8	0.20	4.3
Inferred	11.5	0.62	70,800	0.14	16,300	0.20	2.3	0.20	2.5
Total	34.1	0.52	177,700	0.13	43,800	0.20	6.1	0.20	6.8
Vodorazdelny									
Measured	0.8	0.57	4,700	0.17	1,400	0.3	0.2	0.3	0.2
Indicated	4.8	0.66	31,200	0.17	8,200	0.1	0.6	0.1	0.6
Subtotal	5.6	0.64	35,900	0.17	9,600	0.1	0.8	0.1	0.8
Inferred	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Total	5.6	0.64	35,900	0.17	9,600	0.1	0.8	0.1	0.8
Maly Kurumkon									
Measured	0.0	0.00	0	0.00	0	0.0	0.0	0.0	0.0
Indicated	21.8	0.58	126,100	0.16	34,900	0.1	2.4	0.1	3.0
Subtotal	21.8	0.58	126,100	0.16	34,900	0.1	2.4	0.1	3.0
Inferred	31.1	0.54	168,100	0.16	50,200	0.1	3.0	0.1	3.1
Total	52.9	0.56	294,200	0.16	85,100	0.1	5.4	0.2	6.1
Total measured	15.7	0.52	81,800	0.13	21,100	0.2	2.9	0.2	3.2
Total indicated	37.8	0.56	210,500	0.15	57,000	0.1	4.6	0.1	5.3
Total measured & indicated	53.5	0.55	292,300	0.15	78,100	0.1	7.5	0.2	8.5
Total inferred	67.3	0.53	358,300	0.15	100,300	0.1	9.4	0.1	9.5
Grand total	120.8	0.54	650,600	0.15	178,400	0.1	16.9	0.1	18.0

Source: Amur Minerals

After completing the initial phase of exploration, Amur considers that a number of the targets in the area subject to its production licence will require further trenching and drill testing to delineate additional resources. As a result (and in the light of previous positive drill and assay data), we consider that the final resource statement is likely to be much larger than that presented above. In addition, the company is in the process of implementing a 6,000m programme of in-fill drilling during the 2015 field season, at a cost of c US\$50/m drilled, to increase geological confidence in the resource. Hence, we also anticipate that future resource upgrades will be at higher levels of confidence and higher grades. In terms of exploration drilling, investors should note that the company's immediate priority is one of in-fill drilling, rather than resource expansion.

In the meantime, SRK has undertaken sufficient work studies to determine that all of the reported resource has a reasonable prospect of eventual economic extraction. To date, nearly 80% of the measured and indicated resource is defined as being mineable. Moreover, as the deposits are all near surface, it could be expected that a high rate of conversion from mineral resource to mineable reserve will be achieved. Self-evidently, a further 67.3Mt of inferred resource may also be upgraded to reserve status in due course.

Permitting

In May 2015, Amur announced that the Russian Prime Minister Dmitry Medvedev had approved the company's detailed exploration and mine production licence for Kun-Manie until July 2035. This then enabled the Ministry of Natural Resources (MNR) and Rosnedra to issue the licence, subject to Amur paying RUB23.6m (c US\$429,000 at the time of payment) within 30 days of the registration of the final document, which was duly done. The licence grants Amur's wholly owned subsidiary, ZAO Kun-Manie, the rights to recover all value from the minerals defined to be present at Kun-Manie, including nickel, copper, cobalt, platinum, palladium and other minerals and, as a result, Amur's strategy has now shifted from exploration to pre-production. Nevertheless, a preconceived work plan included in the submission will allow Amur to take advantage of the current field season to define additional reserves and resources in the project area and to in-fill drill to define the extent of proven and probable reserves. Note that all drilled mineralisation lies within the limits of the production licence. In due course, additional work related to metallurgy and engineering will be compiled in a final permanent TEO (Russian feasibility study) to be approved by the GKZ (State Reserves Committee), including additional results for detailed exploration.

Included in Amur's responsibilities under the terms of its new licence are:

- that the results of pre-production evaluation are to be presented to the government by 1 December 2020;
- the mining plan is to be approved by the government no later than 1 June 2022;
- a recultivation/site remediation plan to be submitted to the government one year before decommissioning facilities; and
- annual activity reports must be submitted to Rosnedra and Amurnedra.

We note that, if during the life of the licence, exploration results further increase the size of the resource and/or reserve, the company can apply to have the production licence extended.

SRK pre-feasibility study (PFS)

In late 2007, the design, configuration and economics of a project at Kun-Manie were outlined in a pre-feasibility study undertaken by SRK Consulting (Russia), based on the resources defined to be present in a portion of Maly Kurumkon, Vodorazdelny and Ikenskoe at the time. The study indicated that the defined mineralisation could support three open pit mines and that subsequent treatment of the (sulphide) ores could be achieved by conventional crushing, grinding and flotation and that the final concentrate would be suitable for contract smelting, with Amur receiving an estimated 70% of the value of the nickel and 50% of the value of the copper contained in concentrate (note that no payable value was attributed to the by-product metals of cobalt, platinum and palladium).

Assuming production and processing at a rate of 4.0Mtpa over a 10-year life, SRK estimated production of c 15,900t Ni and 4,300t Cu in concentrate pa and a project net present value (discounted at 10%) of nearly US\$89m at nickel and copper prices of US\$7.50/lb (US\$16,538/t) and US\$1.50/lb (US\$3,308/t), respectively.

All costs were included in the analysis, including staff costs, mining, transport to and from site, loading and railway transport to the third-party smelter. However, potential cobalt, platinum and palladium co-product revenues were excluded from the analysis. In addition, while the optimal pit outlines were determined, these were not specifically translated into optimum production schedules. As a result, some higher-grade production was delayed until later years, resulting in a reduction of the project's NPV compared to an optimised result.

In its conclusion to the 2007 Technical Study for Kun-Manie, SRK listed seven points requiring further work, two of which related to the resource. The first related to the grade of the resource and recommended further investigation of the potential to mine a higher grade in earlier years. The second stated that Amur should look at the potential to define additional resources at the project. Both of these have now been completed in the form of Amur's updated JORC resource (announced July 2013 and updated subsequently with the inclusion and upgrade of the Kubuk resource in April 2015). Also, as announced on 18 May 2012, metallurgical test results conducted by SGS Minerals demonstrated a beneficial reduction in magnesium oxide (MgO) levels globally from 16% to c 11.5%. SRK's remaining points related to the cost of a process plant, royalty rates and tax holidays and further investigations into site access roads.

Subsequent developments re PFS

Work subsequent to the PFS has now substantially modified the original design concept of the project. Among other things, this included improved metallurgical recoveries, improved Russian taxation and royalty structures, reduced smelter penalty fees and a more than doubled resource base, all of which have conspired to necessitate a comprehensive review of SRK's original specification.

Scale and process

Mine production will be derived from four pits located along the Kurumkon Trend (vs three pits proposed in the PFS) plus two underground mines. Also, the site is to be operational all year round. Whereas the PFS projected throughput rate of 4.0Mtpa, proposed annual production has now been expanded to 6.0Mtpa to produce 350,000t concentrate pa (albeit via fundamentally the same process route of crushing, grinding and floating the sulphide ore). The recovery of nickel is estimated to be 80% of the mine delivered grade of 0.57% nickel. Copper recoveries are projected to be approximately 90% with a grade of 0.15%. Mill tailings will be stored in an impoundment area adjacent the mill site.

Specific metallurgical test work required to assess the final configuration of the operation has yet to be determined. However, metallurgical test work completed by SGS to date indicates that it would also be possible to generate a near-final marketable matte and/or smelter product.

Reserves

As a part of the update, mining reserves are being recalculated and it is anticipated that there will be a substantial increase in the JORC Proven and Probable categories when the PFS is ultimately updated.

Transportation

The original concept was always for the flotation concentrate to be trucked 320km from site to the rail head at Ulak located on the Baikal-Amur railway for onward transportation by rail to a commercial smelter. However, Amur is now looking at developing an owner-operated smelter on the Baikal-Amur railway line near Verknezeisk or Gorny (see Owner-operated smelter option, below).

As a result, the road design has been substantially upgraded to handle year-round operations with a widening to two lanes and an increase in the size of the associated maintenance fleet.

Power

Power will be generated on site using diesel generator sets as opposed to via an extension of the grid, thereby obviating c US\$288-360m of power line construction costs. This is a substantial change from the scenario envisaged at the time of SRK's PFS, when the local utility stated that the power line would be constructed at its own expense. A total of 40MW of installed capacity is planned. Alternatives, such as wind, hydroelectric, etc are also being investigated.

Metallurgy

The mineralisation at Kun-Manie is sulphidic in character and independent studies by both Russian (Sibsvetmetniproject) and western (SGS) metallurgical contractors have indicated that it can be recovered into concentrate using historically proven, simple flotation recovery methods.

Amur has succeeded in improving metallurgical recovery of all of the principal metals due to be mined at Kun-Manie. Flotation test work was undertaken on 24 sulphide ore samples representing six grade ranges taken from the drill reserve portions of the Maly Kurumkon, Vodorazdelny and Ikensko deposits. Importantly, the samples selected for SGS's flotation testing are considered to be more representative of life-of-mine operating parameters and the likely variability of the ore delivered to the process plant than those originally used by SRK. A comparison between the two is shown in Exhibit 5 below.

Exhibit 5: Change in metallurgical recoveries				
Metal	Average life-of-mine grade	SRK utilised metallurgical recovery (%)*	SGS projected metallurgical recovery (%)	Change (%)
Nickel	0.57%	75.9	77.8	+2.5
Copper	0.15%	72.9	90.4	+24.0
Cobalt	0.01%	57.0	68.6	+20.4
Platinum	0.13g/t	51.1	73.9	+44.6
Palladium	0.14g/t	40.8	82.4	+102.0

Source: Amur Minerals. Note: *2007 pre-feasibility study.

As a result of the improved recoveries, SGS has been able to project markedly higher potential nickel and copper concentrate grades of 9.6% (vs 7.0% used in SRK's 2007 PFS) and 2.9% (vs a 2.4% life-of-mine average), respectively. However, it should be noted that Amur will have to undertake additional work programmes, involving drilling the pre-resource exploration targets shown in Exhibit 3 and laboratory test programmes for these increased concentrate grades to be deemed applicable to Kun-Manie as a whole.

Penalty elements

The corollary of increasing concentrates payability is a reduction in the concentration of penalty elements. Two of the most important such compounds with respect to nickel processing are arsenic (As) and magnesium oxide (MgO). In this case, a significant reduction of MgO was achieved by SGS, with levels reduced from 16% (that used in the 2007 SRK pre-feasibility study) to below 11%. However, accurate assessment of the positive impact of any reduction in MgO content on cash flows will only be known after further work has been undertaken by Amur's consultants. In the meantime, it is known from previous drill programmes that Kun-Manie nickel ores are relatively free of arsenic; however, accurate assessment of arsenic levels will still need to be calculated for the purpose of agreeing any future third-party smelting contract.

Water allotment

In May 2015, Amur announced that it had obtained a 112km² water allotment adjacent to the planned mill site at Kun-Manie. The water allotment area includes the Maia River and eight of its drainages and will be examined using various geophysical survey methods and subsequently drilled (c 20 holes of 100m each, on average) to determine the sources from which water may be extracted (including the provision of potable water to support a 1,000-person operation). Winter activities will include an assessment of ice formation, its thickness and impact on the availability of water. These surveys will also provide valuable information in establishing permafrost limits and depths. No significant costs will be incurred during the first phase of the programme, which will be conducted during the remainder of the 2015 calendar year.

Conceptual open pit study (2015)

Taking into account this subsequently derived information, in 2015 Amur conceived a conceptual open pit study based on a modified design (albeit still based on the concept of producing a saleable nickel-copper concentrate for subsequent sale and smelting on the international market).

Reserves

In August 2014, Amur updated the defined reserve at Maly Kurumkon-Flangovy, Vodorazdelny and Ikenskie-Sobolevsky. The cumulative contained proved and probable reserve was established to be 39.2Mt ore containing 219,000t Ni and 58,100t Cu. The reserve was based on JORC 2012 reporting standards and a nickel price of US\$8.50/lb (US\$18,740/t).

The reserve was derived from SRK resource models. Runge, Pincock & Minarco (RPM) then uploaded the resource models to the Whittle open pit optimisation algorithm and generated a series of open pit mine shells for two distinct scenarios:

- Existing reserves, based on the promotion of mineral inventory from the existing Measured and Indicated resource categories into the Proven and Probable reserve categories.
- Upside potential, based on the inclusion of Inferred resources as well. These pit shells are much larger than the reserve shells. A comparison of the two also allowed Amur to determine where in-fill drilling is necessary to convert Inferred resources into the higher-quality resource categories for subsequent inclusion in reserve statements. Note that these shells do not represent reserves according to the JORC definition, but only depict potential (ie they are non-JORC compliant).

The generated shells for each of the two scenarios were derived from conventional parameters, such as pit slope angles (45°), mine dilution (5%), Q214 operating costs estimates, metallurgical recoveries (80.4% Ni and 90.2% Cu) and metal payability (70% Ni and 50% Cu, but 0% for Co, Pt and Pd). A comparison of formal reserves and 'upside target mineralisation' is shown in Exhibit 6 below.

Exhibit 6: Reserve vs upside target mineralisation comparison

Deposit	Reserves			Upside target mineralisation			Difference		
	Ore (Mt)	Ni (%)	Contained Ni (t)	Ore (Mt)	Ni (%)	Contained Ni (t)	Ore (%)	Grade (%)	Contained Ni (%)
Ikenskie-Sobolevsky	12.7	0.53	67,200	17.1	0.61	104,493	34.9	15.1	55.5
Maly Kurumkon-Flangovy	21.5	0.55	118,500	37.9	0.58	219,994	76.4	5.5	85.6
Vodorazdelny	5.0	0.67	33,420	5.0	0.67	33,420	0.0	0.0	0.0
Kubuk	0.0	0.00	0	7.3	0.62	45,012	N/A	N/A	N/A
Total	39.2	0.56	219,190	67.3	0.60	402,919	71.7	6.9	83.0

Source: Amur Minerals, Edison Investment Research. Note: Totals may not add up due to rounding.

The mineralised tonnages contained in the upside pit shells (above) contain all resource categories of mineralisation. These therefore represent target tonnages only and should not be considered a reserve.

In the process of conducting its study, RPM also confirmed that there was potential to mine some of the ore in the lower levels of the pits by underground methods and that the open pits might well therefore be reduced in size. Hence, as well as targeting the upgrade of 15Mt of Inferred material into the Indicated category during the 2015 field season, a part of the year's exploration drilling will also be directed towards targeting the underground mining potential below the preliminarily defined open pits.

Note that the Gorny deposit has not been included in this assessment owing to its limited size and lower average grade. Kubuk also contains no reserves at present, although in-fill drilling could add an estimated 7.3Mt to the reserve at an average grade of 0.62%.

The changes to the design along with inflation and the recent devaluation of the rouble have also resulted in the need for a comprehensive update of the operating costs. In Q115, Amur calculated operating costs using first principle engineering practices. The updated Q115 operating costs for both underground and open pit operations are shown in Exhibit 7 below.

Exhibit 7: Kun-Manie open pit and underground unit cost estimates (US\$)		
Cost centre	Open pit	Underground
Mining cost per tonne	1.58	11.88
Processing cost per ore tonne	10.38	10.38
Tailings handling cost per ore tonne	0.14	0.14
Concentrate transport to rail per ore tonne	1.72	1.72
General & administrative per ore tonne	2.15	2.15
Rail transport to smelter per ore tonne	12.09	12.09
Smelter penalties per ore tonne	3.80	3.80
Source: Amur Minerals 2015		

Note that, over the projected 15-year life of the operation, approximately half of production will be derived from open pit sources and half from underground sources.

Owner-operated smelter option

On 16 April 2015, Amur reported that it had completed the first of two internal assessments for constructing an owner-operated smelter in lieu of contract smelting Kun-Manie concentrate. The study envisaged the smelter being situated on the Baikal-Amur railway line near Verknezeisk or Gorny to simplify the importation of associated consumables (eg coal and limestone) to produce any one of three additional products:

- Concentrate would be smelted by an electric arc furnace to produce a low-grade matte (approximately 25% combined nickel, copper and cobalt) suitable for on-sale and future smelting and refining.
- Alternatively, the low-grade matte could be further upgraded into a high-grade matte via the addition of an oxygen plant, a converting furnace and an off-gas converter to the electric arc furnace. In contrast to the 25% of the low-grade matte, the high-grade matte would contain approximately 70% combined nickel, copper and cobalt and would (typically) be sold to a refinery for onward processing.
- The final product – a cathode precipitate metal – would be produced by the addition of a refinery to the circuit, comprising leaching, solvent extraction electrowinning (SX-EW) and precipitation plants. In this case, the recovered metal would include nickel and copper cathodes, cobalt precipitate and platinum and palladium metals.

Economically, the development of an on-site smelter would obviate the US\$12.09/t expense of railing concentrate to a third-party toll smelter, but would incur additional smelting and refining

costs. In this case, the blended average operating cost per tonne over the life of the operation is estimated to be US\$34.86 per ore tonne, as shown in Exhibit 8 below.

Exhibit 8: Kun-Manie open pit and underground unit cost estimates (US\$)

Cost centre	Owner operated smelter option
Mining cost per tonne	9.10
Processing and tailings cost per ore tonne	10.51
Concentrate transport per ore tonne	1.72
General & administrative per ore tonne	2.26
Rail transport to smelter per ore tonne	0.00
Smelter penalties per ore tonne	0.00
Smelting cost per ore tonne	11.27
Total cost per ore tonne	34.86

Source: Amur Minerals, 2015

Note that, in the case of Amur developing on owner-operated smelter, it would also benefit from the absence of toll smelter payability deductions (estimated at 30% for nickel and 50% for copper) and allow it to manage its own magnesium oxide balance. Potentially, it would also provide Amur with the opportunity to toll smelt on behalf of other third parties with excess concentrate, with access to the Baikal-Amur railway line.

Including owner-operated smelter options, updated capital expenditure estimates for the Kun-Manie project are shown in Exhibit 9 below.

Exhibit 9: Kun-Manie capex estimates (US\$m)

	Toll smelting (original)		Low-grade matte		High-grade matte		Refinery	
	Initial	Sustaining	Initial	Sustaining	Initial	Sustaining	Initial	Sustaining
Infrastructure & permanent facilities								
Studies	5	0	5	0	5	0	5	0
320km access road	312	7	312	7	312	7	312	7
Power	118	3	118	3	118	3	118	3
Site facilities	10	0	10	0	10	0	10	0
EPCM (road, power facilities)	6	0	6	0	6	0	6	0
Processing	133	4	133	4	133	4	133	4
Tailings	14	23	14	23	14	23	14	23
Electric furnace smelter	0	5	127	5	127	5	127	5
Converter smelter	0	3	0	3	190	3	190	3
Refinery	0	3	0	3	0	3	342	3
Smelter infrastructure	0	0	22	0	22	0	22	0
Haul roads	10	20	10	20	10	20	10	20
Ikenskoe diversion	0	0	0	0	0	2	0	2
Total fixed assets	608	68	757	68	947	70	1,287	71
Mobile equipment								
Transportation fleet	15	29	15	29	15	29	15	29
Mining fleet	79	150	79	150	79	150	79	375
Total mobile	94	179	94	179	94	179	94	404
Grand total	702	247	851	247	1,041	249	1,381	475

Source: Amur Minerals 2015. Note: Totals may not add up owing to rounding.

Valuation

In addition to the parameters set out above, we have made certain other operational and financial assumptions in our valuation of Amur, which are summarised in Exhibit 10 below.

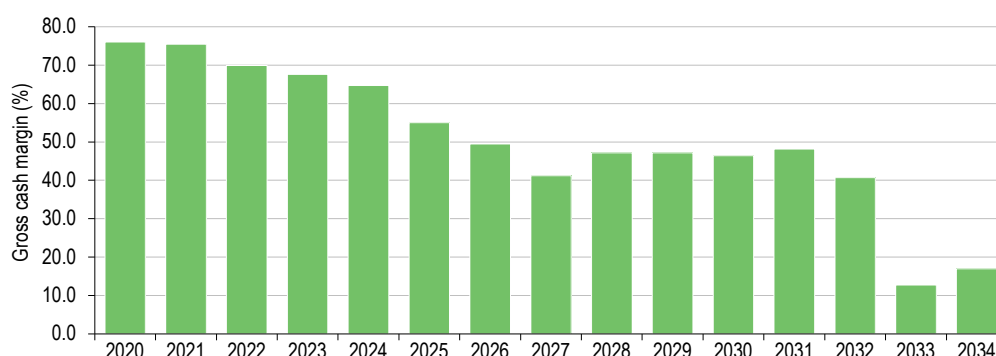
Exhibit 10: Additional valuation assumptions summary

Parameter	Assumption
Timing	Equity fund-raising in FY17; development in FY17-19; production in FY20.
Long-term nickel price	US\$10.14/lb (US\$22,355/t) – derived from long-term oil correlation.
Long-term copper price	US\$2.75/lb (US\$6,064/t).
Stripping ratio	2.5 in years 0-8; underground operation in years 9-15.
Mean life-of-mine nickel grade (%)	0.57%
Average MgO content in ore (%)	14.95%
Average MgO content in concentrate (%)	7.4-10.8%
MgO penalty	US\$8.00/t for every percentage point above 4% in concentrate.
Mass pull (ratio of concentrate to ore)	7.0%
Moisture	8.0%
Ni grade of concentrate (%)	6.53%
Taxation	0% until year 6 of production; 10% for further five years, then 20% thereafter.

Source: Edison Investment Research

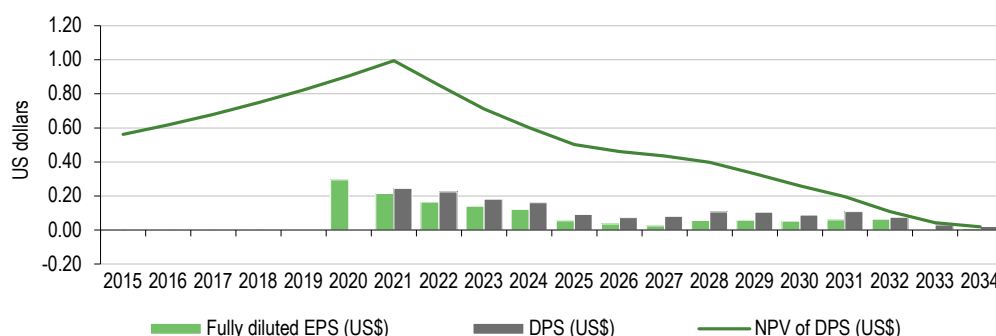
Finally, we have assumed that Amur raises sufficient equity at the currently prevailing share price so that its gearing (debt/equity) ratio does not exceed 100% and its leverage (debt/[debt+equity]) ratio does not exceed 50% at its maximum extent.

A notable consequence of the subsequent financial analysis is the high cash margins earned by Amur as a result of its exploitation of the Kun-Manie ore bodies on the basis of the assumptions outlined above. In the case of the toll treatment option, margins start in excess of 76%, when higher grades are being exploited, and then narrow to the 40-50% range as mining evolves into more sustainable, long-term areas of the ore bodies (see Exhibit 11 below).

Exhibit 11: Projected Kun-Manie project gross cash margins* (%)


Source: Edison Investment Research. Note: *Toll smelting option.

The stream of dividends then resulting from this margin averages 11.3 US cents per share pa and potentially reaches 24.5c/share. When discounted at a rate of 10% pa, the net present value of this dividend stream to investors is US\$0.56 per share in FY15, rising to US\$1.00 in FY21 when debt has been repaid and the first dividend could theoretically become payable.

Exhibit 12: Amur Minerals forecast EPS and (maximum potential) DPS, FY15-34e


Source: Edison Investment Research

Directly comparable results for each of the four development options, expressed relative to varying discount rates, are shown in Exhibit 13 below.

Exhibit 13: AMC equity valuations by development scenario and discount rate (US cents per share)

US cents per share (post-dilution)	0%	5%	10% (base case)	15%	20%	25%	30%
Toll smelting – US\$312m in equity fund-raising required	159	92	56	36	24	16	11
Low-grade matte – US\$385m in equity fund-raising required	213	120	72	45	29	20	14
High-grade matte – US\$479m in equity fund-raising required	185	103	61	38	24	16	11
Refinery – US\$647m in equity fund-raising required	219	123	73	46	30	20	14

Source: Edison Investment Research

Of note is the fact that the toll smelting option captures 77% of the maximum potential value of the project (as represented by the refinery option), but that the low-grade matte option captures 99% of the maximum potential value. By contrast, the additional 'value' associated with the high-grade matte and refinery options is largely dissipated by the extra dilution associated with the larger equity fund-raising requirement.

Sensitivities

We assume investors are aware that there are certain risks inherent in investing in Russia at the current time, including the issue of sanctions, which could, among other things, complicate the importation of capital goods. Technical risks include geological, engineering, metallurgical and logistical risks (including the distance of the project from ports and rail infrastructure). In terms of its development, the project's updated conceptual study is effectively at the preliminary economic assessment (PEA) stage of development, although upgrading it to pre-feasibility standard should be a relatively simple matter. In due course, it will nevertheless need to be upgraded to bankable status.

In quantitative terms, a summary of the sensitivity of the toll smelting option to metals prices and costs is shown in Exhibit 14 below.

Exhibit 14: Amur toll smelting development scenario valuation sensitivity relative to metals prices and costs

Valuation (US cents per share)		Metals prices					
		Spot price	-20%	-10%	Base case	+10%	+20%
	+20%	0	13	31	46	61	81
	+10%	0	18	36	51	66	87
Cash costs	Base case	0	22	41	56	72	92
	-10%	0	27	46	61	77	97
	-20%	0	32	51	67	82	103

Source: Edison Investment Research

In this case, a 10% change in metals prices results in a 17c change in valuation, whereas a 10% change in costs results in a 4c change. However, note that in this case 17c, in particular, is large in percentage terms in some instances.

By contrast, a summary of the sensitivity of the refinery option to metals prices and costs is shown in Exhibit 15 below.

Exhibit 15: Amur refinery development scenario valuation sensitivity relative to metals prices and costs

Valuation (US cents per share)		Metals prices					
		Spot price	-20%	-10%	Base case	+10%	+20%
	+20%	7	39	53	66	80	93
	+10%	10	43	56	70	83	97
Cash costs	Base case	13	46	59	73	87	100
	-10%	16	49	63	76	90	103
	-20%	19	52	66	80	93	107

Source: Edison Investment Research

In this case, regardless of the absolute level of metals prices, a 10% change results in a c 14c change in valuation, whereas a 10% change in costs results in a 3c change in valuation.

Also notable is the much greater defensive resilience of the refinery scenario from a financial perspective – ie 14c in particular is a proportionately lower percentage of the overall valuation.

Between the two, the low-grade matte scenario has the following sensitivities:

Exhibit 16: Amur low-grade matte development scenario valuation sensitivity relative to metals prices & costs

Valuation (US cents per share)		Metals prices					
		Spot price	-20%	-10%	Base case	+10%	+20%
	+20%	0	34	48	62	76	91
	+10%	1	38	53	67	81	96
Cash costs	Base case	5	43	57	72	86	100
	-10%	9	47	62	76	91	105
	-20%	14	52	67	81	96	110

Source: Edison Investment Research

Again, in the case of the low-grade matte scenario, a 10% change results in a c 14c change in valuation, whereas a 10% change in costs results in a 5c change in valuation.

Financials

Amur had US\$1.4m of net cash as at 31 December 2014 with an additional US\$7.381m available via its funding arrangement with Lanstead Capital LLP (valued at the December 2014 share price of 10.5p). Since the end of FY14, the company's cash position has continued to improve as Amur's share price and traded volumes have increased, resulting in "substantial inflows" from Lanstead, such that the unaudited cash position of the group at 17 June 2015 was reported to be US\$6.0m (cf 12-month cash burn rates of US\$3.9m in FY13 and US\$2.7m in FY14). As such, Amur's cash position should be sufficient for it to upgrade its conceptual study to bankable status within three years, before full financing and execution of the project.

Exhibit 17: Financial summary

	US\$'000s	2010	2011	2012	2013	2014	2015e	2016e
Year end 31 December		IFRS	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS								
Revenue		0	0	0	0	0	0	0
Cost of Sales		0	0	0	0	0	0	0
Gross Profit		0	0	0	0	0	0	0
EBITDA		(1,928)	(2,892)	(1,750)	(2,539)	(2,358)	(2,358)	(2,358)
Operating Profit (before GW and except.)		(1,928)	(2,892)	(1,750)	(2,539)	(2,358)	(2,358)	(2,358)
Intangible Amortisation		0	0	0	0	0	0	0
Exceptionals		(328)	(1,505)	(435)	(151)	1,158	0	0
Other		0	0	0	0	0	0	0
Operating Profit		(2,256)	(4,397)	(2,185)	(2,690)	(1,200)	(2,358)	(2,358)
Net Interest		0	(211)	(1,813)	(1,141)	(161)	21	13
Other		0	0	0	0	0	0	0
Profit Before Tax (norm)		(1,928)	(3,103)	(3,563)	(3,680)	(2,519)	(2,337)	(2,345)
Profit Before Tax (FRS 3)		(2,256)	(4,608)	(3,998)	(3,831)	(1,361)	(2,337)	(2,345)
Tax		0	0	0	0	0	0	0
Profit After Tax (norm)		(1,928)	(3,103)	(3,563)	(3,680)	(2,519)	(2,337)	(2,345)
Profit After Tax (FRS 3)		(2,256)	(4,608)	(3,998)	(3,831)	(1,361)	(2,337)	(2,345)
Average Number of Shares Outstanding (m)		193.9	271.8	345.1	387.2	431.2	432.7	434.2
EPS - normalised (c)		(1.0)	(1.1)	(1.0)	(1.0)	(0.6)	(0.5)	(0.5)
EPS - FRS 3 (c)		(1.2)	(1.7)	(1.2)	(1.0)	(0.3)	(0.5)	(0.5)
Dividend per share (c)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Margin (%)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBITDA Margin (%)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)		N/A	N/A	N/A	N/A	N/A	N/A	N/A
BALANCE SHEET								
Fixed Assets		14,151	13,903	17,928	18,955	12,035	12,764	12,764
Intangible Assets		13,685	13,503	17,084	18,318	11,783	12,512	12,512
Tangible Assets		466	400	844	637	252	252	252
Other receivables		0	0	0	0	0	0	0
Current Assets		7,215	7,386	8,389	11,074	9,090	8,556	7,701
Stocks		167	165	224	269	237	237	237
Trade Debtors		0	0	0	0	0	0	0
Cash		3,066	4,436	2,048	2,392	1,389	855	0
Other receivables/other		3,982	2,785	6,117	8,413	7,464	7,464	7,464
Current Liabilities		(109)	(102)	(119)	(123)	(407)	(407)	(1,897)
Creditors		(109)	(102)	(119)	(123)	(407)	(407)	(407)
Short term borrowings		0	0	0	0	0	0	(1,490)
Long Term Liabilities		0	0	0	0	0	0	0
Long term borrowings		0	0	0	0	0	0	0
Other long term liabilities		0	0	0	0	0	0	0
Net Assets		21,257	21,187	26,198	29,906	20,718	20,913	18,568
CASH FLOW								
Operating Cash Flow		(1,201)	(2,761)	(1,071)	(1,556)	(1,960)	(2,358)	(2,358)
Net Interest		0	0	0	0	0	21	13
Tax		0	0	0	0	0	0	0
Capex		(492)	(20)	(3,482)	(2,315)	(748)	(729)	0
Acquisitions/disposals		363	0	0	0	0	0	0
Financing		3,527	4,344	2,165	4,242	1,841	2,532	0
Dividends		0	0	0	0	0	0	0
Net Cash Flow		2,197	1,563	(2,388)	371	(867)	(534)	(2,345)
Opening net debt/(cash)		(997)	(3,066)	(4,436)	(2,048)	(2,392)	(1,389)	(855)
HP finance leases initiated		0	0	0	0	0	0	0
Other		(128)	(193)	0	(27)	(136)	0	0
Closing net debt/(cash)		(3,066)	(4,436)	(2,048)	(2,392)	(1,389)	(855)	1,490

Source: Company sources, Edison Investment Research

Contact details	Revenue by geography
Amur Minerals Corporation, 14 Gaidar Street, Office 9, Khabarovsk 680063, Russia. Phone: +74212755615 www.amurminerals.com	N/A
Management team	
CEO: Robin Young	Non-executive chairman: Robert Schafer
Mr Young is a geological engineer who has worked extensively in the CIS since 1991. He has 39 years' experience in the mineral resources industry, including responsibility for large projects in remote areas, as well as the junior sector. He has a BSc in Geological Engineering and is a licensed professional geologist. He has been CEO of the company since October 2004.	Mr Schafer has 40 years' experience in the mineral industry with both major and junior mining companies, including notable experience in Russia's Far East. He is currently executive VP, business development at Hunter Dickinson. In addition, he is president of the Canadian Institute of Mining & Metallurgy, VP of PDAC and a past president of the Mining & Metallurgical Society of America.
President of Russian operations: Randolph Lewis	Non-executive director: Brian Savage
Mr Lewis joined the company in April 2014 as president of Russian operations and advisor to the board of directors, with special responsibility for securing Amur's production licence at Kun-Manie. He has a decade of experience in the region in both the CIS and Russia, including working for western companies in the construction, finance and mining sectors and progressing projects from exploration to production. He is fluent in Russian and maintains a full-time presence in Moscow.	Mr Savage has 25 years' experience in all aspects of the mining industry, having held senior positions in the Bank of New York, Sharps Pixley and the Bank of Montreal and been a director of Frontier Mining since its formation in August 1998 (including acting as CEO between 2001 and 2009). In 1996, he became president of Earth Search Sciences (ESSI) and has formed several joint venture companies in Kazakhstan. He has a BSc in Mining Engineering and an MSc in Mineral Economics from the Colorado School of Mines.
Principal shareholders	(%)
TD Direct Investing Nominees	15.70
Hargreaves Lansdown (Nominees)	12.20
Investor Nominees	11.30
HSDL Nominees	11.00
Barclayshare Nominees	9.80
HSBC Client Holdings Nominee (UK)	5.10
Wealth Nominees	4.20
Companies named in this report	
Amur Minerals (AMC)	

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